Lepidopterologica Hungarica

18(1) | 2022

Redigit
Fazekas Imre

Pannon Intézet | Pannon Institute | Pécs | Hungary | 2022

Lepidopterologica Hungarica 18(1): 1–152. | Published 26.06.2022 (print)
HU ISSN 2732–3854 (print) | HU ISSN 2732–3498 (online)

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 most megszűnő 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, faunisztikai, állatföldrajz, ökológia, természetvédelem, tudománytörténet. A folyóirat nyomtatott formában, a szerkesztő címén megrendelhető.
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http://lepidopterologica-hungarica.gportal.hu

Kiadványterv, tördelés, tipográfia | Design, layout, typography: Fazekas Imre
Kiadó | Publisher: Pannon Intézet | Pannon Institute | H-Pécs
Nyomtatás | Print: Rotari Nyomdaipari Kft., H-Komló
Megjelent | Published: 2022.06.26. | 26.06.2022

Contents – Tartalom

https://doi.org/10.24386/LepHung.2022.18.1.5 HU ISSN 2732-3854 (print) | HU ISSN 2732-3498 (online)

Lepidopterologica Hungarica 18(1): 5–21. | https://epa.oszk.hu/04100/04144

Received 30.12.2021 | Accepted 18.01.2021 | Published: 26.01.2022 (online) | 06.26.2022 (print)
ZooBank: https://zoobank.org/References/CCD7222C-9CDB-4856-B9FA-2C7A400EF501

Zenodo: https://zenodo.org/record/6414610#.YkwsQdvP0wg

Distribution and bionomy of *Lyonetia ledi* Wocke, 1859 – a review with notes (Lepidoptera, Lyonetiidae)

Imre Fazekas

Citation. Fazekas I. 2022: Distribution and bionomy of *Lyonetia ledi* Wocke, 1859 – a review with notes (Lepidoptera, Lyonetiidae). – Lepidopterologica Hungarica 18(1): 5–21.

Abstract. *Lyonetia ledi* Wocke, 1859 is a very rare and little-known member of the Palearctic fauna. The populations can be very inconspicuous and can therefore have been passed unnoticed during previ-ous field studies. It is emphasized that the Palaearctic fauna further study and that habitats of *Lyonetia ledi* and other rare or declining species may yet be found. In Central Europe, *Lyonetia ledi* is very spo-radically distributed in only a few isolated localities. It is critically endangered in Switzerland, Austria, the Czech Republic, and Germany. It is considered an extinct species in Romania. Its occurrence in Hungary is based on an erroneous report. The centres of its European range are the Polish lowlands, the Baltic region, and the marshy, swampy areas of Scandinavia. The plains of Eastern Europe are little known and almost unexplored, although there are many potential habitats. The study of the vast Asian territories of Russia has much to offer. With 21 figures.

Keywords. Lepidoptera, *Lyonetia ledi*, distribution, bionomy, ecology, Palaearctic, Nearctic.

Author's address. Imre Fazekas | Pannon Institute | 7625 Pécs, Magaslati út 24. | Hungary
E-mail: fazekas@lepidoptera.hu

Introduction

The family Lyonetiidae is cosmopolitan and includes about 200–210 described species. The group is poorly known and needs taxonomic work. Lyonetiids are extremely small moths, usually with wingspans 9–12 mm. The frons is smooth scaled, and the base of the antenna forms an eye cap. The larvae are leaf or twig miners, usually of dicotyledonous plants.

There are several publications on the geographic distribution and bionomics of *Lyonetia ledi* (see references). Some of the older literature is uncertain and requires detailed revision. Many specimen collections have not been published. This applies mainly to European and Asian areas. One aim of this study is to describe the geographical distribution pattern of the species. The preliminary distribution map also shows large geographical areas where the spe-cies is not yet known. Some erroneous occurrence data that incorrectly refer to this species are pointed out.

It was particularly important to study the Hungarian and Romanian occurrences in the Carpathian Basin, because this region is the so-called fluctuation zone of the species. Accord-ing to botanical research, the Bátorliget marsh in eastern Hungary is a relict of the Ice Age. Gozmány (1965) indicated the 'potential' occurrence of *Lyonetia ledi* in this boggy area. This is considered by several literature sources (see Fauna Europaea) as a possible locality, alt-hough no verified specimens are known from the area. Pollen analytical studies (Csinády 1954) have shown that the preferred food plants of *Lyonetia ledi* did not exist in postglacial times in eastern Hungary.

In this paper. The results of personal studies so far are summarised, which will provide a basis for further research.

Material and method

All published literature, given under References, has been critically analysed. Korean, Russian, Scandinavian, and Central European researchers and been consulted, who reviewed specimens from their personal collections, and are acknowledged below. Several European habitats were studied personally.

Results

Lyonetia ledi Wocke, 1859 (Fig. 1.)
Jahres-Bericht der Schlesischen Gesellschaft für Vaterländische Kultur **37**, p.101.
Locustypicus nach Wocke (1859: 100): "im Seebade Misdroy auf der Insel Wollin" [Polen, Woiwodschaft Westpommern, Insel Wolin, Ostseebad Międzyzdroje].

Synonym: *Lyonetia candida* Braun, 1916, The Canadian Entomologist 48: 140–141. Locus typicus: "California, Santa Cruz Big Trees".

Previous records: Baraniak 1996, Baryshnikova 2007, 2019, Bengtsson & Johansson 2011, Buszko 1981, Buszko 2017, Buszko & Nowacki 2017, Deutschmann & Zessin 2009, Gozmány & Szőcs1965, Huemer & Schmid 2021, Ivinskis & Rimšaité 2018, Kozlov *et al.* 2014, Kuroko 1964, Laštůvka & Liška 2011, Marek *et al*. 1991, Matveev & Zolotuhin 2018, Reiprich 1992, Rennwald & Rodeland 2021, Robinson *et al.* 2010, Seksyaeva 1981, Shin et al. 1983, Sobczyk *et al.* 2018, Spuler 1910, Sterneck & Zimmermann 1933, Vavra 2000, Wocke 1874.

Diagnosis: Wingspan 8–11 mm. Head, frons and thorax shining white; labial palpus whitish tinged with pale fuscous externally; antennae 1 1/3 length of forewing, pale fuscous, becoming white towards the base, eyecup shining white. Abdomen greyish-fuscous above, shining white below. Forewing whitish on inner two-thirds; three strigulae from apical blotch to costa; two V-shaped light spots opposite each other on costal and dorsal margins; variable patches sometimes present in the medial space or along dorsum. The circular apical dot, apical transverse and apical pencil form a very characteristic complex.

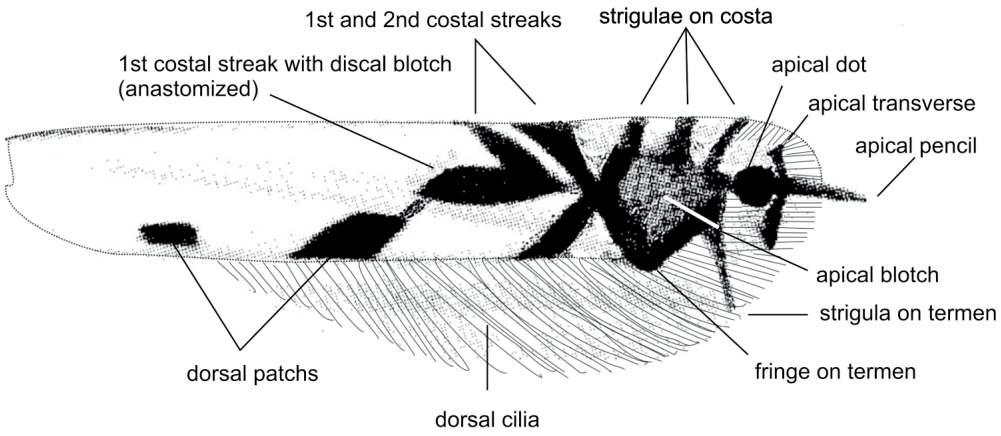
Male genitalia: arms of gnathos not fused, rather long protruded upwardly or inwardly curved, apices slightly forked; valva oblong, cucullus protruded; saccus triangularly pointed. Aedeagus stout, tapered towards incised and two-pointed apex.

Female genitalia: morphologically very different from other *Lyonetia* species. Ostium bursae broad and large, cup-shaped; ductus bursae broad, ductus seminalis opening into corpus bursae; corpus bursae rounded, without signum.

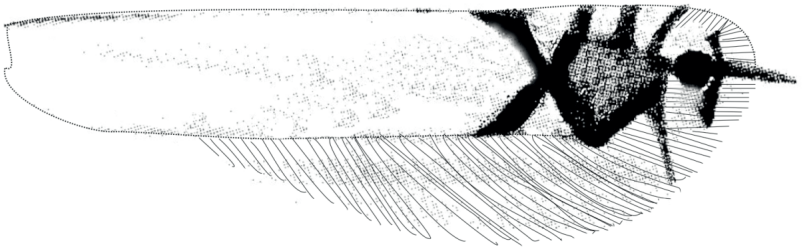
Distribution: *Lyonetia ledi* is a very widespread Holarctic species. It is known trans Palaearctic from central Europe to Scandinavia and Russia. It is known along the Volga River, north of the Caucasus, in the Omsk region, in the Altai region, in the Lake Baikal area; in the Russian Far East, mainly in the Amur region, in Shiota-Alin, as far as Vladivostok. There may be populations in the southern Siberian landscapes of Russia, but the area has not been surveyed. It is widespread in South Korea and on the Japanese islands. No data yet available from North Korea and the Northeast of China.

Special attention should be paid to the area beyond the Ural Mountains. In particular, the marshlands of the Irtysh and Ob rivers and the tributaries of the Yenisei and Lena rivers. The huge geographical protection of Sakhalin and Kamchatka is also in question.

In the Nearctic, *L. ledi* is found in Canada including British Columbia Yukon Territory, Quebec, Mingan Island, Prince Edward Island, Newfoundland, Labrador, and Nova Scotia, and in USA in California. Some consider it to be a boreal species; others emphasize its circumpolar distribution (Huemer & Schmid 2021). Most populations are highly fragmented and relict. Its provisional Palaearctic distribution is shown in Figure 17. European localities are highlighted in Figure 15.



Diagrammatic representation of the right forewing of Lyonetia ledi

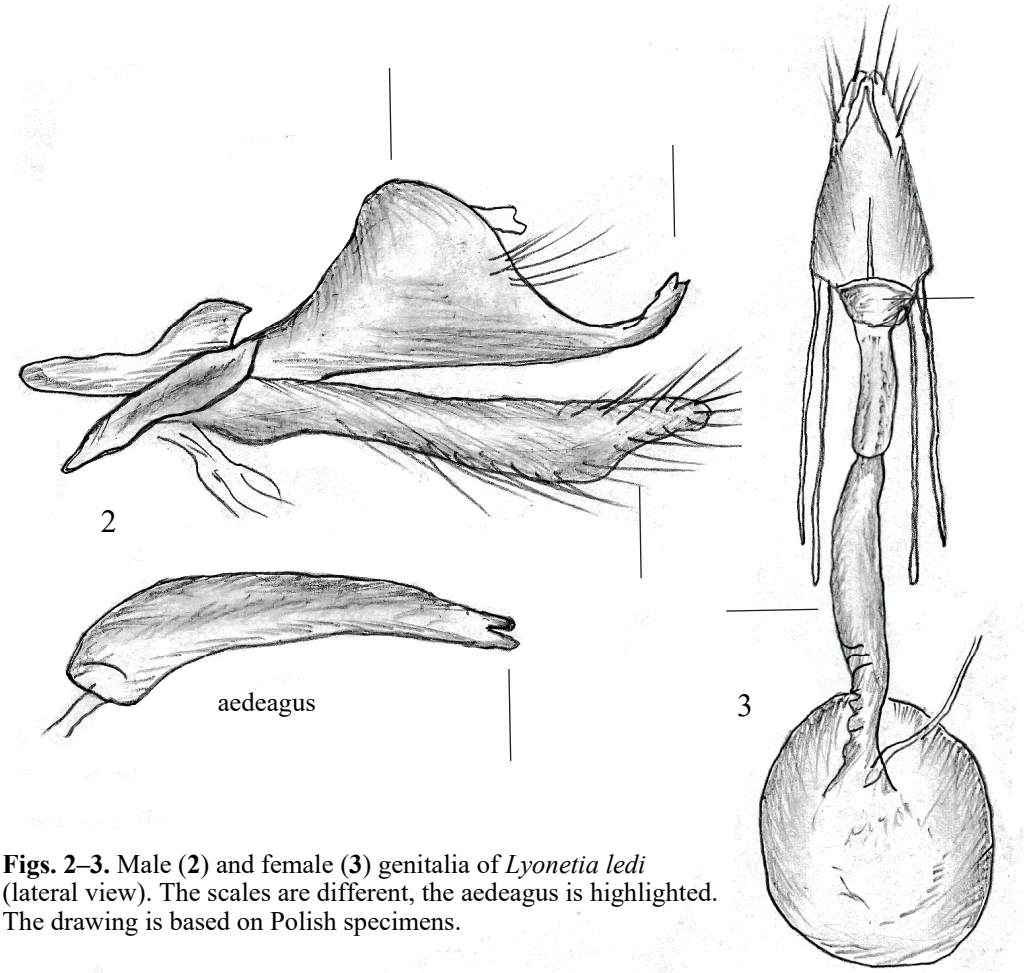


Inner two-thirds of the right forewing of Lyonetia ledi free of spots,
lacking discal and dorsal spots

The typical pattern of Lyonetia ledi is an interconnected complex of lines and spots in the outer third of the forewing. With dominant V-shapes.

Fig. 1. Diagrammatic representation and forewing pattern of *Lyonetia ledi*

According to Baraniak (1996) *L. ledi* is known from the following countries in Europe: Norway, Denmark, Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Germany, France, Austria, Romania. Data from Belarus and Ukraine should be checked, but the occurrence of the species is certainly based on correct identification.

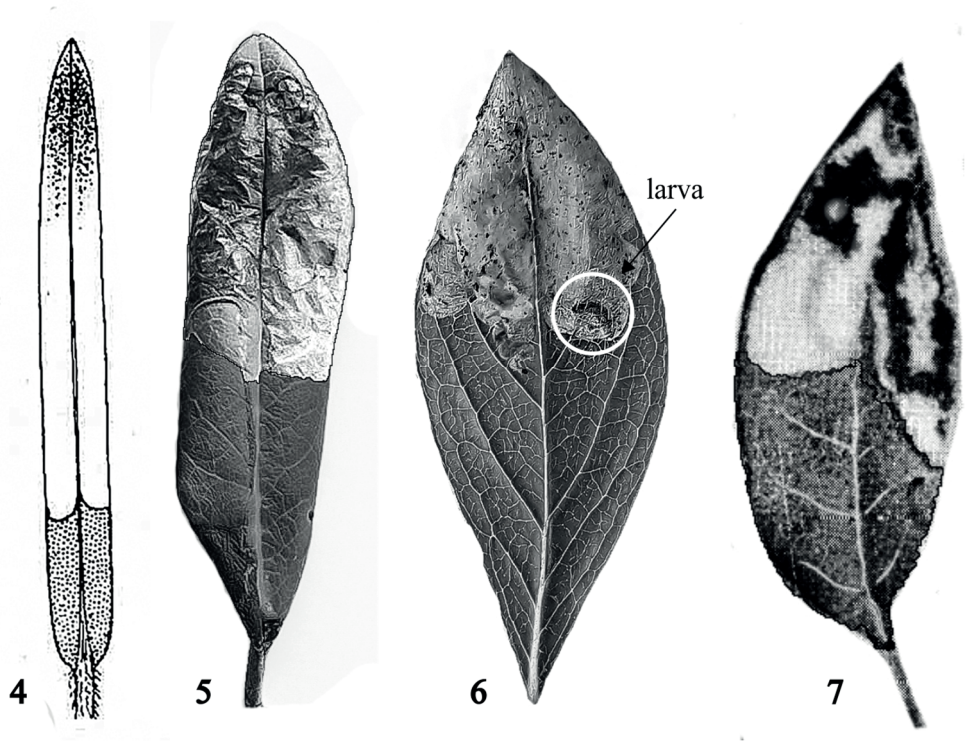


Figs. 2–3. Male (**2**) and female (**3**) genitalia of *Lyonetia ledi* (lateral view). The scales are different, the aedeagus is highlighted. The drawing is based on Polish specimens.

These European territories are certainly home to numerous populations. On page 11 of Karsholt and Razowski's (1996) book, we see an incomplete map. Belarus and Ukraine are replaced by empty white space. These European countries are completely omitted from the book. This was a mistake.

Bionomy and ecology

Habitat: *Lyonetia ledi* is considered to be a tyrphobiontic species (Spitzer *et al*. 1996) because it is restricted to peat bogs. According to Huemer & Schmid (2021), the Swiss habitat (Graubünden, Ardez, SE Sur En, 1760 m, 46°45'38"N; 10°11'11.7"E) is completely different and can be characterized as a northern exposed subalpine *Larici-Piceetum* plant association dominated by *Larix decidua* and *Picea abies*, interspersed *Pinus cembra*, *Betula pendula* and *Alnus alno betula*. This biotope is in a north-facing, steep avalanche gully at the bottom of which remaining snow masses may persist into early summer and provide unique microclimatic conditions.



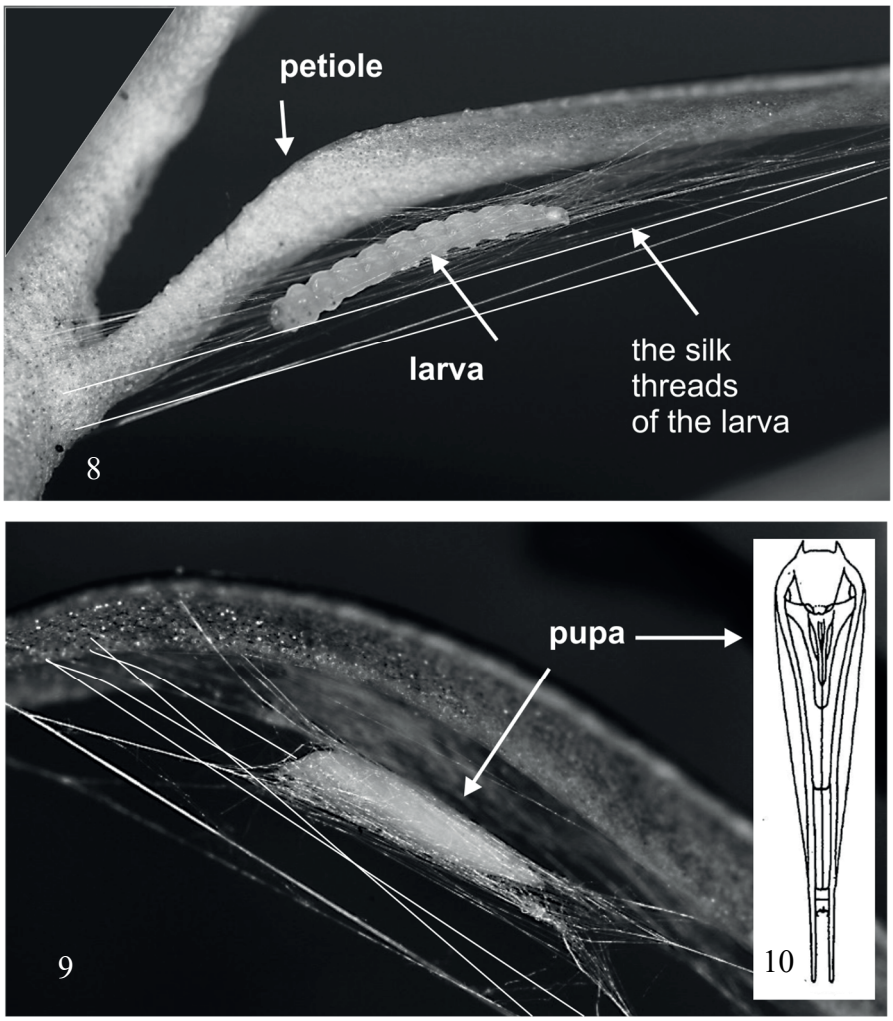
Figs. 4–7. *Lyonetia ledi* larval mine in leaf of foodplants from Europe to Japan: (**4**) *Rhododendron tomentosum* (Buszko 1981), (**5**) *R. ferrugineum* (Huemer & Schmid 2021), (**6**) *Rhododendron* sp. in Korea (Shin et al. 1983), (**7**) *R. mucronulatum* (Kuroko 1964).
Figures not to scale. Redrawn from the original and modified.

Foodplants spectrum: Europe and Asia: *Rhododendron tomentosum*(= *Ledum palustre*), *R. ferrugineum, R. indicum, Myrica gale*. Japan: *Rhododendron dauricum, R. kaempferi, R. pentadrum* (= *Menzieria pentadra*). North America: *Rhododendron occidentale, R. albilorum* (Kuroko 1964; Robinson *et al*. 2010, Huemer & Schmid 2021). *Rhododendron hirsutum* is a potential foodplant in the Alps. The range of food plants is probably wider, especially in the *Rhododendron* genus. The ovipositor of the female is specialized for piercing plant tissues.

According to most observations (see literature), the young larva first mines a narrow passage and moves along it towards the tip of the leaf, where a blotch is formed; small leaves may be mined out completely. The larva makes a few slits in the side of the blotch away from the tip, through which most of the frass is ejected. The larva eventually leaves this mine, to make new blotches in one or two more leaves, which turn yellow like the first one. Mines are invariably in the upper parts of the plant. Pupation outside the mine, in a cocoon that hangs freely in a sort of hammock fastened under a new leaf, which becomes inflated.

The larvae seem to be regularly infested by parasitic wasps of *Diadegma* cf. *semiclausum,* (Ichneumonidae) and an unidentified species of Ichneumonidae as several cocoons were found that were already empty (Huemer & Schmid 2021).

The preferred foodplant of *Lyonetia ledi* is *Rhododendron tomentosum*, a shrub which occurs in coniferous forests, forest margins, marshes and wet meadows, at elevations of between 400 and 1400 m. The known range of *Rhododendron tomentosum* is in Eurasia and North



Figs. 8–10. Larva (**8**) and pupa (**9**) of *Lyonetia ledi* on *Rhododendron ferrugineum.* Modified and supplemented following the publication of Huemer & Schmid (2021). (**10**) The ventral view of the pupa after Kuroko (1964).

America: Alaska, Alberta, Aleutian Islands, Altai, Amur, Austria, Baltic States, Belarus, British Columbia, Buryatia, Central European Russia, Chita, Czech Public (Moravia), Eastern European Russia, Finland, Germany, Greenland, Inner Mongolia, Irkutsk, Kamchatka, Kazakhstan, Khabarovsk, Korea, Krasnoyarsk, Kurile Islands, Labrador, Magadan, Manchuria, Manitoba, Mongolia, Northern European Russia, North-western Europe, Norway, Nunavut, Ontario, Poland, Primorye, Quebec, Sakhalin, Saskatchewan, Sweden, Tuva, Ukraine, Western Siberia, Yakutskiya, Yukon. It thrives on peaty soils, especially in moss and lichen tundra, and is widely distributed in the countries from which *L. ledi* has been recorded. A specific example ecoregion of occurrence is in the South Hudson Bay taiga, particularly on the floor of Black spruce dominant forests, where there are considerable local topographic depressions that form localised wetlands.

The geographic range of the food plant matches the range of *Lyonetia ledi,* but populations of the moth appear to be isolated and fragmented. According to unconfirmed sources, *Rhododendron tomentosum* was also present in Romania but became extinct. This may explain the collection of *Lyonetia ledi* specimens in the 1924–1925's in the marshland of the "Fehér-Körös" river (Borosjenő [Inue]. No further specimens have been collected since then.

The other most important food plant of *Lyonetia ledi* is *Myrica gale*, which is widely distributed in the northern hemisphere, but there are large gaps in its distribution. It is scattered throughout northern North America, as far south as Virginia and as far east as the Far East of Asia. In Europe, *M. gale* has a distinctly Atlantic and north-western distribution (Holm & Holm 1991), from north-western Spain to central Germany and north-western Russia, including the Baltic coastal zone (Behre 1999). In Finland it also grows on the edges of inland lakes (Svoboda *et al*. 1998). In temperate North America it inhabits riverbanks and freshwater lakes (Berliner & Torrey 1989). *Myrica gale* var. *tomentosa* occurs in northern Japan, Sakhalin, and eastern Siberia. Preston and Hill (1997) refer to *M. gale* as a sub-oceanic boreal temperate.

What do we know about the newly discovered food plant*?* Habitat and ecology of *Rhododendron ferrugineum*: This is an Alpine perennial shrub found throughout montane areas in acidic soils associated with pine. In the past decades the northern Alps have been subject to a decrease in disturbance from pasture which has caused *Rhododendron ferrugineum* to flourish. It can reproduce sexually by selfing and outcrossed seeds or vegetatively through layering, which usually occurs downslope at 50 or 60 years of age. Heavy snow cover allows branches to root in the ground. It also produces many flowers and seeds (Castroviejo *et al.* 1993, Escaravage *et al.* 1998). *Rhododendron ferrugineum* is endemic to the Mediterranean and west-central Europe at elevations between 1600–2200 metres, predominantly in the Alps and the Pyrenees (Valdés 2009, Gibbs *et al.* 2011, Malicki *et al.* 2019). Its presence and distribution in Croatia, Albania, Serbia, and Slovenia requires confirmation. *Rhododendron ferrugineum* is an abundant species in montane areas of the Alps and Pyrenees. This species is classified as Least Concern in view of its relatively wide distribution, stable populations, and no major threats.

The northernmost occurrence of *Rhododendron ferrugineum* has been found in southern Poland (Malicki *et al.* 2019). The newly described population of *Rhododendron ferrugineum* is the northernmost and most isolated population of this subalpine shrub species. It is located approximately 350 km north from the nearest populations in the Austrian Alps. The provenance and character of this population have long been enigmatic and, in general, it has not been accepted as a native element of the regional flora.

There are known cases of *Rhododendron* introductions in the Polish mountains (Karkonosze Mts. See Malicki *et al.* 2019), mostly in the nineteenth century. The plant community of *R. ferrugineum* was classified into the Genista pilosa-Vaccination alliance. Of particular note is the discovery of *Rhododendron ferrugineum* in Poland. It is a potential habitat for *Lyonetia ledi*. It is probably a transition zone towards upland and lowland marshy swamp populations. Detailed research should be carried out here.

Larval life and pupation (Figs. 4–10)

According to the old literature and recent observations (see references), the larva, after hatching, pierces the upper leaf epidermis and forms a mine in the leaf parenchyma, in which it is well protected from bad weather and predatory insects, spiders and birds. The mine starts with a long corridor that widens as the larva grows and ends in a large square blotch where frass is deposited. When it is time to pupate, the caterpillar leaves the leaf and forms a web on the underside of one of the leaves. It then makes an elaborate 'hammock' of fine silken threads, in which pupation takes place.

Fig. 11. The geographical distribution of *Rhododendron ferrugineum* in Europe (after Valdés 2009, Gibbs *et al.* 2011; supplemented and amended). The black arrow points to the recently found site in Poland. For details of the Polish site, see Malicki et al. (2019).

Flight period of adults and occurrence with notes

The flight period varies from one area to another and is not yet known precisely. The first specimens can be collected at light in April, and subsequently from spring to autumn, with peak numbers in July and August, and on into late October and early November. Voucher specimens are ubiquitous in the larger collections. Probably bivoltine. It is thought to overwinter as an imago, but this has not yet been unequivocally demonstrated. Recent research in Switzerland is reported in detail by Huemer and Schmid (2021).

Reports from other countries are summarised below

Belarus: Yevgeniy Derzhinsky wrote (in e-mail) the following about the occurrences in Belarus: "*Lyonetia ledi* has been recorded in some papers, but most of them are without clear information about locations where this species was found. Only information like ''this species occurs rarely at peat bogs in Belarus'' or ''peat bogs in the northern part of Belarus''. Only one more or less clear record somewhere near this point: 54°48'34.0"N | 26°53'39.3"E° was found."

The site is in the Naroch National Park which is near Minsk and has an area of 97.3 thousand hectares. 17% of Park is covered by lakes. Altogether, there are about 40 lakes surrounded by untouched forests with rare species of animal. The Naroch National Park is very important in the Eastern European Plain, where many undetected populations of *Lyonetia ledi* may occur. Such so-called "stepping stones" are essential for the maintenance of population relationships. Without adequate information, we do not know the current state of research on the ecology of this species.

Czech Republic: According Vavra (2000) the moth is a monophagous, tyrphobiontic species. In 1999, large numbers of larvae and pupae were found for the first time on the small peat bog PP Nad Dolskym Eminem. Its presence on the foodplant is so obvious that it is unlikely to have escaped attention in previous years. According to Vavra (2000) *Lyonetia ledi* is found in eutrophic tall-herbed meadows which are permanently damp in the upper soil layer and are mown once or twice a year, and in unmown, waterlogged meadows with species-rich vegetation. The closest known Czech locality is Jestrebi–Konvalinkovyvrch Podmokel (Sterneck & Zimmermann 1933).

Denmark: According to Ole Karsholt (pers. comm.) *Lyonetia ledi* is a local and rare species in Denmark, known from only two localities in the north-eastern islands, where moths have been collected in July and August near *Myrica gale* plants.

France: According to Lucienne Nel (pers. comm.) "This species, to my knowledge, was reported with doubt in the Catalog of Lhomme (1923), - IV-IX, Alpes-Maritimes: Cannes (Millière); Cher: Sommerère (Sand). These records remain unconfirmed, and the presence of the species in France is regarded as doubtful."

Hungary: the occurrence of *Lyonetia ledi* in Hungary has to be considered in some detail, because there is a lot of misunderstanding about it. Gozmány (1965) wrote in detail about *Lyonetia ledi* in his booklet Fauna Hungariae, in square brackets, indicating that the species had not yet been captured in the country, but its presence is likely. The square brackets have been misinterpreted by researchers unfamiliar with the Hungarian language, expecting them to mean presence unconfirmed. In his work, Gozmány did not cite any literature sources. According to him, *Lyonetia ledi* is a species with a central European distribution, which has not been collected in Hungary, but may possibly occur in the Bátorliget marsh. He also names the foodplants *Ledum palustre* and *Myrica gale*, neither of which occur in Hungary, so it is not clear why the author assumed their 'possible' occurrence in Hungary, and specifically in the Bátorliget marsh.

The palaeoecological research was carried out on Bátorliget marsh, a Nature Reserve area approximately 2 km west of the Hungarian-Romanian border, on the northern edge of the Great Hungarian Plain. This region, named by Nyírség and surrounded by the high ridge of Carpathians (running in NW to SE) and the flat expanses of the Great Hungarian Plain to the West, makes a unique geographical position in Europe. It is located on the border of two very different environmental zones, not only in terms of the geological situation but in the association of ecological zones. Bátorliget marsh represents a combination of fauna and flora characteristic in mountainous regions of the Carpathians and the Great Hungarian Plain. Flora and fauna of the marsh include several species being rare to the Hungarian lowland although widespread in mountain regions.

Csinády (1954) conducted thorough pollen analytical studies in the area. He did not find any pollen from potential food plants of *Lyonetia ledi.* Therefore, neither *Rhododendron* spe-

Figs. 12–13.
Csinády Gerő (**12**) [1902–1970]
Gozmány László (**13**) [1921–2006]

cies nor *Myrica gale* lived in this ancient marsh, which is considered by Hungarian botanists as a postglacial remnant. Thus, albeit hypothetically, we can conclude that there is no likelihood that *Lyonetia ledi* lived in this lowland area in the past. The hypothesis of Gozmány (1965), who expected the species to occur in Hungary from here, is erroneous. In my opinion, the distribution range of the species is consistent with the biogeographical history of the preferred food plants.

Japan: In Japan (see Kuroko 1964) the number of generations is unknown, but larvae have been collected from the beginning to the end of June and from the middle to the end of July, and the adults appeared from the end of June to the middle of July and from the end of July to the beginning of August. Foodplants: *Rhododendron dauricum*, *R. kaempferi* (600–1000 m, according to Wilson it is a sun-loving plant, 'seen to best advantage in open thickets on mountain slopes'), *R. japonicum, R. pentadrum* (= *Menzieria pentadra*, native to Japan, Kuril Is. and Sakhalin).

North Korea: My colleague Bong-Kyu Byun informed me about the North Korean populations based on literature data. To his knowledge, only one site is known so far, in Suweon township (Shin *et al.* 1983). There is also more news from the Weolaksan Mountains.

Lithuania: According to Povilas Ivinskis (pers. comm.), *Lyonetia ledi* in Lithuania is the key species of marshland rural. The species throughout Lithuania. Bred specimens in collections: Alytus district (Zhuvintas Biosphere Reservation), Alytus district (Puniošilas (forest), Kretinga district (Šventoji, 2 km to east), Molėtai district (near Dubingiai), Panevėžys district (Raguva, forest), Šalčininkai district (Rūdninkai, former military area), Šilutė district (Žalgirai, forest), Švenčionis district (Januliškis, Petreežeris lake bog), Purviniškiai, forest lakes bogs,Trakai district (Aukštadvaris Regional Park, Riezničia, Kerėplis lake bogs), Vilnius district (Dūkšteliai bog, Raudonojibala bog), Varėna district (Dzūkija National Park: Katra, Musteika. Varėna district Burbonys, Puodžiainraised bogs, Zarasai district (Dūkštos env.).

Poland: Throughout Poland in raised bogs and in a boggy marsh (Buszko 1981). Bivoltine, in June and from the end of September to the spring of the following year. The larva mines the top leaves of *Rhododendron tomentosum* (= *Ledum palustre*) and occasionally *Myrica gale*. During its lifetime it changes leaves two or three times. According to Buszko (pers. comm. 29.11.2021) *Lyonetia ledi* is widespread but local in Poland. In some sites it is abundant. It occurs almost everywhere where *Rhododendron tomentosum* (= *Ledum palustre*) is present with clear preference for boggy pine forests and raised peat bogs.

Romania: Examined specimens; 1 ex, Borosjenő [Ineu], '924. VII. 2. Diószeghy, 1 ex, Borosjenő, '925. XI. 11. Diószeghy (in coll. Hungarian Natural History Museum, Budapest).

Fig. 14.
Dioszeghy László (1877–1942); Hungarian painter, Lepidoptera collector, entomologist. He was a thorough and meticulous collector. A significant part of his collection is kept in the Natural History Collection of the Szekler National Museum. Many of his specimens are in the British Museum and the Hungarian Museum of Natural History. He is the only collector of the *Lyoneti ledi* species in Romania.

These are specimens from a very old collection. No more recent specimens are known. It is possible that there are still specimens in some museums or private collections, but none have been investigated. Here it is noted that according to maps from 100–150 years ago, the Romanian Borosjenő (Ineu in Romanian) and its region were ecologically suitable for the existence of populations of *Lyonetia ledi*. Today this is less likely, but with thorough search, it is not impossible for the species to be found again.
(See in https://www.arcanum.com/en/technology/historical-maps/)

Russia: The moths fly from July to August in European Russia, being recorded in October in Khabarovsk Territory. The species is known to form the northern race distinguished from the southern one by the fore-wing pattern (Kuroko, 1964). This race is recorded for the first time in Russia on the basis of the material collected by V. P. Ermolaev in the Khabarovsk Territory (see Baryshnikova 2007).

Slovakia: first collected in Slovakia in 1989 near the Polish border (Sucha Hora). For more information see Marek *et al*. (1991). In his paper, Reiprich (1991) refers to the previous publication but expands it. According to him, larvae are observed in the months V–VI and VII –IX, and the imago is observed in July, and from September, when it overwinters until April. Since then, no new information has been published. This Slovak population is very close to the well-known Polish populations (see distribution map). It is questionable how isolated the population is and whether there is a genetic link to Polish populations. It can be assumed that there are still hidden populations in the mountain ranges of the Carpathians, awaiting a similar discovery as the recently discovered Swiss population (cf. Huemer & Schmid 2021).

Ukraine: Bidzilya reported (pers. comm. in e-mail) on the status of the species in Ukraine Oleksiy and stated that *Lyonetia ledi* has been recorded from two localities in Western Ukraine: "Rzesna Polska", currently a district within the city of Lviv, and "Mikuliczyn", now Mikulichin in Ivano-Frankivsk region (Schille 1930: p. 284). According to Bidzilya, no recent observations are known.

Fragmentation and extinction

Human use of the landscape by urbanisation, agriculture, mining and so on has resulted in its significant fragmentation across Europe. The elements that previously formed a coherent matrix are now isolated patches. Fragmentation not only results in significant habitat loss, but also leads to the disappearance of some, with their associated species (Harker *et al*. 1999). Most of the remaining habitat patches are not large enough to provide habitat for viable populations of *Lyonetia ledi*. Remaining habitat patches are becoming increasingly impoverished, and dispersal between patches may be significantly reduced. A species may be absent from a potential isolated patch partly because it cannot get there, and partly because its extinction is more significant than its establishment. White & Walker (1997) suggest that species with lower competitive ability may be favoured because of their better dispersal ability.

Discussion

Lyonetia ledi is susceptible to extinction in Central Europe because of the isolation of extant populations. There is also a lack of information about population densities and their dynamics. This species does not have protected status in Europe. The limited mobility of adults also limits the colonization of new habitats. Thus, any pressure exerted on the remaining habitat by external factors will also affect the populations of *Lyonetia ledi*. For this reason, we consider the knowledge of the ecological preferences of habitat and population dynamics to be extremely important to better formulate any future management and protection implications.

Despite their geographical isolation, there are no significant differences between the habitus pattern of *Lyonetia ledi* from Central Europe and those from Eurasia. This lack of phenotypic diversity between the various isolated populations requires further study with different methods.

Based on more analytical evolutionary, causal, and zoogeographical analyses, we should take better account of the more fragmented zoogeographical regions or subregions that have recently appeared in several publications (see Ficetola *et al*. 2017 and others). These zoogeographical maps clearly show that *Lyonetia ledi* is absent from the so-called "Arctic-Siberian" (sub)region of the Palaearctic, which has always been treated as a unified region. Most of the sites are in the Eurasian region, but also appear in the Sino-Japanese sub-region. The Holarctic, circumpolar designation of the species should be revised. In evolutionary terms, we are probably dealing with a Nearctic-Eurasian-Sino-Japanese faunal element with several centres.

In Europe, it is clear that the boreal region is the centre of distribution of *Lyonetia ledi*. It is highly fragmented in the continental region and has a strong peripheral position in the alpine region. These populations are relict, highly isolated remnants of the postglacial period. Their survival in these ecological niches is uncertain.

Acknowledgements
Many colleagues have assisted in the preparation of this study. Some provided reference to old literature, others looked through the collections in their own institution, or shared with me many chorological and ecological observations. The study remains incomplete, but it will certainly trigger further research. The following colleagues are thanked by name: Svetlana Baryshnikova (RU), Bengt A. Bengtsson (SE), Bong-Kyu Byun (KP), Oleksiy Bidzilya (UA), Jaroslaw Buszko (PL), Yevgeniy Dzerzhinsky (BY), Konstantin Efetov (RU), Peter Huemer (AT), Povilas Ivinskis (LT), Tim Karisch (D), Ole Karsholt (DK), Gergely Katona (HU), Irén Kocs (RO), Zdenek Laštůvka (CZ), Lucienne Nel (FR), Gábor Pastorális (SK). Sergey Sinev (RU), Jukka Tabell (FI), Jaan Viidalepp (EE). Finally, I am indebted to my friend Barry Goater (UK) who did the linguistic proofreading of the manuscript.

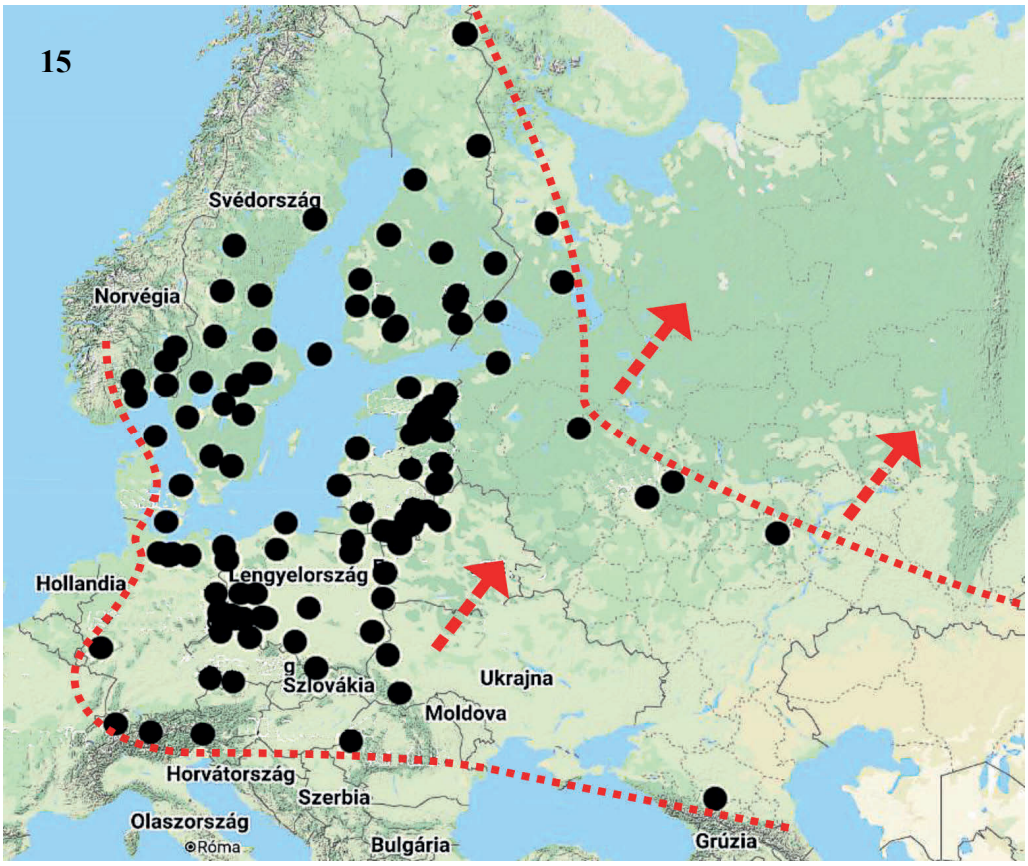


Fig. 15.
Geographical distribution pattern of *Lyonetia ledi* in Europe. Preliminary map, based on verified locality data. Dotted red lines indicate hypothetical distribution limits. Red arrows indicate the direction of potential spread.
The map clearly shows the geographical areas where further research is needed.
Note: Country names are in Hungarian.

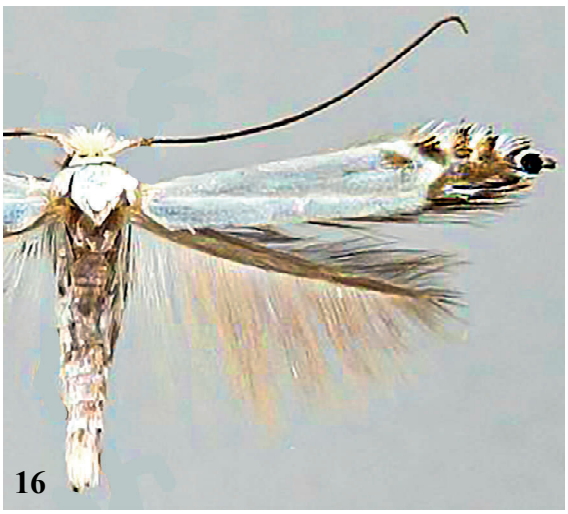
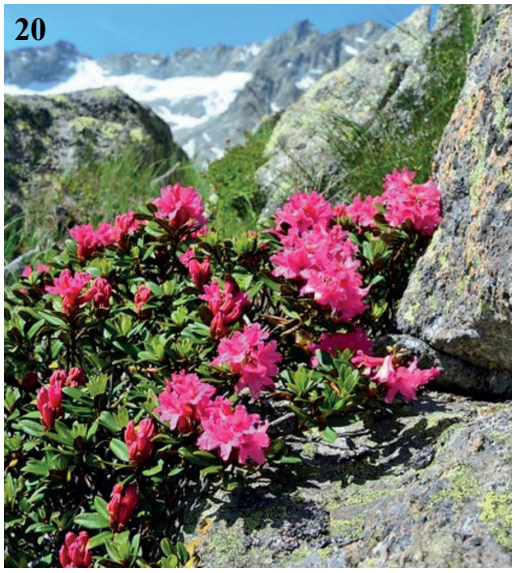


Fig. 16.
Lyonetia ledi, adult, Finnland, Nordsavo, (photo: R. Siloaho)

Fig. 17. The geographical distribution of *Lyonetia ledi* in the Palaearctic. The apparent center of its distribution is central and northern Europe. Not yet known in the Arctic-Siberian sub-region. In southern Siberia it has a trans-Palaearctic distribution, but with highly fragmented populations. The southern limits of its range are the Alps, Carpathians, and Caucasus mountains.

Figs. 18–21.
Preferred habitats of *Lyonetia ledi* in the Palaearctic,
18, Poland, with *Rhododendron tomentosum*,
19, Russian Far East, Arkhangelsk region, marshland,
20, Alps, with *Rhododendron ferrugineum*.
21, *Lyonetia ledi, adult* (photo: Hlasek J.)



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https://doi.org/10.24386/LepidHung.2022.18.1.23 HU ISSN 2732-3854 (print) | HU ISSN 2732-3498 (online)

Lepidopterologica Hungarica 18(1): 23–43. | https://epa.oszk.hu/04100/04144

Received 04.01.2022 | Accepted 08.02.2022 | Published: 08.03.2022 (online) | 26.06.2022 (print)

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A synopsis of the bionomics and geographical distribution of *Phtheochroa* species in Hungary (Lepidoptera: Tortricidae, Cochylini)

Imre Fazekas

Citation. Fazekas I. 2022: A synopsis of the bionomics and geographical distribution of *Phtheochroa species in Hungary* (Lepidoptera: Tortricidae, Cochylini). – Lepidopterologica Hungarica 18(1): 23–43.

Abstract. This is the first part of a series of papers on the bionomics and geographical distribution of Hungarian Tortricidae, which covers *Phtheochroa* Stephens, 1829 species. The study presents partial flight data, food plants and preferred habitats of Cochylini species. A distribution map of each species has been produced.

Keywords. Lepidoptera, Tortricidae, *Phtheochroa* Stephens, 1829, bionomy, distribution, Hungary

Author's address. Imre Fazekas | Pannon Institute | 7625 Pécs, Magaslati út 24., Hungary |
E-mail: fazekas@lepidoptera.hu | https://orcid.org/0000-0003-4318-3946

Zusammenfassung

Fazekas I. 2022: Eine Übersicht über die Bionomik und die geografische Verbreitung von *Phtheochroa*-Arten in Ungarn. – Lepidopterologica Hungarica 18(1): 23–43.

Dies ist der erste Teil einer Reihe von Beiträgen über die Bionomie und die geografische Verbreitung der ungarischen Tortricidae, die *Phtheochroa* Stephens, 1829 Arten umfasst. Die Studie enthält partielle Flugdaten, Nahrungspflanzen und bevorzugte Lebensräume der Cochylini-Arten. Für jede Art wurde eine Verbreitungskarte erstellt.

Die Arten von *Phtheochroa* Stephens, 1829 kommen in einem großen geografischen Gebiet vor: Holarktische, neotropische und afrotropische Regionen. Nach Razowski (2009) stammt die Mehrzahl der Arten aus der Paläarktis, und von den ca. 100 in der Region bekannten Arten sind zehn Phtheochroa-Arten in der ungarischen Fauna bekannt, über die jedoch nur sehr wenig geschrieben wurde (Fazekas 1991–1995). Einige sind im ganzen Land verbreitet (z. B. *Ph. schreibersiana, Ph. pulvillana*), die meisten sind jedoch sehr selten und lokal begrenzt (z. B. *Ph. annae, P. procerana*) oder sind aus den früher bekannten Lebensräumen verschwunden.

In dieser zusammenfassenden Studie werden die Flugzeiten, Nahrungspflanzen, bevorzugten Lebensräume und die geografische Verbreitung der aus Ungarn bekannten *Phtheochroa*-Arten beschrieben. Die Verbreitung der einzelnen Arten in Ungarn wird anhand der üblichen ungarischen naturgeografischen Landschaftsklassifizierung kartiert. Dieser Kartentyp zeigt die Topografie, die Hydrologie, die Vegetation und die allgemeine Ökologie Ungarns besser als die so genannte UTM-Gitterkarte, bei der nur Punkte das Vorkommen von Arten angeben. Diese Kartierungsmethode wurde bereits in "Sesiidae fauna of Hungary" (Fazekas 2017) und "The Eupitheciini of Hungary" (Fazekas 2020) verwendet. Dies ist ein völlig neues Kartierungskonzept in Ungarn.

Nach bisherigen Erkenntnissen sind in Ungarn 10 Arten von *Phtheochroa* bekannt. Das Vorkommen mehrerer Arten ist nur aus alter Literatur bekannt, und in ungarischen Sammlungen wurden keine authentischen Exemplare gefunden. Es ist bekannt, dass viele in Ungarn gesammelte Exemplare in anderen Sammlungen, vor allem in Österreich, Deutschland, Italien und England, aufbewahrt werden, aber ihr Vorhandensein wurde von ungarischen Forschern, die ihre Untersuchungen auf das Material in ungarischen Sammlungen beschränkt haben, stark vernachlässigt. Dies ist eindeutig falsch, und das Problem sollte angegangen werden.

Introduction

Hungary is located in the western Palaearctic Region. The entire territory of the country is part of the Pannonian biogeographical region. Special mention should be made of the large areas of lowlands. The Great Hungarian Plain is a very special landscape in Europe. In summer, the permanent saline lakes are among the hottest in Europe: they expand in springtime but recede and become very shallow by July and August; during very dry and hot summers many of them may even dry out (as indicated on old maps of the Austro-Hungarian monarchy-at a time when about half of the entire area was an immense self-contained watery empire. The dune region is geomorphologically, botanically and zoologically unique in Europe: nothing like this inland sand-hill world exists west of the Pannonian Basin.

In addition to the lowlands, Hungary's most diverse habitats are found in the so-called low middle mountains west of the Danube and in the north of the country, the Transdanubian Mountains and North Hungarian Mountains. As most of Hungary is under intensive agricultural cultivation, the last refuges for moths are in the mid-mountains, which are protected under nature conservation law. All the species described in this study have secure habitat in mountain areas. Unfortunately, the Hungarian nature conservation authorities do not pay much attention to the so-called "Microlepidoptera" species. Many people explain this simply by a lack of specialists.

The fauna of Hungary is extremely diverse. There is a strong Balkan and continental Eurasian influence, with species from the Atlantic regions being the least frequent. One could say that the flora and fauna are a 'meeting' of east, south and west. This is why it is important to understand and explore the faunal composition of the Western Palaearctic, Europe, and especially Central Europe. We are looking for isolates of similar species in Hungary, such as *Phtheochroa procerana*. In this paper, a synopsis of a genus of Lepidoptera (Tortricidae: *Phtheochroa* Stephens, 1829) is presented, for which no similar Hungarian study has yet been published.

Although the *Phtheochroa* fauna of the Palaearctic region is reasonably well-known through the work Microlepidoptera Palaearctic (Razowski 1970, 2009), some parts of the region were not fully investigated and studied.

Species of *Phtheochroa* Stephens, 1829 are found over a vast geographical area: Holarctic, Neotropical, and Afrotropical regions. According to Razowski (2009), the majority of species are Palaearctic, and of ca. 100 species known in the Region, ten *Phtheochroa* species are known in the Hungarian fauna, but very little has been written about them (Fazekas 1991–1995). Some are generally distributed in the country (e.g., *Ph. schreibersiana, Ph. pulvillana*, but most are very rare and local (e.g. *Ph. annae*, *Ph. procerana*) or have disappeared from habitats known in the past.

In this summary study, the flight periods, food plants, preferred habitats and geographical distribution of the Phtheochroa species known from Hungary are described. The distribution of each species in Hungary is mapped, with the usual Hungarian natural geographic landscape classification (Marosi, Somogyi 1990). This map type shows the topography, hydrology, vegetation, and general ecology of Hungary better than the so-called UTM Grid map, where only points indicate the occurrence of species. This mapping method has been employed previously in "Sesiidae fauna of Hungary" (Fazekas 2017) and "The Eupitheciini of Hungary" (Fazekas 2020). This is a completely new mapping concept in Hungary. This series of Tortricidae studies, and the planned book, are nothing like the "Fauna Hungariae" series of books, the concepts of which were conceived in the 1950's 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).

According to research to date, 10 species of Phtheochroa are known in Hungary. The occurrence of several species is only known from old literature, and no authentic specimens have been found in Hungarian collections. It is well known that many specimens collected in Hun-

gary are preserved in other collections, mainly in Austria, Germany, Italy and England, but their presence has been large neglected by Hungarian researchers who have restricted their investigations to material in Hungarian collections. Clearly, this is wrong, and the problem should be addressed.

Material and methods

The author's personal interest in Lepidoptera began in the early 1980s, and for the last 40 years he has been collecting in all natural geographic regions of Hungary, where he has studied habitats, larval foodplants, flight periods. Adult specimens were mostly collected at night, at street lights and with the use of light traps, mostly 160 Watt HMLI and 125-Watt mercury vapour lamps. Specimens were also obtained by day by netting and tapping vegetation.

Between 1986 and 2021, all the available literature on Tortricidae was consulted, the most important of which is given at the end of the paper. All the major museum and private collections in Hungary were visited in search of material. For accurate and authentic identification, thousands of genital preparations were made.

Genitalia dissections were made in accordance with Robinson (1976). Some of the genitalia were mounted in Euparal on slides; others are 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), Wanke & Rajaei (2018). More than 850 collection specimens of Hungarian *Phtheochroa* species have been examined, about 300 dissected and their genitalia analysed.

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 correct identification of all *Phtheochroa* specimens was checked personally. 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, 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

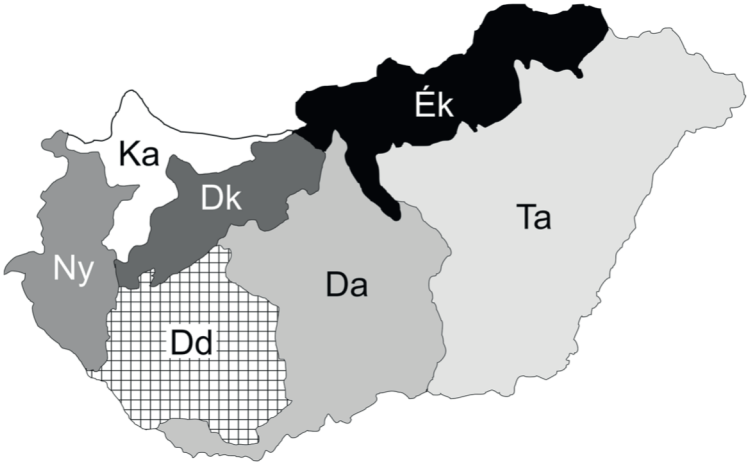

Fig. 1.
Natural landscape units in Hungary.
Dd: Transdanubian Hills (with Mecsek Mts and Villány Hills)
Ny: West Hungarian Borderland
Ka: Little plain
Dk: Transdanubian Mountains
Ék: North Hungarian Mountains
Ta: Tisza Plain
Da: Duna Plain
(Ta and Da= English Great Hungarian Plain)

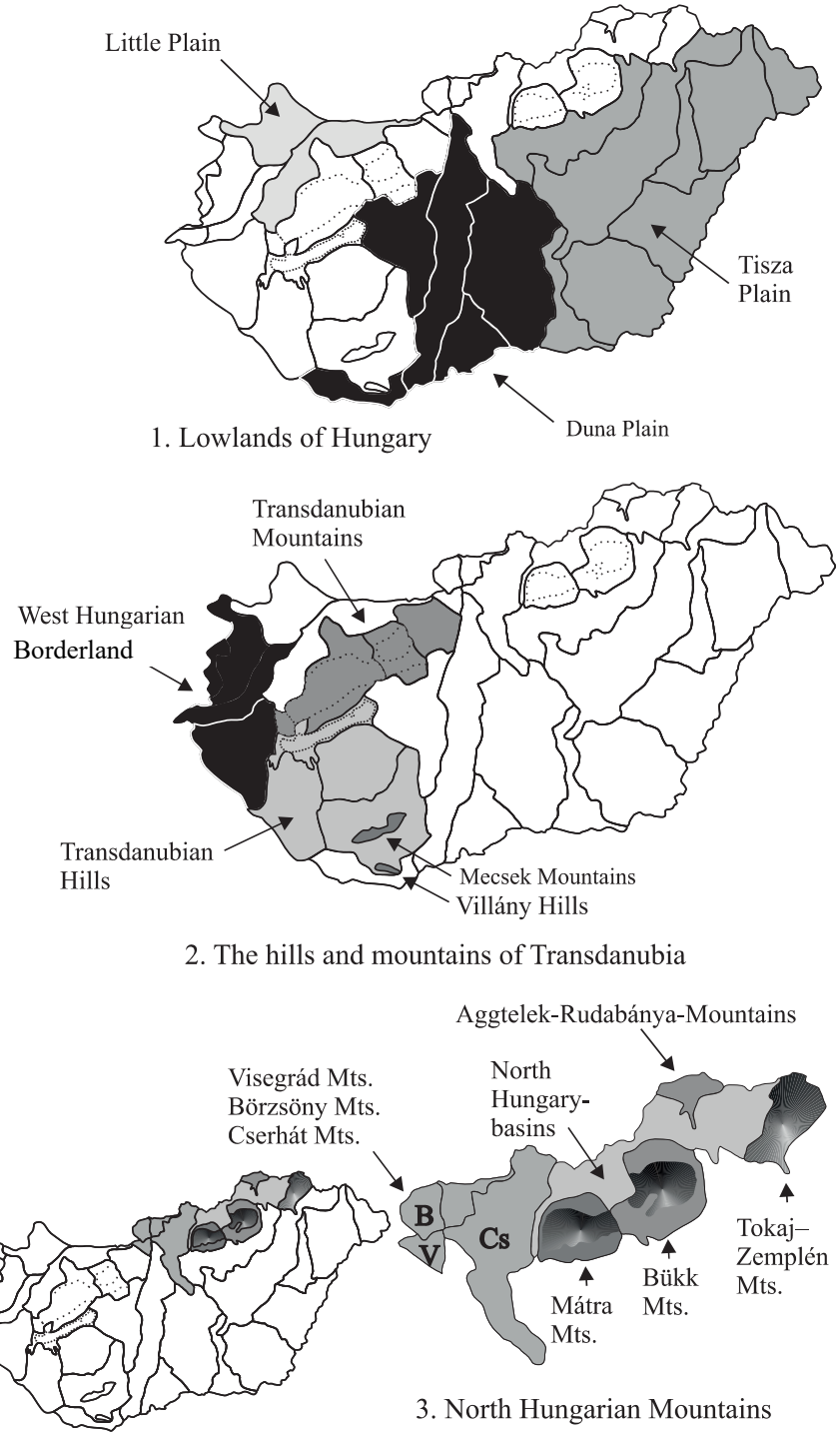

Fig. 2. Hungary's major natural landscapes and major ecological impact areas.

Results

Biology and distribution of Phtheochroa species in Hungary

Tortricidae
Tortricinae - Cochylini

Phtheochroa Stephens, 1829
The species of *Phtheochroa* have usually been described or placed under its junior synonym *Hysterosia* Stephens, 1852 or *Trachysmia* Guenée, 1845. Full synonymy and comments on the genus are in my revision of the genera of Tortricidae (Razowski 1987). Since publication of the revision of the Palaearctic fauna of Cochylini (Razowski 1970) only little new data have appeared in the literature. The larvae of *Phtheochroa* feed in seeds, fruits, stems or roots being probably oligophagous. Unfortunately, knowledge on their bionomy is very limited. Of the best-known Palaearctic fauna ten species of *Phtheochroa* are known to be associated with fifteen plant species in the families Berberidaceae, Chenopodiaceae, Compositae, Liliaceae, Rhamnaceae, Rosaceae, Salicaceae and Ulmaceae. Of palaearctic species only three (*Phtheochroa decipiens* Walsingham, 1900*, Ph. sodaliana* Haworth, 1811 *and Ph. schreibersiana* Frölich, 1828) feed on deciduous trees (Razowski 1991).

Diagnosis: The genus includes about 120 species in Holarctic, Neotropical and Afrotropical regions, of which about 50 occur in the Palaearctic. The number of Nearctic species is now close to 20. The species are generally associated with steppe-forest and arid regions. The number of food plants known so far is between 17 and 20, most of them Asteraceae. Larvae feed in seeds, fruits, roots or stems of dicotyledonous plants, hibernation in larval or pupal stages. Flight period within a species is strongly related to altitude and the climatic and ecological conditions of the geographical area.

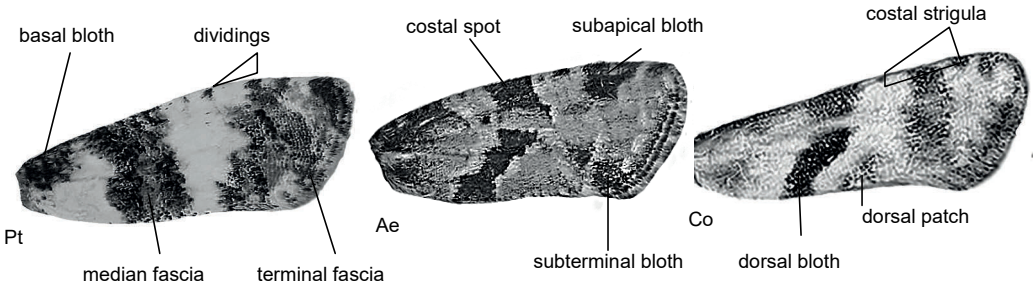

Fig. 3. Comparative features (with indicated) of forewing pattern in *Phtheochroa* **(Pt),** *Aethes* (**Ae**) and *Cochylimorpha* (**Co**).

Valva of males of several species of *Phtheochroa* may be distinguished by the presence of a terminal process of sacculus; all species apart from the *P. rugosana* group have well-developed uncus. Examination of the genitalia is often essential for the exact identification of species, and it is often very important to separate the aedeagus and to examine it carefully, especially in regard to the structure of the cornutus. In female genitalia, the corpus bursae is broad and sclerotized; accessory bursa and ductus seminalis variable.

List of Hungarian *Phtheochroa* species
1. *Ph. inopiana* (Haworth, [1811])
2. *Ph. schreibersiana* (Frölich, 1828)
3. *Ph. pulvillana* (Herrich-Schäffer, 1851)
4. *Ph. sodaliana* (Haworth, 1811)
5. *Ph. fulvicinctana* Constant, 1893
6. *Ph. procerana* (Lederer, 1863)
7. *Ph. purana* (Guenée, 1845)
8. *Ph. duponchelana* (Duponchel, 1843)
9. *Ph. rugosana* (Hübner, 1799)
10. *Ph. annae* Huemer, 1990

1. ***Phtheochroa inopiana*** (Haworth, [1811])

Biology: Bivoltine. Flight periods June-July and August-September. Larva oligophagous on *Artemisia campestre*, *Eupatorium cannabinum* and *Pulicaria dysenterica*; the overwintering larvae feed within the roots of the food plants. This species occurs in xero-, and mesotrophic 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 anywhere. It is worth looking for on the edges of forests and in shrubby, bushy vegetation, especially on south-facing hillsides and mountainsides.

Range in Hungary: *Ph. inopiana* is 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). It is not uncommon in lowland mosaics of marshy and sandy hilly habitats (see later at *Phtheochroa pulvillana* in the description of the "turján" landscape).

Distribution: trans-Palaearctic. 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.

Remark: Sexually dimorphic, the females usually plainer than the males.

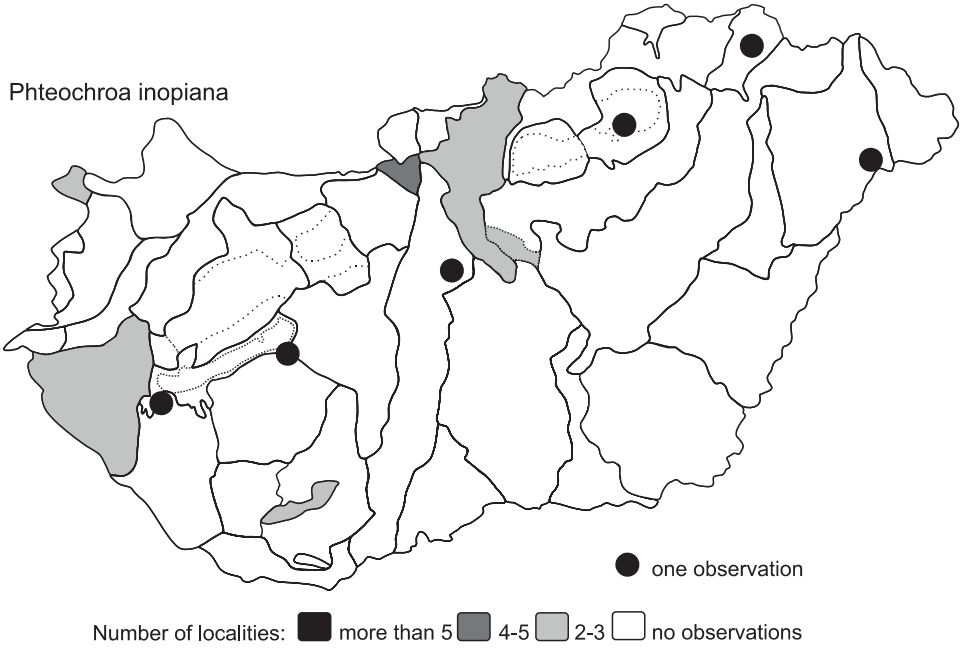

Fig. 4. Localities of *Phtheochroa inopiana in Hungary*

2. ***Phtheochroa schreibersiana*** **(**Frölich, 1828)

Biology: Univoltine. Flight period from April to early July. Larvae on foliage of *Prunus padus* (not native shrub in Hungary), *Populus nigra* and *Ulmus minor* to September; hibernating until the following spring, pupating in early April in the bark of the food plant. 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 area 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, Spain and Italy in the south.

Remark: Monitoring data in Hungary are incomplete, with a total of 16 known sites. There are very few new observations, and most of the specimens were collected in the first half of the 20th century. Analysis of the data suggests that the species is probably in regression in Hungary.

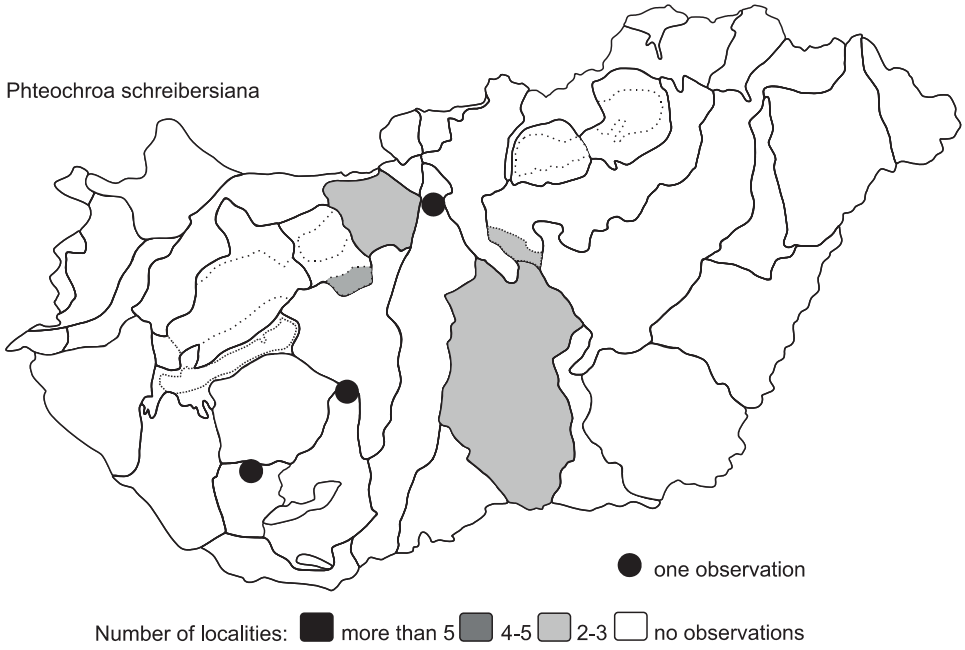

Fig. 5. Localities of *Phtheochroa schreibersiana in Hungary*

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

Biology: Univoltine, with a long flight period extending from May to July, with a peak between mid-May and mid-June. Larva monophagous on *Asparagus officinalis*. Habitats include margins of hilly and mountainous mesophilous and thermophilous deciduous forests, dry grasslands, grasslands and pastures; lowland sand dunes, steppe meadows, saline meadows, planted forest pine forests. Also in agricultural land along roadsides and field margins.

Range in Hungary: In the western and northern parts of the country, *P. pulvillana* is known in the 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 meadows of the Hortobágy. The typical habitat in the Hungarian lowlands is the so-called "Turján-region": the waterlogged, boggy, difficult to walk on vegetation is called “turjános”, from which the whole area and the Natura 2000 site takes its name: "Turján-vidék" (in Hungarian). It is the largest coherent wetland and sand habitat system in Central Hungary. Many species live here that are typical only for the Pannonian biogeographical region, so its protection is a priority task of Hungarian nature conservation. Natura 2000 identification code: HUDI 20051.

Distribution: *Ph. pulvillana* is a widespread, subspecific, mostly fragmented species in the Palaearctic. Wieser et al. (2001) reported it from Iran: Ghale-e Palangān (Golestān National Park).

Remark: The European populations belong to the nominotypical subspecies described from Germany.

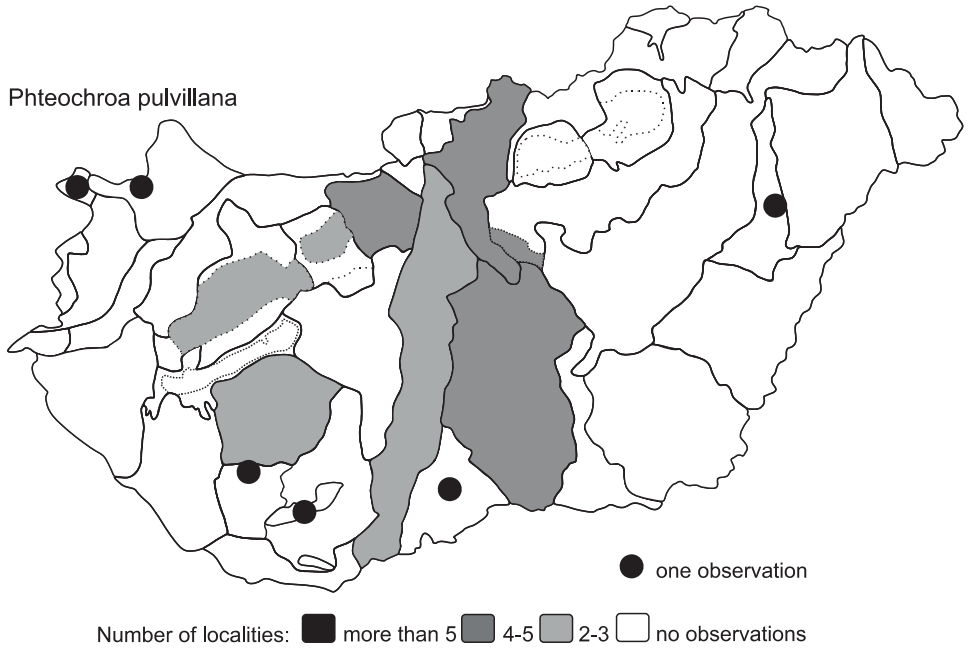

Fig. 6. Localities of *Phtheochroa pulvillana in Hungary*

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

Biology: Univoltine. Flight period May and June, becoming active from just before dusk. Larvae on *Rhamnus catharticus* and *Frangula alnus*; they spin the berries together. Habitats are mesophilic and xerophilic deciduous forest margins, shrublands, karst scrub forests on hills and mountains; sporadic lowland groves, and secondary (non-native) birch forests on sand, near streams and watercourses. Hársbokor-hegy (-Mount), Fót, Somlyó-hegy (-Mount), Jászság (birch forests, Hungarian "nyírfás").

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

Distribution: this species 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 reassessed.

Remark: *Ph. sodaliana* is reminiscent in some respects of a small *Ph. rugosana* but is quickly distinguished by the conspicuous ferruginous-red apical spot and the generally white basal area of the forewing. In collections where specimens that are slightly frayed or fragmented in light traps have not been genitally examined, there are many misidentifications.

5. ***Phtheochroa fulvicinctana*** (Constant, 1893)

Biology: flight period from June to September, probably in two generations, but this needs to be investigated further. Larvae on *Limonium vulgare* and *Limonium gmelinii*. The native range of *L. gmelinii* is Central and Southeast-Europe to Siberia and Iran, but its presence in Hungary is accepted. Further breeding experiments are needed to confirm additional food plants. Habitats are mountainous karst scrub forests on dolomitic bedrock, dry sandy and saline grasslands, meadows.

Range in Hungary: only a few sites are known west of the Danube River (Budai Mts.). Most 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

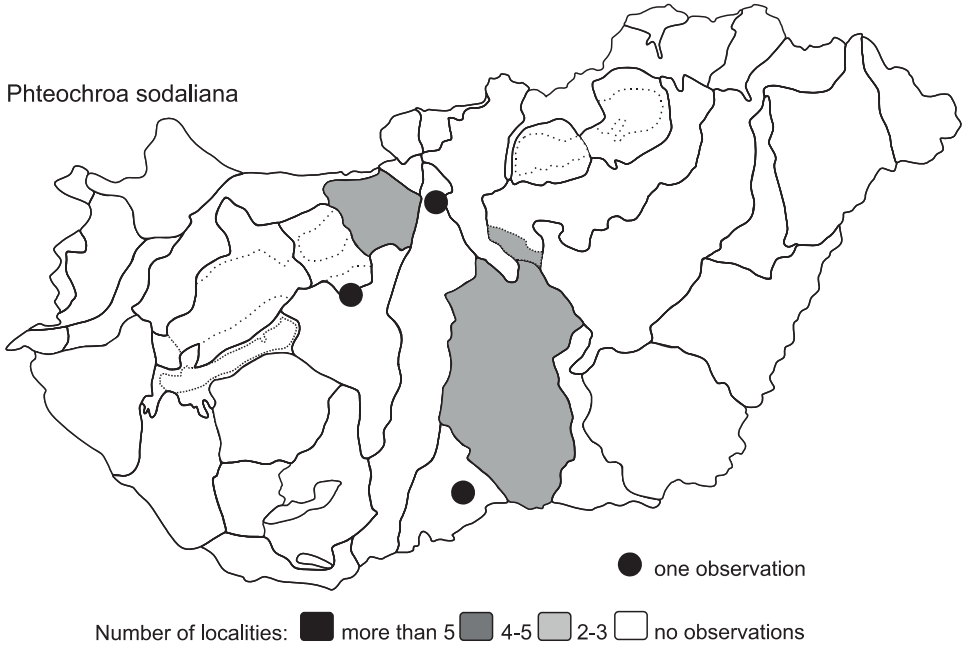

Fig. 7. Localities of *Phtheochroa sodaliana in Hungary*

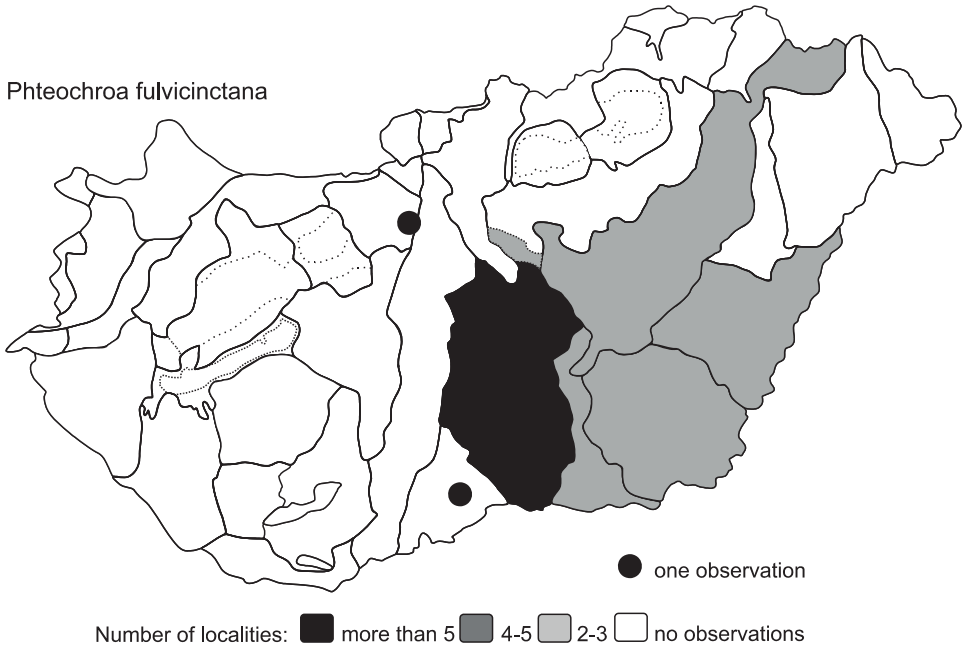

Fig. 8. Localities of *Phtheochroa fulvicinctana in Hungary*

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,

but in his Palaearctic volume (Razowski 2009), he gives: "S Europe from France to Albania, in more northern territories locally: Switzerland, Romania and Hungary; Dageshestan. It is a sub-Mediterranean fauna element". However, its range is significantly larger. In Ukraine it has been found in Crimea, and in Russia along the Volga and in the Caspian lowlands (Sinev et al. 2019), and it is evidently not a sub-Mediterranean species. Further chorological studies are needed.

Remark: *Ph. fulvicinctana,* described from France, is a characteristic species of the Hungarian lowlands; most of the known localities are in national parks. Population abundance is low. According to Gozmány et al. (1986) the species has recently invaded Hungary from the SE; the known habitats are natron flats and grasslands in the Plain.

6. ***Phtheochroa procerana*** (Lederer, 1863)

Biology: the exact flight period is uncertain at present. So far, specimens have been collected only in June and July. The food plant is unknown. To date, only one known locality survives, which can be described as follows: rock grass slope steppe, Buda rabbit-tail grass rock grassland closed; on dolomitic rock grassland.

Range in Hungary: collected solely in and around Budapest. Three specimens are known. (all in coll. HNHM, Budapest): Budapest, Farkas-völgy (= valley), [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. There have been no records of *P. procerana* since 1942.

Distribution: According to Razowski (2009) only occurrence in Europe in Hungary, Romania, Bulgaria; in addition, Asia Minor.

Remark: The forewing of the Hungarian specimens seen so far has a lighter ground colour than that of the nominotypical subspecies described from Bulgaria. This is clearly 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. However, since the species has not been seen in Hungary for over 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 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.

The 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); Sesleria 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, 2) and its genetic structure. This method makes it possible to study processes of conservation biological importance: 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)

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

Fig. 9. Distribution clades of *Phtheochroa procerana* in SE Europe based on the main observation points. The historical antecedents of the distribution trends shown on the map were established during a favourable postglacial period. The reasons for the strong fragmentation, persistence and extinction are not known.

The hypothetical geographic range of the species is 154 766 km², and 20 isolated sites are known in this geographic area. The northernmost occurrence (HU, Budapest) is 692 km from the nearest Balkan site (BG, Veliko Tarnovo).

France, Portugal, and Spain). In the Western Balkans, in the 1980's, it was noted sporadically in along xerothermophilous paths and roadsides, in disturbed zones, along the margins of Mediterranean Pine woods and shrubland and in rocky areas on karst.

Range in Hungary: in the Hungarian faunistic literature, the name of the species can only be found in the publications of Gozmány (1968, 1971), in which there is no mention of any specific locality. Razowski (2001, 2009) does not mention *P. purana*. In his earlier, Palaearctic volume (Razowski 1970), he mentions Hungary, citing Kennel (1913). In addition, see Kennel (1921), page 297, where he wrote: "Hab. Südfrankreich, Ungarn, Bithynien". During personal investigations, no specimens have been found in any Hungarian collections.

Distribution: according to Razowski (2009), *Ph. purana* is a sub-Mediterranean faunal element, found mainly in southern Europe, France, Croatia, and Bosnia.

Remark: it is assumed that Kennel's (1913) Hungarian data (specimens) are from the Adriatic coast of historic Hungary, which is now part of Croatia. The find 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 is not impossible that *Phtheochroa purana* will also appear in Central Europe as an adventive species. Its permanent establishment in that region is unlikely.

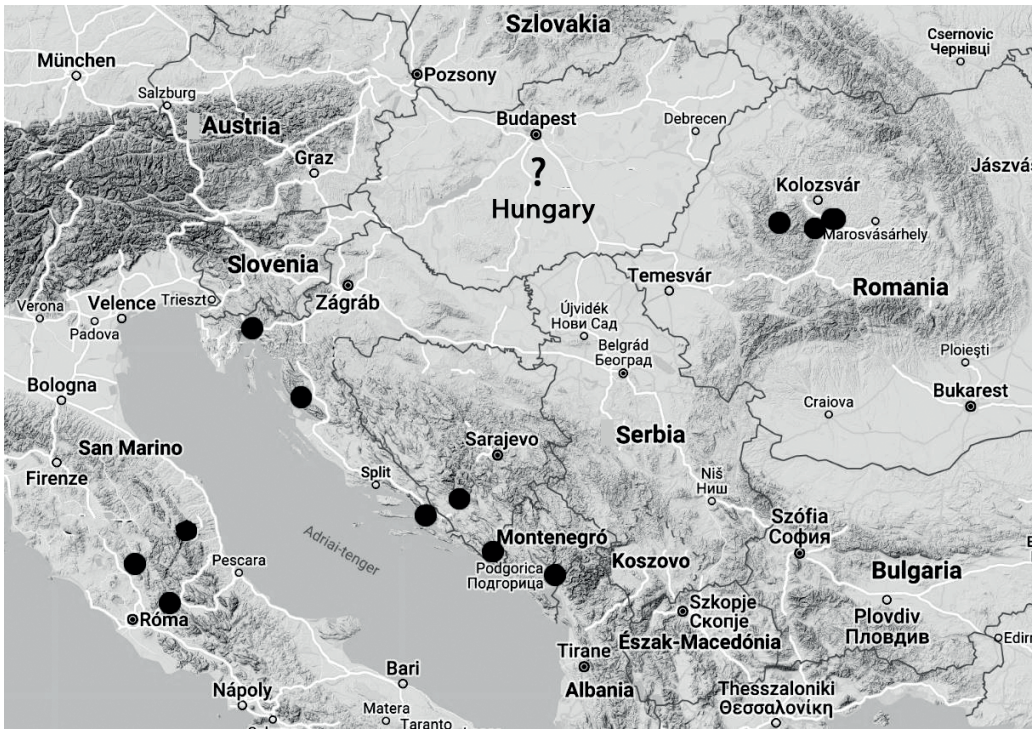

Fig. 10. Geographical distribution of *Phtheochroa purana* in Italy, the Western Balkans and Romania (preliminary, verified map)

8. ***Phtheochroa duponchelana*** (Duponchel, 1843)

Biology: according to Razowski (2009) the moth flies in two generation late March to mid-May, and July. The larva and the food plant are unknown. It is assumed that it lives on *Acanthus spinosus*. This plant is native to Mediterranean regions but is planted in many areas as an ornamental.

Range in Hungary: only Gozmány (1968, 1971) and Razowski (2009) mention the species from Hungary, without any evidence. There are no identified specimens in Hungarian collections. There is only one, unlabelled, specimen in the Hungarian Museum of Natural History in Budapest. It is said to have been collected on the "Csiki" hill near Budapest a few decades ago. The area has since been developed and the habitat destroyed.

Distribution: elsewhere, the range of *Ph. duponchelana* is not clearly 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 (e. g., Montenegro). It is probably a highly fragmented Holomediterranean faunal element.

Remark: it cannot be proved, but probably *Ph. duponchelana* is extinct in Hungary.

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

Biology: flight period early May and June. Inactive by day. It may sometimes be seen on warm evenings flying about its habitat, but is usually more active towards dusk, occasionally observed at light. Larvae oligophagous on flowers and leaves *Bryonia dioica*, and probably *Echballium elaterium*. Preferred habitats are mesophilic and xerophilic meadows, roadsides, weedy areas, edges of groves. There are also populations in arboreta (e.g., Szombathely).

Range in Hungary: *Ph. rugosana* is known mainly from low mountainous areas (e.g., Ba-

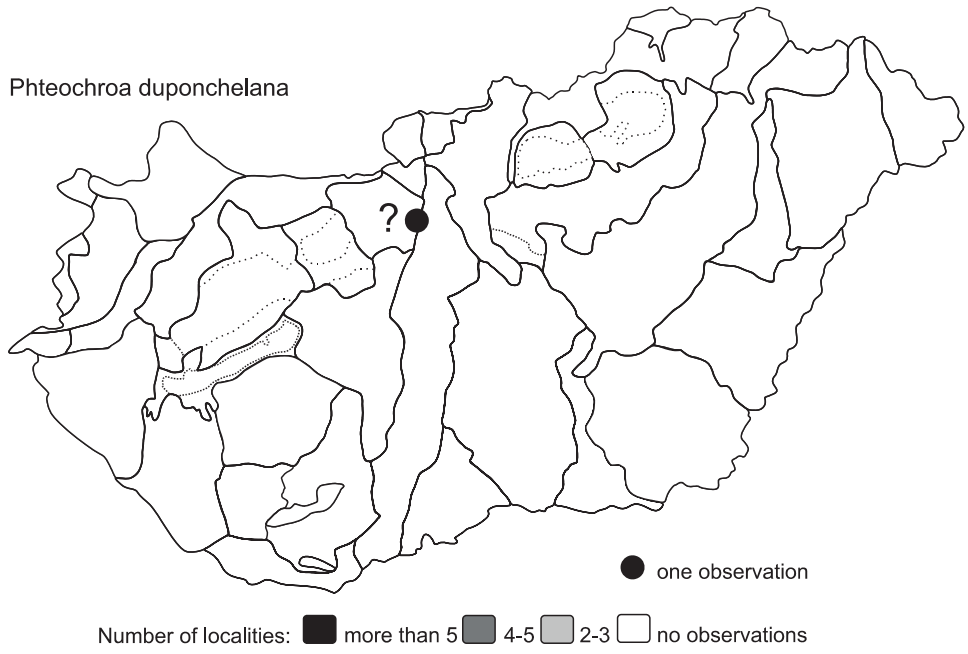

Fig. 11. Localities of *Phtheochroa duponchelana in Hungary*

kony Mts., Mátra Mts., Vértes Mts.), and hills, but it also occurs sporadically on the edges of the Hungarian lowlands (e.g., Tápió-vidék).

Distribution: incompletely known. Razowski (2009) states that it is a European faunal element, but this is disputed. According to several literature records (cf. Bradley 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, and is a local and uncommon species. It is most likely an expansive Holomediterranean faunal element.

Remark: according to Razowski (2009), imagines 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: specimens have so far only been collected at night with a lantern in April and May. During the day, they sit on leaves in the vegetation, whence they can be disturbed. The larvae feed on seeds in fruits of *Bryonia dioica*, but also on the leaves. They pupate in a fine web on the food plant. The habitats studied so far are dominated by forested areas.

Ph. annae has been found along 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 *Ph.* rugosana. Subsequently, it has been found from Nemesgulács and also from Vértes Mountains (Fazekas 1991, Pastoralis & Szeőke 2018). These localities are located in the Transdanubian Mountains at low altitudes (250-300 m). Since the sister species *Ph. annae* and *Ph. rugosana* occur sympatrically, their identity should be checked with care.

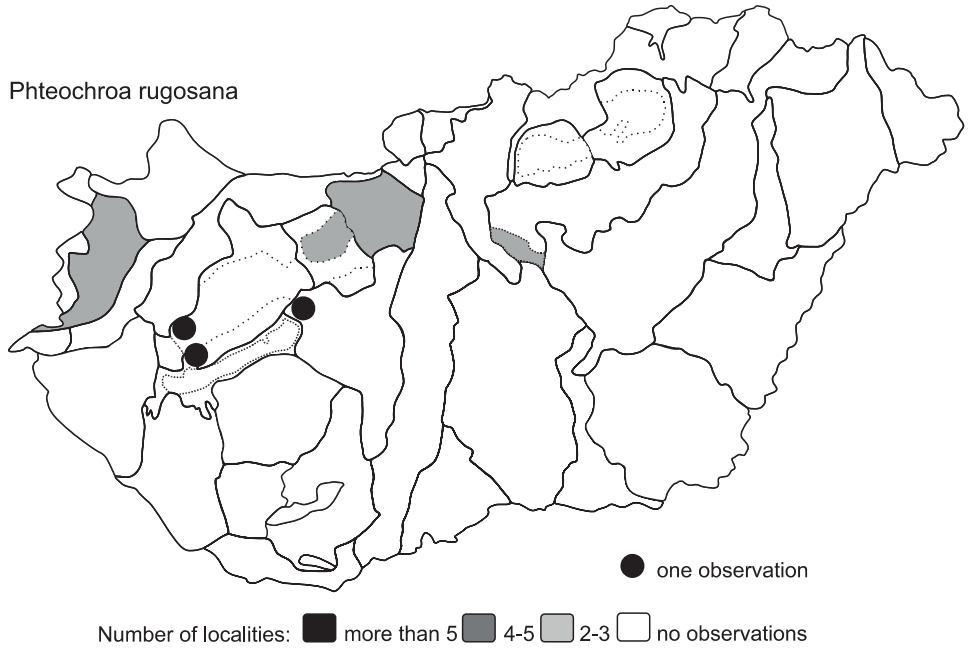

Fig. 12. Localities of *Phtheochroa rugosana in Hungary*

Distribution: only few confirmed records are known from Austria, Hungary, Romania, Bulgaria (Zlatkov & Sivilov 2012) and Greece. The geographical distribution of *P. annae* will only be worked out following a revision of the species in collections. Material from Greece requires molecular data and re-examination (P. Huemer pers. comm).

Remark: in very local populations in Hungary, numbers are very low. In some years the species is not even detected. According to Huemer (1990) *Ph. annae* should show only a small geographical range of variation: specimens from Austria, Hungary and Romania show no variability, the examined individuals from Greece differ somewhat in the width of the valva and the antrum but are nevertheless regarded as conspecific.

The following points should be considered when distinguishing the species *Phtheochroa rugosana*: *Ph. rugosana* varies externally both in size and in the markings of the forewings. The genitalia show only a very small range of variation that cannot be geographically correlated: the male genitalia vary only slightly in the valve with, but also in the number of transtilla teeth; the female genitalia show a certain range of variation, especially in the extent of the corpus bursae sclerotization (see Fazekas 1991, Huemer 1990).

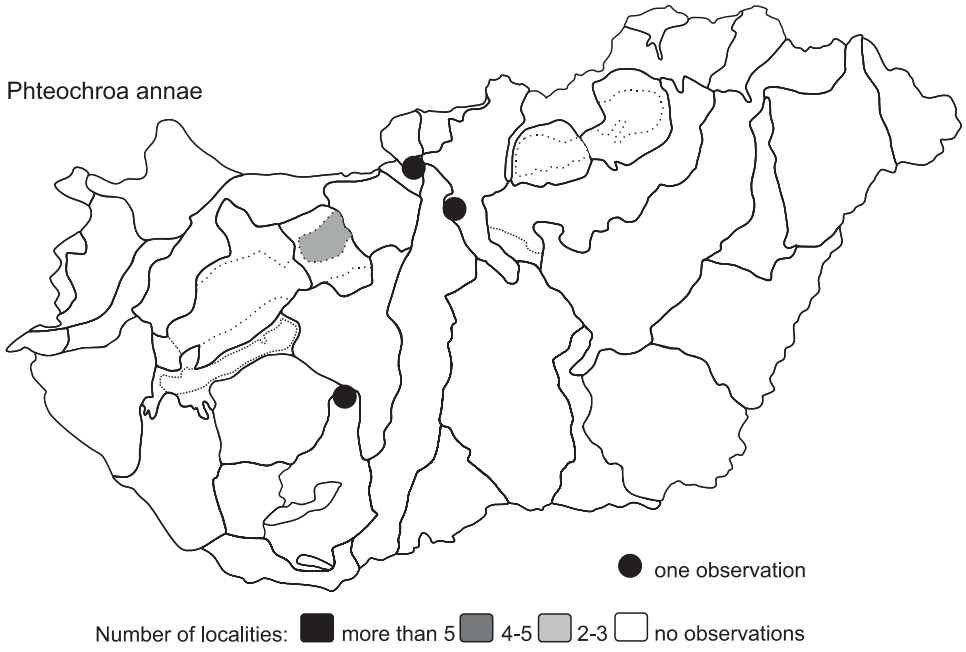

Fig. 13. Localities of *Phtheochroa annae* in Hungary

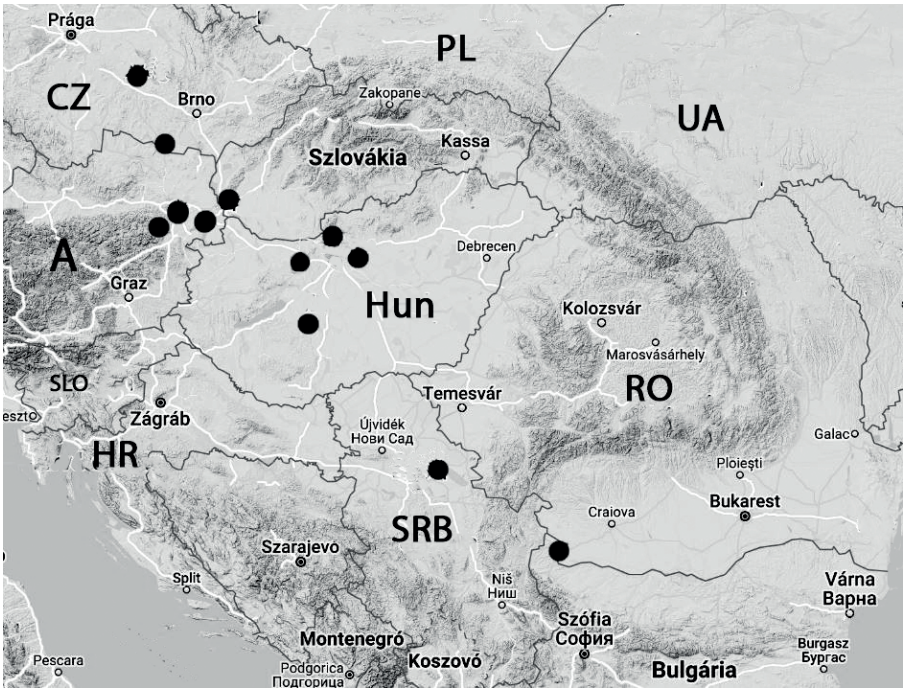

Fig. 14. The geographical distribution of *Phtheochroa annae* in Central and South-Eastern Europe. The known range is 450 000 km², the total number of occurrences is only 15. It reaches the coast of Asia Minor in the south and the Czech Republic in the north. It is probably an Anatolian, Balkan and Central European species with a less known chorology.

Review

This is the first study in Hungary to review the biology and geographical distribution of *Phtheochroa* species. It concludes that 10 species have been documented in the country so far. *Phtheochroa duponchelana* is probably extinct in Hungary. *Phtheochroa procerana* has its northernmost distribution in Hungary (Budapest). The survival of this highly isolated population is questionable, the last specimen was collected in 1942 and no observations have been made since then.

Chorologically, the faunal elements were examined, and within them the so-called faunal components. The results are presented in a table (see Table 1). The fauna types (see table) is dominated by Mediterranean species, with very few widespread Palaearctic or Euro-Siberian species. Faunal component analysis shows that species are predominantly associated with mesophilic and xerophilic habitats. They prefer warm, steppe-like hilly areas and the southern slopes of low mountain ranges. Geographically, the sandy areas between the Danube and Tisza rivers and the remaining patches of the forested steppe are very important for the distribution of Hungarian species.

Table 1. List of the Hungarian *Phtheochroa* species faunal types and faunal components.
Faunal types: Trpal= Transpalaearctic, EuSib = Euro-Siberian, Eur-Cauc= European-Caucasian,
Eur-Am= European-Asia Minor, Submed= Submediterranean, Pmed-Anat= Pontomediterranean-Anatolian, Hmed= Holomediterranean
Faunal components: Rst= rock grass slope steppe, Mes-sil= mesophil-silvicol, Mes-eur= mesophile-euryök,
Ndf= nemoral deciduous forest, MeXerMe= mesophilic and xerophilic meadow.

Species	**Faunal types**	**Faunal components**
1. *Phtheochroa inopiana*	EuSib	Mes-eur
2. *Ph. schreibersiana*	EuAm	Ndf
3. Ph. pulvillana	Trpal	Steppe
4. *Ph. sodalina*	Eur-Cauc	Mes-sil
5. *Ph. fulvicinctana*	Submed	Steppe
6. *Ph. procerana*	Pmed-Anat	Rst
7. *Ph. purana*	Submed	Rst
8. *Ph. duponchelana*	Hmed	MeXerMe
9. Ph. rugosana	Hmed	MeXerMe
10. *Ph. annae*	unknown	Mes-sil

The majority of the Hungarian *Phtheochroa* species are oligophagous; monophagous species are very rare. The majority of species live on herbaceous plants. *P. schreibersiana* and *Ph. sodaliana* are associated with shrubs or trees. A total of 15 food plants have been identified:

Asparagus officinalis
Acanthus spinosus
Artemisia campestre
Bryonia dioica
Cephalaria leucantha
Echballium elaterium
Eupatoriun cannabinum
Frangula alnus
Limonium gmelinii
Limonium vulgare
Populus nigra
Pulicaria dysenterica.
Prunus padus
Rhamnus cathartica,
Ulmus minor

Table 2. Food plants spectrum and preferred habitat types of *Phtheochroa* species in Hungary. Larval foodplants information: the botanical nomenclature of Hungarian plants in this list is based on "Új magyar füvészkönyv" by Király [ed.] (2009).

Food plants	*P. inopiana*	*P. schreibersiana*	*P. pulvillana*	*P. sodaliana*	*P. fulvicinctana*	*P. procerana*	*P. purana*	*P. duponchelana*	*P. rugosana*	*P. annae*
Acanthus spinosus								+		
Artemisia campestris	+									
Asparagus officinalis			+							
Bryonia dioica									+	+
Cephalaria leucantha							+			
Echballium elaterium									+	
Eupatoriun cannabinum	+									
Frangula alnus				+						
Limonium gmelinii					+					
Limonium vulgare					+					
Populus nigra		+								
Pulicaria dysenterica	+									
Prunus padus		+								
Rhamnus cathartica				+						
Ulmus minor		+								

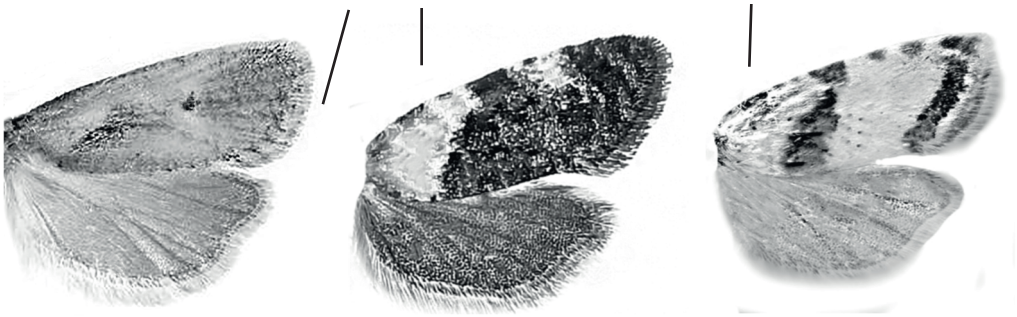

Table 3. Food plants spectrum and preferred habitat types of *Phtheochroa* species in Hungary. The majority of species live at the grassland level. The following species live in the canopy of trees: *Ph. schreibersiana, Ph. sodaliana.*

1. *Asparagus officinalis - P. pulvillana*
2. *Acanthus spinosus - P. duponchelana*
3. *Artemisia campestre - P.. inopiana*
4. *Bryonia dioica - P. annae, P. rugosana*
5. *Cephalaria leucantha - P. purana*
6. *Echballium elaterium - P. rugosana*
7. *Eupatoriun cannabinum - P. inopiana*
8. *Frangula alnus - P. sodaliana*
9. *Limonium gmelinii - P. fulvicinctana*
10. *Limonium vulgare - P. fulvicinctana*
11. *Populus nigra - P. schreibersiana*
12. *Pulicaria dysenterica - P. inopiana*
13. *Prunus padus - P. schreibersiana*
14. *Rhamnus cathartica - P. sodalina*
15. *Ulmus minor - P. schreibersiana*

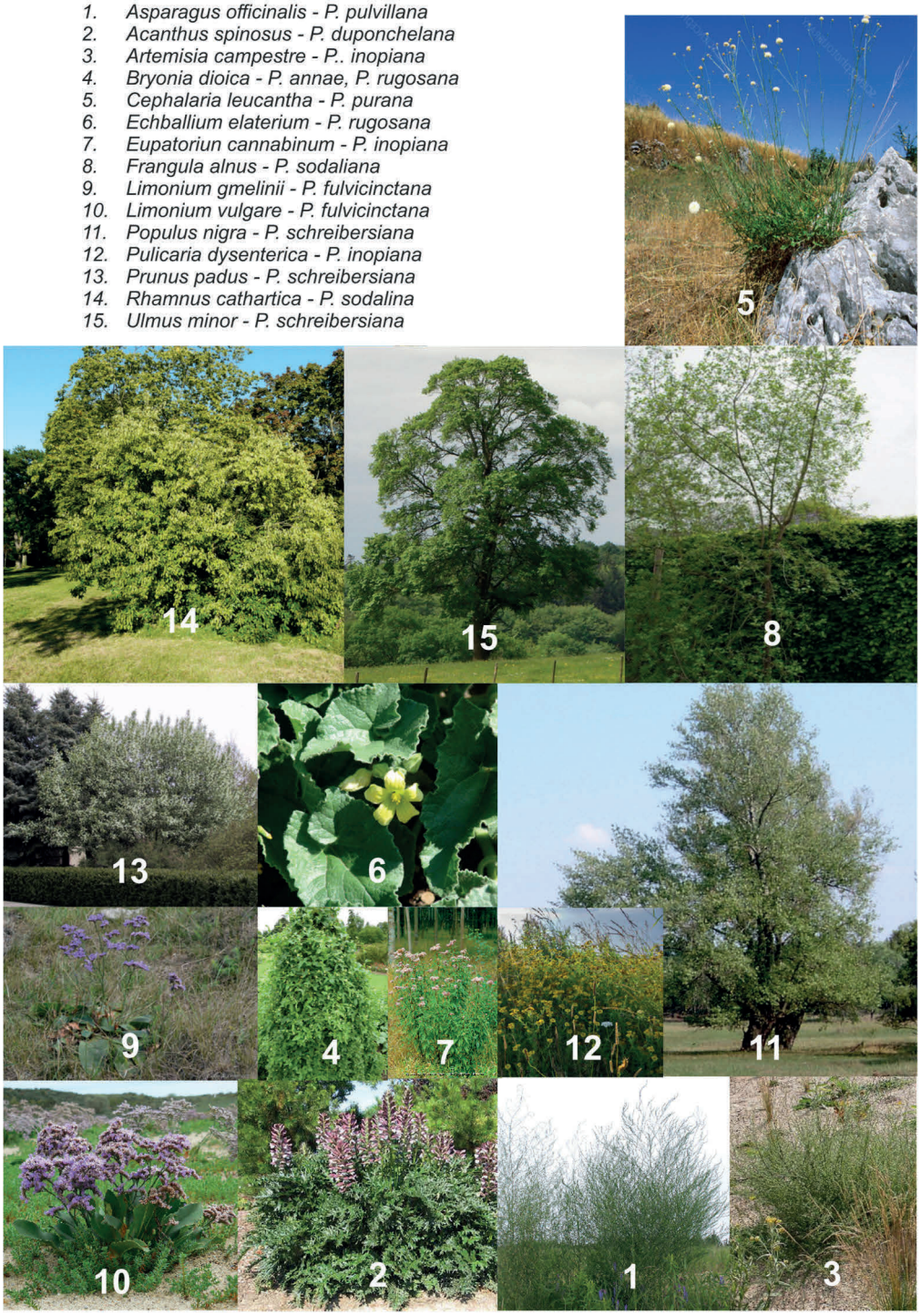

Fig. 16. Diagnostic characters of wings of Hungarian *Phtheochroa* species

Acknowledgements

My colleagues Ferenc Buschmann (HU), Zoltán Kovács (RO), Boyan Zlatkov (BG), Gábor Pastorális (SK), Ignác Richter (SK), Josef Razowski (PL), Pasquale Trematerra (IT), Peter Huemer (AT), Bong-Kyu Byun (KR) helped me in discussion of the distribution and bionomic data. Language proofreading was done by Barry Goater (GB). The German summary was read by Gerhard Tarmann (AT). Thank you all for your help.

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https://doi.org/10.24386/LepidHung.2022.18.1.45 HU ISSN 2732–3854 (print) | HU ISSN 2732–3498 (online)

Lepidopterologica Hungarica 18(1): 45–53. | https://epa.oszk.hu/04100/04144

Received 01.03.2022 | Accepted 23.03.2022 | Published: 29.03.2022 (online) | 26.06.2022 (print)

ZooBank: https://zoobank.org:pub:C2A6DF5E-344B-4B82-8ED7-F522FF186885
Zenodo: https://zenodo.org/record/6390442#.YkG56C3P3_M | https://doi.org/10.5281/zenodo.6390442

New observations and notes of *Prays citri* Millière, 1873 in Hungary (Lepidoptera: Praydidae)

Imre Fazekas

Citation. Fazekas I. 2022: New observations and notes of *Prays citri* Millière, 1873 in Hungary (Lepidoptera: Praydidae). – Lepidopterologica Hungarica 18(1): 45–53.

Abstract. The paper presents new data on observations of *Prays citri* Millère, 1873 in Hungary. It is found in large glass houses and in grass gardens. Professionals working there had not recognized the species. The author identified it by genital examination. In his opinion, the species may be present in several private nurseries where citrus fruits are kept in containers during the growing season and then moved to a warm place to escape winter frosts. Many citrus shipments arrive in Hungary from Mediterranean countries, so it is important to monitor *Prays citri* and organise its control. The study is illustrated with 17 figures.

Keywords. New records, citrus flower moth, biology, distribution, Hungary.

Author's address. Imre Fazekas | Pannon Institute | 7625 Pécs, Magaslati út 24. | Hungary
E-mail: fazekas@lepidoptera.hu

Introduction

In Hungary, three species of the genus *Prays* Hübner, 1825 are at present (Pastorális & Buschmann 2018): *P. fraxinella* (Bjerkander, 1784), *P. ruficeps* (Heinemann, 1854) and *P. citri* Millère, 1873). The first two species are indigenous to the Hungarian fauna, while *P. citri* was introduced to Hungary (Takács *et al*. 2018). *P. citri* was first captured in a sex phero-mone trap set in a fallow field near the Vala Valley Rest Area (Kajászó) on the M7 (E71) mo-torway (EOV: 627060; 218348 | 47.18315N | 18.44388E) (Takács *et al*. 2018), which was de-ployed on 15 April 2017 and operated until 4 May 2017. A total of 10 *P. citri* specimens were caught. The study aimed at detecting the presence of insect species not native to our country, accompanying seedling consignments imported from abroad. According to Attila Takács (pers. comm. 2022), he is not aware of any new sites or specimens of *P. citri* observed in the last five years.

In mid-February 2022, a light trap at the ELTE (= Eötvös Loránd University) Botanic Garden (1083 Budapest, Illés u. 25. | 47.48395N; 19.08561E) collected more than 50 very worn specimens near the citrus trees. As unknown, unidentified specimens, Attila Haltrich and György Zsigó sent them to me (Pécs, Pannon Institute) for identification. Following mounting and genital examination, it was clearly established that a second occurrence of *P. citri* had been detected in Hungary, only 41 km east of the first occurrence (Kajászó). A photograph of a mined lemon tree leaf showing presumed damage was received along with the specimens (Figure 14), but clearly this was not caused by *P. citri*, as it primarily infests the flowers of citrus fruits. Subsequently, Attila Haltrich and György Zsigó surveyed the flowering citrus in the ELTE Botanical Garden on 13.03.2022 and found numerous damaged flowers with larvae of another species; adult moths were flying continuously and present in the light trap for two months after the first sighting (mid-February 2022 and were shown to be

Phyllocnistis citrella. This species has been previously detected in Hungary (Katona *et al*. 2020), but this is only the second record.

Results

The species of the genus *Prays* are very like *Atemelia torquatella*, with some apomorphic similarities: r4 and r6 stalked in the forewing, m3 and cux fused in the hindwing; head without a longitudinal seam, characteristic formation of the VIII sternite. Pierce & Metcalfe (1935) emphasized that they are not to be classified among the Yponomeutids and show closer relationships to *Scythris* Hübner, 1825 (see Friese 1960).

Prays citri Millère, 1873
Acrolepia citri Millière, 1873| Lépidoptères nouveaux de France. – Petites nouvelles entomologiques **5** (77): 310. | Locus typicus: Corsica.
References. Arambourg & Pralavorio 1978; Abo-Sheaesha & Agamy 2004; Agassiz *et al.* 2013: El-Metwally *et al*. 2010; Friese 1960; Huemer 2016; Morena *et al*. 1990; Seliger & Hemmersbach 2018; Pastorális & Buschmann 2018; Takács *et al.* 2018.

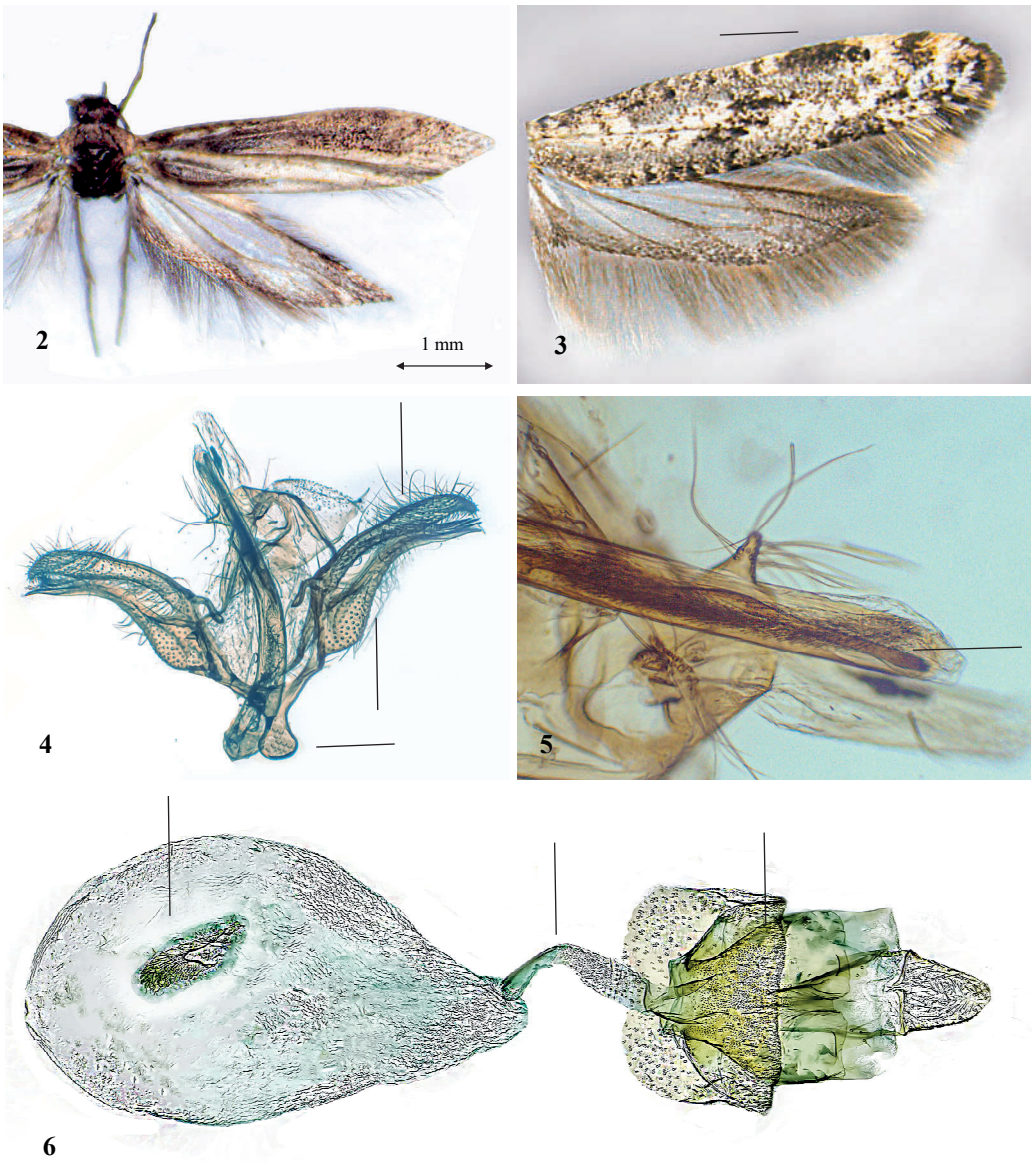
Examined material. 57 adult specimens and 8 larvae | Budapest, ELTE Botanical Garden (=füvészkert), 1083 Budapest, Illés u. 25. | 47.48395N; 19.08561E) | in coll. Pannon Intézet, Pécs. | 3 larvae in Pécs, University of Pécs, Botanical Garden, Ifjúság útja 6. | 46.077328N; 18.205831E.

Diagnosis. Wingspan 10-12 mm. Head grey brown. Antennae just over half length of forewing. Forewings grey brown with many darker spots. Hindwings grey, margin smudged with black, and the dorsum marked with two oblong spots also black.

Acrolepia Citri.

Envergure 12 mill. — Très-voisine pour la coupe d'ailes de l'*Assectella*, Z., et de la *Vesperella*, Z. (*Smilaxella*, Mill.) Les ailes sont allongées, d'un aspect gris foncé et luisant. Les supérieures sont rectangulaires, à fond blanchâtre, aspergées d'atomes noirs et traversées par une bande diagonale très-obscure, laquelle présente vers son milieu un signe noir en forme de ≺ couché, dont la pointe se projette extérieurement. La côte est maculée de noir et le bord interne marqué de deux taches oblongues également noires. Les ailes inférieures sont unicolores. Le dessous est gris, cependant les nervures sont bien indiquées en noir. Thorax et abdomen concolores.

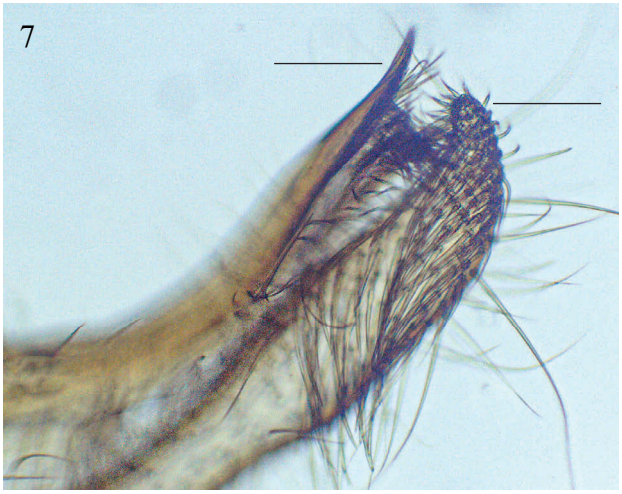
Fig. 1. Citation of original description by Millière 1873 (extracts from the text)



Figs 2-6. *Prays citri*: **2.** ♀ adult, Budapest; **3.** pattern of the right wings (enlarged); **4.** ♀ genitalia, gen. prep. Fazekas I. No. 3509; **5.** magnification of tip of aedeagus, sign indicating the long cornutus; **6.** ♀ genitalia, gen. prep. Fazekas I. No. 3510.

Male genitalia. Costa of valva slightly curved, lateral margin concave; sacculus strong, cucullus with a cleft and a branch; vinculum well developed, drumstick-like. Aedeagus long, slightly curved, cornutus rod-like.

Female genitalia. Ostium bursae broad, sclerotized; ductus bursae short, corpus bursae pear-shaped, with a large jug-shaped signum.



Figs 7–8. *Prays citri*: **7.** characteristic structure of the apex of the right valva (♂); **8.** lateral view of abdomen of female.

Bionomics. *Prays citri* is an important pest of citrus in parts of the Mediterranean, from Portugal, Spain, Italy and Greece to Turkey and the Middle East. The preferred main food plants are *Citrus aurantiifolia*, *C. limon*, *C. medica*, *C. reticulata*, and to some extent *C. sinensis*. It also feeds on various species of Rutaceae and Sapotaceae (*Manilkara zapota, Casimiroa edulis*) and Oleaceae (*Ligustrum lucidum*).

Up to 3–6 generations are produced each year. Females lay oval, whitish, ~0.2 mm eggs on flower buds or in flowers. The number of eggs varies from 50 to 160, but even larger numbers have been observed. Larvae light grey, green, or brown, reaching 4–5.5 mm long at the last larval stage. Larval development takes about two weeks, depending on temperature. Some larvae burrow into the fruit but die there. Necrotic lesions develop at the site of these tiny boring marks, causing a reduction in the quality of the citrus fruit. The greenish, brownish pupae are found in damaged flowers, between leaves and even on fruit. The pupal stage lasts for 6-8 days.

According to some observations, the larvae can cause 15–70% to >90% damage to flowers, resulting in significant yield losses.

The females move from flower to flower (or bud to bud) and deposit 1–3 eggs on each, laying about 100 or more eggs. The emerging larvae bore into these structures, wherein they feed and produce abundant webbing that ties the flowers together. There is much overlap of the several generations during summer and autumn. Females attract males by a pheromone that is produced at night. The moths, which are weak fliers, tend to remain in the same area (http://www.agri.huji.ac.il/mepests/pest/Prays_citri/).

According to Moore & Kirkman (2014) in South Africa it was shown that the first generation of *P. citri* in spring attacks lemon blossoms and it is the second generation that develops on fruit, leading to blemishing of fruit and possibly even crop reduction.

According to Abo-Sheaesha & Agamy (2004) the egg parasitoid *Trichogramma evanescens* (Westwood) (Trichogrammatidae) is very effective in controlling the species. Several bacteria of the genus *Bacillus* have infected the pest in Egypt and an application of a commercial product of *Bacillus thuringiensis* reduced larval infestations by about 60–75%. According to El-Metwally *et al*. (2010) three species of entomopathogenic bacteria were isolated identified and tested on larvae (CFM= citrus flower moth). Statistical analysis indicated that *B. sphaericus* had the highest pathogenicity to CFM, while *Bacillus subtilis* ranked second in the order of activity, *B. thurengeinsis* had the lowest entomopathogenic properties.

Figs 9–15.
Illustrations of the bionomy of *Prays citri* in Hungary:
9. Budapest, light trap; **10.** larva in a flower of a lemon tree; **11.** pupae; **12.** traces of larval feeding activity (© Haltrich A.); **13.** clumps of sap and chewed flowers in Pécs (© Fazekas I.)

14. Leaf mines of *Phyllocnistis citrella* on a lemon tree in Budapest (© Haltrich A.)

15. The first location of *Prays citri* in Hungary in 2017; 47.18315N | 18.44388E (©Takács A.)

Morena *et al*. (1990) examined the parasites of *P. citri* in Spain and identified the following species and wrote the following: "The parasitoids of *P. citri* were determined in the laboratory at 22–24°C, 60–70% RH and LD 16:8 using eggs, larvae and pupae collected in a lemon growing area of Spain. The braconids *Phanerotoma bilinea*, *P. dentata*, *Microchelonus rimatus*, *Habrobracon* [*Bracon*] sp. and *Choeras* sp. were found parasitising the pest for the first time. Two established parasitoids (*Bracon laetus* and *Ageniaspis fuscicollis*) were also observed. A new hyperparasitoid of *B. laetus* (*Gyrinophagus* sp.) was also established. *Heteropelma* sp. and *Choeras* sp. were found parasitising the tortricid *Cacoecimorpha pronubana* and the geometrid *Gymnoscelis pumilata* [*G. rufifasciata*]".

From the obtained results, it can be concluded that the highest activity of *Prays citri* has been recorded when mean temperature was 18.4 and 16.4°C (during the first and second seasons, respectively). These results are supported by Burgio *et al.* (1974) who found that the maximum number of laid eggs was obtained at 20°C. According to statistical analysis of the present study, mean temperature and relative humidity had relatively low effects on *P. citri* population. Mineo *et al.* (1980) reported that climatic and cultural factors had considerable effects on *P. citri* activity in Sicily. With respect to wind speed, there was insignificantly positive and negative correlation between *P. citri* and the changes of mean wind speed during the first and second years of study. According to Jonason *et al*. (2014) flight activity of micro moths is markedly affected by wind speed with no flight occurring above at wind speeds greater than 10km/hr. Wind speeds above 8km/hr reduce the moth flight activity.

New localities in Hungary

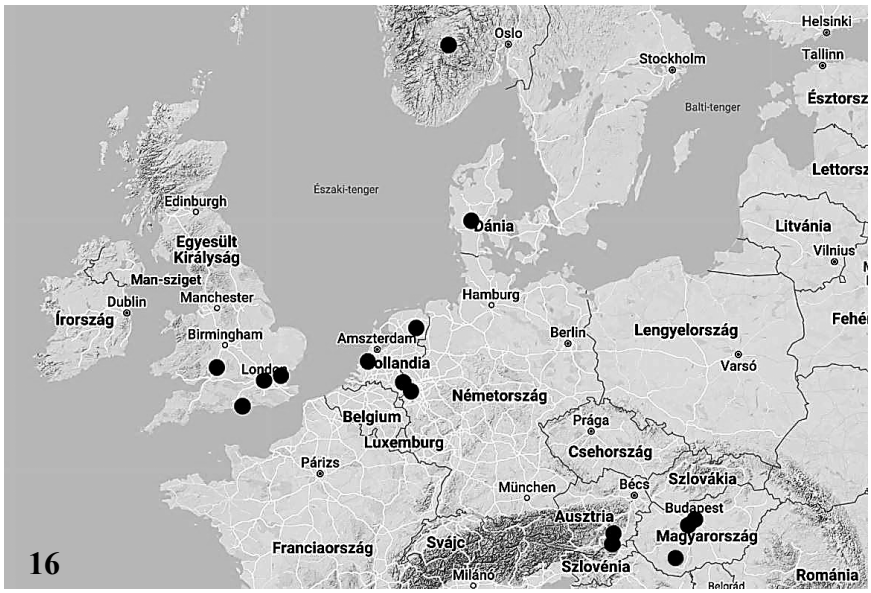
1.Budapest, Eötvös Loránd University) Botanic Garden, 1083 Budapest, Illés u. 25. | 47.48395N; 19.08561E); The first Hungarian Botanical Garden was founded in 1771 by the predecessor of Eötvös Loránd University. It was moved to its present premises more than 150 years ago and in 1960 it became a National Nature Reserve. The Botanical Garden contains about 7, 000 species and varieties of plants. The orangery built in the 19th century and the greenhouse restored in 1984 are the home of the tropical and sub-tropical plants.

2. Pécs, University of Pécs, Botanical Garden, Ifjúság útja 6. | 46.077328N; 18.205831E. The park used to be the garden of the Jesuit Pius Grammar School. Following the foundation of the Biology Department at the former Teachers' Training College, its development into a botanical garden was launched in 1952. The garden is under the professional supervision of the Department of Plant Systematics and Geobotany at the Faculty of Sciences, while its financial management belongs to the central financial body of the university. The garden was declared a County Nature Conservation Area in 1989.

Geographical distribution

Prays. citri is known throughout the Mediterranean region. It has been observed in South Asia, the Indomalayan Archipelago, Australia, South Africa. However, its occurrence in Southeast Asia and Australia should be treated with caution, as *Prays citri* can be confused with *P. nephelomima* Meyrick, 1907, *P. endocarpa* Meyrick, 1919.

Prays citri has spread throughout the Mediterranean following the planting citrus trees [see in www.cabi.org]: Cyprus, Greece, Malta, Italy (regional), Sicily, Sardinia, Corsica (= locus typicus!), Balearic Islands, France (restricted to the south), Spain, Portugal, Canary Islands, Azores and Madeira (see map). It has also been reported from Albania, Austria, Croatia, Denmark, England, Hungary, Germany, the Netherlands, Norway, Turkey. It is mainly found in nurseries and herb gardens, but also indoors. The species overwinters in these temperate, heated spaces.



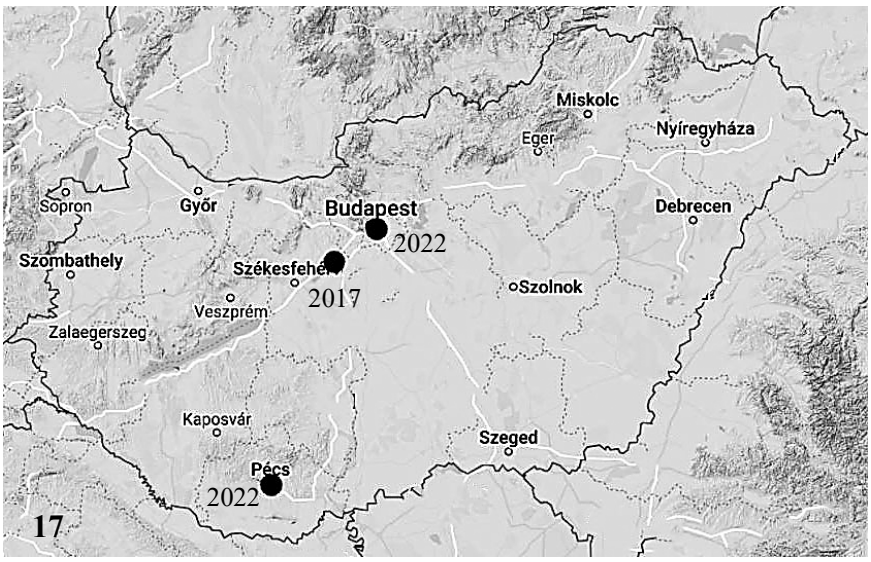


Fig. 16. Observed occurrences of *Prays citri* in Central, Western and Northern Europe (sketch distribution map). Details are described in the text.

Fig. 17. Observed occurrences of *Prays citri* in Hungary, with the year of observation.

Notes

Observations in Central and Western Europe are reported in chronological order (outline) from Denmark (Buhl *et al*. 2001), England (Agassiz *et al*. 2013), Austria (Huemer 2016), Hungary (Takács *et al*. 2018) and Germany (Seliger & Hemmersbach 2018). In Holland, since the first discovery in 1995, the species has been collected a dozen times by the Plant Protec-

tion Service. It is often imported with citrus trees from tropical or Mediterranean areas. In 2010 the species was collected for the first time in the wild in Geulle (Province of Limburg). In 2014 some specimens were collected on a citrus tree indoors in Sleen (Province of Drenthe) and a specimen was reported from Mook (province of Limburg). Incidental, with no evidence of reproduction in the wild. (https://www.nederlandsesoorten.nl/linnaeus_ng/app/views/species/nsr_taxon.php?id=167302 [17.03.2022]

Not surprisingly, animals from these areas are sometimes brought to Central or Northern Europe with the lemon. Thus, Buhl *et al*. (2001) are the first to record Denmark, with reference to introductions: "Four species were first reported as introductions: *Lindera tessellatella, Prays oleae, Prays citri* and *Sameodes cancellalis*."

Agassiz *et al*. (2013) list the species as an "adventive species", and for England they write: "One specimen London, 2000: (Honey, 2001). Cosmopolitan." At [norfolkmoths.co.uk], you can learn about Britain: "First recorded in London in 2000, the larvae feed within the fruit of *Citrus* sp. causing sufficient damage to make it a serious pest. With several open-network cocoon exuviae (including a dead moth) found at the base of two linden plants at Bressingham Horticultural Centre in 2016 (B. Heckford, S. Beavan. 02.10.2016)".

Interesting is the first record of the species in Austria, reported by Huemer (2016). Huemer. Example ID: TLMF Lep 18197; Series ID: LEATJ622-15 (658 bp). First record from North Tyrol and Austria! Previously unknown from East Tyrol and South Tyrol." On May 11, 2020, Horst Pichler [forum post of May 13, 2020] found a moth in his garden in St. Peter, Graz, Styria - where there are no lemon trees.

Seliger and Hemmersbach (2018) were the first to report on the species in Germany, specifically in North Rhine-Westphalia: the larvae twisted the associated citrus flowers into a ball and pupated in it. A total of 28 moths hatched between 24 October and 10 November 2017. Given the increasing popularity of citrus in recent years, often kept in gardens as tub plants and overwintering in heated rooms, it is very likely that *P. citri* is present in Germany and other central European countries in several locations.

Acknowledgements

I would like to thank Attila Haltrich (H-Budapest) and György Zsigó (H-Budapest) for sending me the test material and for inspecting the citrus flowers on the spot. Thanks to Attila Takács (H-Velence) for sharing information about the first Hungarian locality of *Prays citri*. Thank you to Tamás Wirth (H-Pécs) for providing me with the opportunity to inspect the University of Pécs Botanical Garden. Finally, I thank my colleague Barry Goater (UK) for linguistic and stylistic corrections to the manuscript.

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Received 22.03.2022 | Accepted 28.03.2022 | Published 05.04.2022 (online) | 26.06.2022 (print)
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New records on the Balkan Coleophoridae with description of *Coleophora colinplanti* Baldizzone & Richter, sp. nov. (Lepidoptera, Coleophoridae)

Giorgio Baldizzone* & Ignác Richter

Citation. Baldizzone G. & Richter I. 2022: New records on the Balkan Coleophoridae with description of *Coleophora colinplanti* Baldizzone & Richter, sp. nov. (Lepidoptera, Coleophoridae). – Lepidopterologica Hungarica 18(1): 55–70.

Abstract. The paper deals with new records on the geographical distribution of 34 Coleophoridae in the Balkan area. Moreover, is described *Coleophora colinplanti* Baldizzone & Richter, sp. n., from North Macedonia, belonging to the group of *Coleophora kahaourella* Toll, 1957

Keywords. Lepidoptera, Coleophoridae, new species, distribution, Balkan area.

Addresses of the authors. Giorgio Baldizzone | I-14100 Asti, via Manzoni 24, Italy |
E-mail: baldizzonegiorgio@gmail.com | Orcid 0000-0001-8127-0843
Ignác Richter | SK-97101 Malá Čausa 289, Slovakia | E-mail: ignac.richter@gmail.com
Orcid 0000-0001-8122-8709

Introduction

During the 21st century a good number of distributional and taxonomic works have been published which have significantly increased the number of the Coleophoridae known for the Balkan area (Richter & Pastoralis 2015; Richter, 2017, 2018; Baldizzone, 2016b, 2019b, 2019c). This result derives from the field researches of the authors of this paper, and of many collectors who have given their specimens to the two authors for determination. The publication aims to present further data on the distribution of 34 species of this family and also to describe a new species collected in North Macedonia: *Coleophora colinplanti* Baldizzone & Richter n. sp.

Material and methods

The Euparal slide mounts of dissected genitalia were photographed with a Bresser MicroCam II 12 MP attached to a BTC trinocular microscope, mainly using the Nikon 10/0.30 objective. The CombineZP program was used for stacking layers into deep-focus images. The photos were cleaned and edited with Adobe Photoshop version 21.0.2. Adults were photographed with a Canon EOS 600 D digital camera equipped with a Canon MP-E 65 mm objective, with lighting provided by two circular neon lamps OSRAM L 32W / 8400 C (cool white).
Morphological terms follow Baldizzone (2019a).

Abbreviations. coll. = collection; det. = determinavit; IgR = Ignác Richter; leg. = legit

*Contribution to the knowledge of Coleophoridae CLIII

Description of new species

Coleophora colinplanti Baldizzone & Richter, sp. nov. (Figs. 1, 2, 3, 5)

Holotype: ♂ (GP 31535 IgR): North Macedonia, Galičica NP, 1666 m 40°989'622'' N | 20°877'730'' E, 31. VIII. 2021, leg. Ignác Richter, in research collection of Ignác Richter.

Paratype: ♂ (GP 30030 IgR): North Macedonia, Kozjak, Venec, W. of Nova Breznitsa, by road 302, 41°532'32.16''N | 21°13´48.89 E, 1060 m, 8. VIII. 2018, leg. Colin W. Plant, in coll. Richter.

Diagnosis. Species of medium size, of yellowish general appearance. Based on the structure of the male genitalia belongs to the group of *Coleophora kahaourella* Toll, 1957 (known from Spain, Tunisia and Libya) in which there are the following species: *C. pterosparti* Mendes, 1910 (known from Spain and Portugal), *C. cytisanthi* Baldizzone, 1978 (known from Italian oriental Alps and Slovenia), *C. olympica* Baldizzone, 1983 (known from Greece), *C. gredosella* Baldizzone, 1985 (known from Spain), *C. aetnensis* Baldizzone, 2009 (known from Sicily). The species whose the male genitalia most closely resembles that of *C. colinplanti* sp. nov. is *C. olympica* with obvious differences: in the male genitalia of *C. olympica* the tegumen is much narrower and slightly constricted in the middle, the transtilla is smaller, triangular at the apex, the nail-shaped seta of the dorsal part of the valvula is thinner and moved towards the base of the cucullus, the cucullus is narrower and longer, the sacculus is narrower and longer, without the sturdy seta in the dorsal angle, the phallotheca is narrower and longer.

Molecular diagnosis. BIN BOLD: AEH6141 (n = 1, 0 public). The nearest neighbour is *Coleophora kahaourella* Toll, 1957, with 4.65% p-distance.

One specimen of *Coleophora colinplanti* sp. nov. recorded in North Macedonia was successfully barcoded at the Canadian Centre for DNA Barcoding (CCDB, Biodiversity Institute of Ontario, University of Guelph). We obtained a full 658 base-pair long segment of the 5' terminus of cytochrome c oxidase gene; the sequences together with details of the sequenced specimens were uploaded to the Barcode of Life Data Systems (BOLD; Ratnasingham & Hebert 2007). This sequence was compared with sequences of all public records of *C. kahaourella* group available in the BOLD. Barcode data for *C. pterosparti* Mendes, 1910 and *C. olympica* Baldizzone, 1983 were not available to authors in the time of publishing of this work. The sequences were downloaded from BOLD using implemented BOLD multiple alignment algorithm (Ratnasingham & Hebert 2007) and subsequently edited and analysed in MEGA X software (Kumar et al. 2018). Degrees of intra- and interspecific variation in the DNA barcode fragments were calculated under the Kimura 2 parameter (K2P) model of nucleotide substitution using analytical tools in BOLD systems v. 4.0 (http://www.boldsystems.org). A neighbour-joining tree of DNA barcode data of available sequences was constructed using MEGA6 (Tamura et al. 2013) under the K2P model for nucleotide substitutions. It was assigned Barcode Index Numbers (BIN) to all taxa according to Ratnasingham & Hebert (2013).

Description. Wingspan 15 mm. Head white, shiny, mild creamy shaded. Antenna: scape white, light ochre suffused, flagellum ringed white and dark brown. Labial palpus white, light ochre on outer side; second segment about 1.5 times the diameter of the eye and a little longer than the third segment. Proboscis of normal shape. Thorax glossy white, tegula creamy white. Forewing light ochre scattered with white scales at the basis, costal strike white, broad from the base to the middle and then narrow to the apex; costal cilia white, dorsal cilia of ochreous colour. Hindwing brown, darker along the edges; cilia light ochre. Abdomen yellowish white.

Abdomen. Anterior lateral strut about 6 times longer than the posterior, transverse strut with proximal edge straight, sclerotized only in middle, distal edge arched, strong sclerotized. Tergal disks (3rd tergite) about long 7 times their width, covered with about 30 conical spines.

Male genitalia. Gnathos knob oval. Tegumen robust, trapezoidal, pedunculus short, slightly dilated. Transtilla short, wider at the base, rounded at the apex. Valvula large, oval, bristling with long thin setae of different lengths, in the dorsal half a very sturdy, short erect seta, in the shape of a nail. Cucullus rather long, slightly thinner at the base. Sacculus stout, laterally expanded, ventral edge slightly curved, bristling with long thin setae, ventral angle large, curved, dorsal angle blunt in shape, with a sturdy inclined silk seta like a thorn. Phallotheca short and

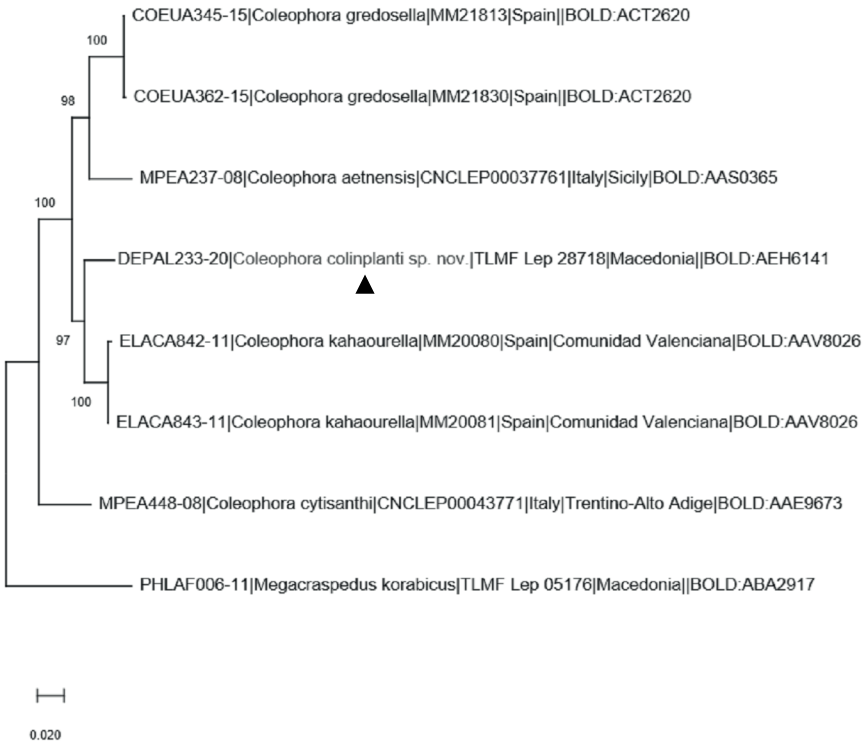


Fig. 1. Molecular diagnosis of the similar species. One specimen of *Coleophora colinplanti* sp. nov. recorded in North Macedonia was successfully barcoded at the Canadian Centre for DNA Barcoding.

stout, more sclerified at the base and dorsally. Cornuti numerous, thorn shaped of different lengths gathered in a long-curved formation, with three cornuti much longer and divergent at the apex.

Female genitalia. Unknown.

Bionomy. The host plant is unknown, but it is probably a plant of family Leguminosae, in analogy with the other species of the group who's the biology is known: *Coleophora pterosparti* (feeding on *Pterospartum tridentatum*), C. *kahaourella* (on *Anthyllis cytisoides*), *C. cytisanthi* (on *Genista radiata*), *C. aetnensis* (on *Genista aetnensis*).

Distribution. North Macedonia.

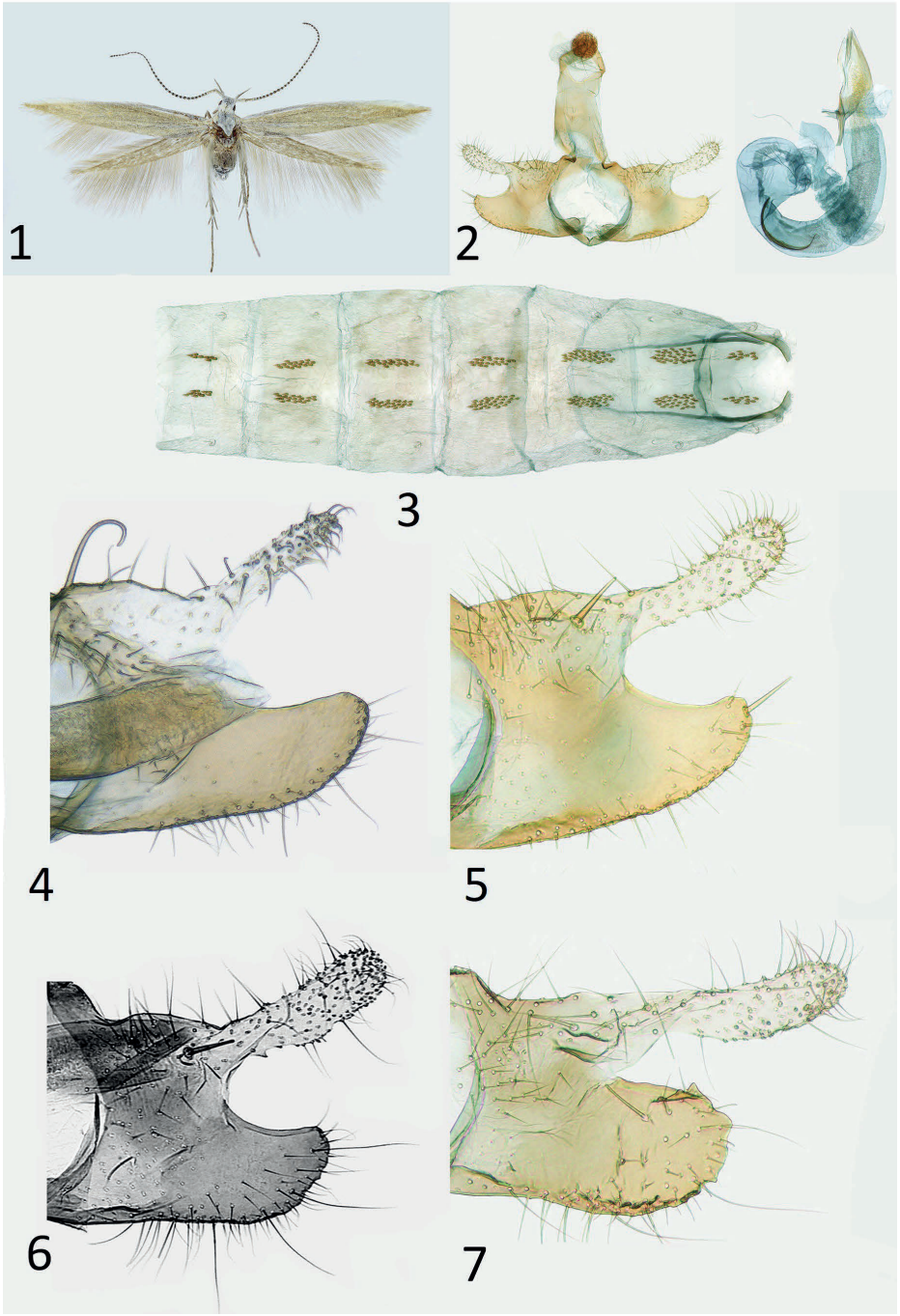
Etymology. The species is dedicated to the British lepidopterologist Colin W. Plant who collected one of the two specimens on which the description of the species is based.

New distributional records

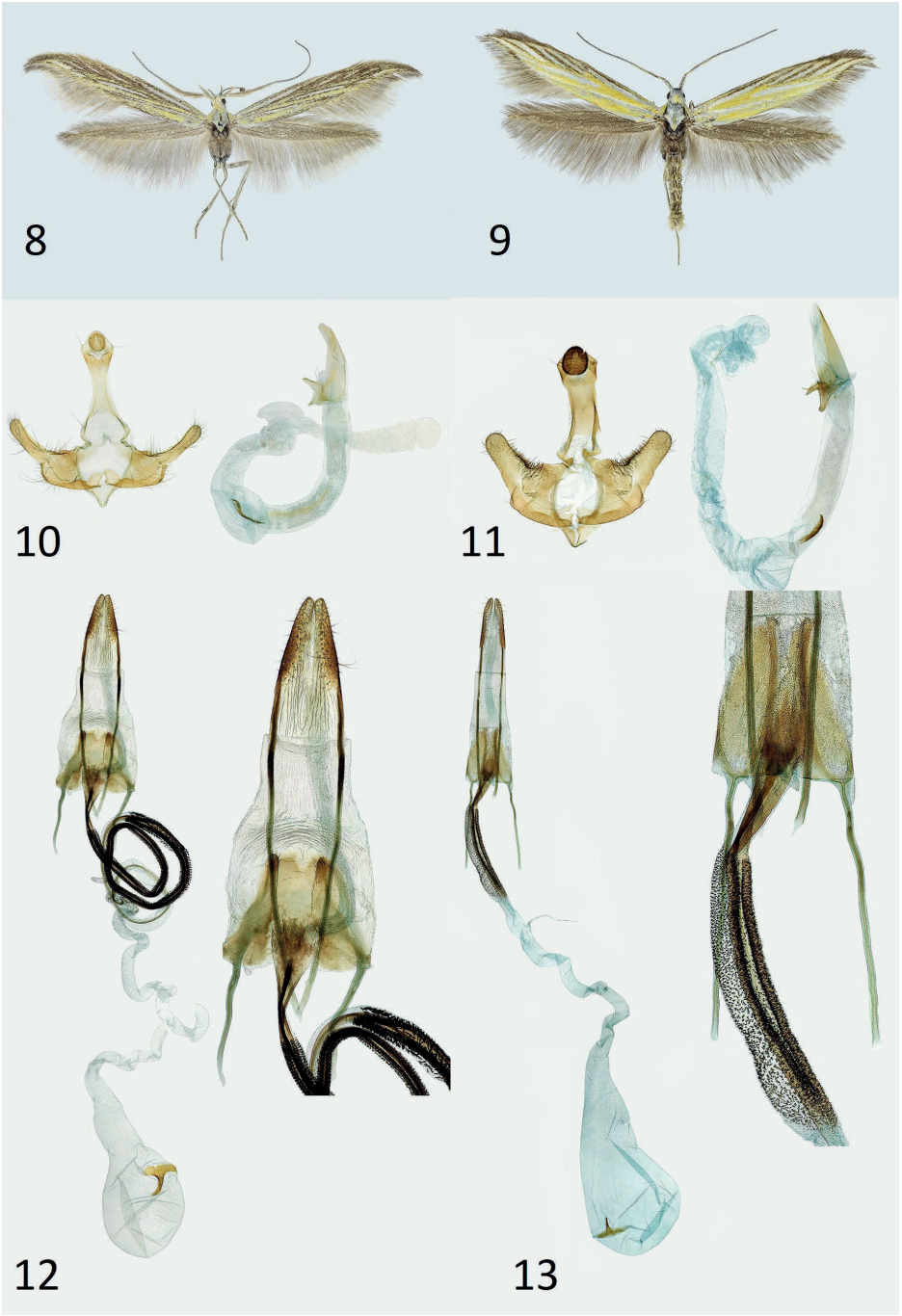
Coleophora serinipennella Christoph, 1872

Slovenia: 1 ♀, Primorska, Koper, Srmin, 27.VII.2007, leg., coll. Gomboc, det. Baldizzone; 1 ♂, 1 ♀ Primorska, Sečoveljske soline, Fontanigge, 2.VI.2019, leg. S. Gomboc & T. Gregor, coll. Gomboc, det. Baldizzone; 1 ♂, ibidem, 16.VI.2012, leg., coll. Gomboc, det. Baldizzone.

Distribution: Spain, southern France, southern Italy, Sicily, Slovenia, Bulgaria, Romania, Ukraine, Russia (Lower Volga), Libya, Algeria, Tunisia, Egypt, Palestine, Central Asia, Ja-



Tab. 1. 1. *Coleophora colinplanti* sp. nov. – adult – HOLOTYPUS; 2. *Coleophora colinplanti* sp. nov. – male genitalia GP 31535 IgR; 3. *Coleophora colinplanti* sp. nov. – abdomen; 4. *Coleophora kahaourella* – sacculus GP; 19528 IgR; 5. *Coleophora colinplanti* sp. nov. – sacculus GP 31535 IgR; 6. *Coleophora olympica* – sacculus GP 2775 Bldz; 7. *Coleophora cytisanthi* – sacculus GP 32244 IgR.



Tab. 2. 8. *Coleophora tricolor* – adult; 9. *Coleophora malatiella* – adult; 10. *Coleophora tricolor* – male genitalia GP 28289 IgR; 11. *Coleophora malatiella* – male genitalia GP 28040 IgR; 12. *Coleophora tricolor* – female genitalia GP 28288 IgR; 13. *Coleophora malatiella* – female genitalia GP 28041 IgR.

pan, Australia (Baldizzone 2019a). The reporting of Slovenia is based on the material listed in this work.

C. herniariae Baldizzone, 2001 (Figs. 31, 33, 35)
North Macedonia: 1 ♂, Krivolak near Negotino, 11.- 12. IV. 2019, leg., coll. Richter.
Bulgaria: 1 ♂ Pirin, Sandanski, Ploski, 200 m, 27.III. - 6.IV.2011, leg. N. Savenkov, det. Baldizzone, coll. Roweck.

Distribution: species described from Turkey; it was subsequently reported for Croatia (Richter 2017). First record for North Macedonia and Bulgaria.

C. niveicostella Zeller, 1839
Serbia: 1 ♂, Tornik Ribna, 1300 m, 16. VI. 2018, leg. Plant, det. & coll. Richter.

Distribution: almost all of Europe, North Africa, Lebanon, Palestine, Turkey, Caucasus (Baldizzone 2019a). First record for Serbia.

C. frischella (Linnaeus, 1758)
North Macedonia: 2 ♂♂, 1 ♀, Mavrovo NP, Korab Mts, Kobilino Pole, 20.- 21. VII. 2015, 1 ♂, 27. VII. 2019, leg., coll. Richter.

Distribution: Finland, Denmark, Germany, France, Spain, Italy, Switzerland, Austria, Czech Republic, Slovakia, Hungary, Montenegro, Greece, Caucasus, Russia (Lower Volga), Afghanistan, Morocco (Baldizzone, 2019a). First record for North Macedonia.

C. cytisanthi Baldizzone, 1978 (Figs. 6, 26, 28, 29)
Slovenia: 1 ♂, Sorisska Planina, Slatnik, 1500 m, 6.VII.2000, leg, coll. Tokár, det. Baldizzone; 1 ♀, Soča, 24. V. 2001 leg. & coll. Líška, det. Richter, ibidem, 1 ♂, 1 ♀, 23. VII. 2004, 1 ♂, 26. VI. 2010, 1 ♂, 9. V. 2015, 2 ♂♂, 4 ♀♀, 10. VIII. 2018, leg. Skyva, det. Richter, coll. Skyva & Richter; 1 ♂, Julijske Alpe, Veliki Mangart, Mangartska koča, 1800-1950 m, 3.VIII.2019, leg., coll. Gomboc, det. Baldizzone.

Distribution: known only in the north-eastern Italian Alps and in Slovenia (Baldizzone, 2019a). The first citation for Slovenia derives from the study of the specimen collected in 2000 by Tokár.

C. squamella Constant, 1885
North Macedonia: 1 ♂, Pepelište near Negotino, 18. IV. 2018, leg., coll. Richter.

Distribution: France, Italy, Sardinia, Austria, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Bulgaria, Romania, Ukraine, Turkey (Baldizzone, 2019a). First record for North Macedonia.

C. curictae Baldizzone, 2016
Slovenia: 1 ♂, Notranjska, Suha krajina, Rakov Škocjan, 517 m, 1.VII.2008, leg., coll. Gomboc, det. Baldizzone; 6 ♂♂, Primorska, Regijski park Škocjanske jame, Matavun, 438 m, 26.VI.2019, 1 ♂, 30.VI.2019, leg., coll. Gomboc, det. Baldizzone.
Greece: 1 ♂, Epirus, Mitsikeli Mt. bei Ioannina, 1170 m, 7.VII.2005, leg., coll. Mayr, det. Baldizzone.

Distribution: Italy, Austria, Germany, Croatia, Montenegro. First record for Slovenia and Greece.

C. didymella Chrétien, 1899
Bulgaria: 1 ♂, Stara Zagora Dubrava, 458 m, 5.V. 2019, leg. Beškov & Nahirnić, det. & coll. Richter.

Distribution: France, Italy, Hungary, North Macedonia, Turkey (Baldizzone, 2019a). First record for Bulgaria.

C. mareki Tabell & Baldizzone, 2014
SERBIA: 1 ♂, Dukat Mts., 820 m, 31. V. 2018, leg. Plant, det. & coll. Richter.
Distribution: France, Italy, Sardinia, Austria, Czech Republic, Slovakia, Hungary, Croatia, North Macedonia, Bulgaria, Greece, Ukraine, Turkey, Iraq (Baldizzone, 2019a). First record for Serbia.

C. flaviella Mann, 1857
Serbia: 1 ♀, Dukat Mts,. 820 m, 31. V. 2018, leg. Plant, det. & coll. Richter.
Distribution: Portugal, Spain, France, Italy, Sicily, Germany, Austria, Czech Republic, Slovakia, Croatia, Hungary, Romania, Greece, Turkey, Libya, Iran (Baldizzone 2019a). First record for Serbia.

C. quadristraminella Toll, 1961
Bulgaria: 1 ♂, Besaparian hills, Isperihovo, 3. V. 2016, leg., coll. Richter; 1 ♂, Petrich, Malak Kozhukh, 4. IX. 2019, leg., coll. Richter.
Distribution: France, Italy, Sicily, Croatia, Romania, North Macedonia, Greece, Crimea, Ukraine, Turkey, Armenia, Russia (Southern Urals), Egypt (Baldizzone 2019a). First record for Bulgaria.

C. agrianella Rebel, 1934 (Figs. 15, 17, 19)
North Macedonia: 1 ♂, Prilep, 8. IX. 2014 ex larva *Onobrychis* sp., 6 ♂♂, 2 ♀♀ 26.- 27. VII. 2015, 4 ♂♂, 1♀, 26. VIII.- 2.IX.2016, 5 ♂♂, 2 ♀♀, 10. IX. 2021, leg., coll. Richter; 1 ♂, Bjelovodica, 31. VII. 2019, leg., coll. Richter; 2 ♂♂, Latovo, 29. VIII. 2016, leg., coll. Richter; 1 ♂, Pepelište near Negotino, 1. IX. 2021, leg., coll. Richter.
Distribution: Described from North Macedonia, is known also for Serbia, Bulgaria, and Greece.

C. tricolor Walsingham, 1899 (Figs. 8, 10, 12)
North Macedonia: 4 ♂♂, 1 ♀, Galičica NP, 1676 m, 5. 7. 2018, leg., coll. Richter.
Distribution: Described from Great Britain, is known also for Switzerland (Uffen 1967), France, Greece (Baldizzone *et al*., 2014). New record for North Macedonia.

C. malatiella Toll, 1952 (Figs. 9, 11, 13)
North Macedonia: 2 ♂♂, Krivolak near Negotino, 16.-17. V. 2018, 1 ♂, 23.- 24. V. 2018, leg., coll. Richter; 1 ♂, Pepelište near Negotino 27. V. 2018, leg., coll. Richter.
Distribution: Romania, Turkey, Iran (Baldizzone *et al*., 2006); Crimea (Budashkin & Falkovitsh 2007). First record for North Macedonia.

C. caucasica Stainton, 1867
Bulgaria: 1 ♂, 1 ♀, Besaparian hills, Isperihovo, 3. VI. 2016, leg., coll. Richter.
Distribution: Turkey, northern Caucasus Region, Georgia, and Armenia (Baldizzone, 2016). Recently discovered in Europe: Slovakia (Tokár *et. al.* 2021), Hungary (Szabóky & Takács 2021). First record for Bulgaria.

C. hartigi Toll, 1944
Serbia: 1 ♂, Tornik Ribna 1300 m, 16. VI. 2017, leg. Plant, det. & coll. Richter.
Distribution: Italy, Austria, Germany, Czech Republic, Slovakia, Hungary, Croatia, Bulgaria, North Macedonia, Montenegro, Albania, Greece, Turkey (Baldizzone 2019a). First record for Serbia.

C. glaseri Toll, 1961
Slovenia: 1 ♀, Bela Krajina, Krajinski park, Kolpa, Vinica, Golek, 19.V.2017, leg., coll. Gomboc, det. Baldizzone; 1 ♂, Notranjska, Koritnice, 610 m, 6.VI.2020, leg. Gomboc & Zadravec, det., coll. Baldizzone.

Distribution: Austria, Croatia, Czech Republic, Slovakia, Hungary, and Bulgaria (Baldizzone 2019b). First record for Slovenia.

C. audeoudi Rebel, 1935 (Figs. 14, 16, 18)
North Macedonia: 1 ♂, Pepelište near Negotino, 8.- 9. VI. 2017, 1 ♂, 18.- 19. VI. 2018, 5 ♂♂, 1 ♀, 26. V. 2018, 1 ♂, 27. V. 2018, 8 ♂♂, 28. V. 2018, leg., coll. Richter; 1 ♀, Krivolak near Negotino, 10.- 12. VI. 2017, 9 ♂♂, 6 ♀♀, 16.- 17. V. 2018, 2 ♂♂, 23- 24. V. 2018, leg., coll. Richter.

Distribution: Known only from North Macedonia and Turkey (Baldizzone 1994).

C. laconiae Baldizzone, 1983 (Figs. 32, 34)
North Macedonia: 1 ♂, Pepelište near Negotino, 1. IX. 2021, leg., coll. Richter.

Distribution: Only known from the Mount Taygetos (Greece). First record for North Macedonia.

C. eupepla Gozmány, 1954
Bulgaria: 3 ♂♂, 4 ♀♀, Sandanski - Ploski, 5. VI. 2016, leg., coll. Richter; 3 ♂♂, 6 ♀♀, Melnik, leg. Dvořák, det. & coll. Richter.

Distribution: known for Hungary, North Macedonia, Spain, France, Greece, Turkey, Russia (Baldizzone & Tabell 2005), Crimea (Budashkin & Falkovitsh 2007) recently recorded for Bulgaria (Buschmann *et al*. 2014).

C. salinella Stainton, 1859
Slovenia: 1 ♀, Slovensko primorje, Sečovlje, soline, 6.IX.2002; 1 ♂, ibidem, leg. coll. Gomboc, det. Baldizzone; 1 ♂, ibidem, 14.IX.2012, leg. & coll. Šumpich, det. Richter,
Croatia: 1 ♂, Lošinj, Nerezine 26. VIII.- 2. IX. 2017, leg. Vicherek, det. Richter, coll. Šumpich.

Distribution: Great Britain, Holland, Spain, Belgium, France, Italy, Sicily, Germany (?), Slovakia, Hungary, Bulgaria, Cyprus, Ukraine, Crimea, Russia (Lower Volga), Caucasus, Armenia, Western Siberia (Baldizzone 2019a). First record for Slovenia and Croatia.

C. filaginella Fuchs, 1881
Bulgaria: 3 ♂♂, Melnik 5. V. 2018, leg. Dvořák, det. & coll. Richter.
Distribution: Finland, Latvia, Germany, North Macedonia, Romania, Greece, Turkey (Baldizzone, 2019c). First record for Bulgaria.

C. halophilella Zimmermann, 1926
Slovenia: 1 ♀, Slovensko primorje, Sečoveljske soline, 6.IX.2000; 3 ♀♀, 4.X.2002, leg., coll. Lasan, det. Baldizzone; 3 ♂♂, 3 ♀♀ , ibidem, 3.IX.2002, 4 ♀♀, 14.IX.2012, leg., coll. Gomboc, det. Baldizzone; 2 ♂♂, 4 ♀♀, ibidem, 27.IX.2012, leg. Gomboc & Zadravec, coll. Gomboc, det. Baldizzone; 1 ♀, ibidem, 14. IX. 2012, leg. & coll. Šumpich, det. Richter.

Distribution: France, Italy, Austria, Slovenia, Croatia, Czech Republic, Slovakia, Poland, Hungary, Romania, Greece, Crete, Russia, Ukraine, China (Baldizzone, 2019a). The presence of the species in Slovenia derives from the data of collection Gomboc listed above.

C. autumnella (Duponchel, 1844) (Figs. 20, 22, 24)
Slovenia: 1 ♂, Soča, 10. VIII. 2018, leg. & coll. Skyva, det. Richter.

Distribution: Spain, Austria, Slovakia, Czech Republic, Romania (Baldizzone et al., 2004), recently recorded for the French Maritime Alps (Nel & Varenne 2019). New record for Slovenia.

C. gardesanella Toll, 1954
Slovenia: 1 ♂, Primorska, Koper/Capodistria, 27.VII.2018, leg., coll. Gomboc, det. Baldizzone.

Distribution: Poland, Finland, Estonia, Latvia, Great Britain, Belgium, France, Italy, Sicily, Austria, Croatia, Armenia, Russia (Lower Volga) (Baldizzone 2019a). First record for Slovenia.

C. sternipennella (Zetterstedt, 1839)
North Macedonia: 1 ♀, Latovo, 29. VIII. 2016, leg., coll. Richter; 1 ♀, Galičica NP, Asan Gjura, 28. VIII. 2021, leg., coll. Richter.

Distribution: almost all of Europe, the Caucasus, Russia (Lower Volga, Siberia, Transbaikalia), Korea, Japan (Baldizzone, 2019a). First record for North Macedonia.

C. jaernaensis Björklund & Palmqvist, 2002
Croatia: 1 ♀, Zagrebačka Županija, Ivanić-Grad, 99 m, 27.VI.2020, leg., coll. Gomboc, det. Baldizzone.

Distribution: Norway, Sweden, Finland, and Denmark, it has recently been reported from Hungary (Szabóky & Takács 2021). New record for Croatia.

C. coarctataephaga Toll, 1961 (Figs. 21, 23, 25)
North Macedonia: 2 ♂♂, Pepelište near Negotino, 1 ♂, 3. IX. 2016, 1 ♂, 26.- 27. VI. 2017, 1 ♀, 28. VIII. 2017, 6 ♂♂, 18.-19. V. 2018, 2 ♂♂, 25. V. 2018, 1 ♂, 10. VII. 2018, 1 ♂, 16.- 17. IV. 2019, 2 ♂♂, 1. IX. 2021, leg., coll. Richter; 1 ♀, Krivolak near Negotino, 20.-24. IV. 2017, 1 ♀, 18. V. 2017 ex larva Achillea coarctata, 1 ♀, 16.-17. V. 2018, 1 ♂, 19.-20. IV. 2019, 2 ♀♀, 1.- 2. VIII. 2019, leg., coll. Richter; 1 ♂, Latovo, 21. VI. 2016, 1 ♀, 29. VIII. 2016, 3 ♂♂, 17.- 18. VI. 2017, 2 ♂♂, 22. V. 2018, 1 ♀, 30. VI. 2018, leg., coll. Richter; 1 ♂, Gopceli, 6. VI. 2014 ex larva Achillea collina, leg., coll. Richter; 1 ♀, Modrište 28. VIII. 2016, leg., coll. Richter; 1 ♀, Bjelovodica 31. VII. 2019, leg., coll. Richter; 2 ♂♂, Kutlešovo, 1. IX. 2016, leg., coll. Richter; 5 ♂♂, 1 ♀, Sirhan, 31. VIII. 2016, leg., coll. Richter; 2 ♂♂, Prilep, 6. VI. 2014, 2 ♂♂, 10. VI. 2016, 1 ♀, 2. IX.9. 2016, leg., coll. Richter. Bulgaria: 1 ♂, Sandanski – Ploski, 5. VI. 2016, leg., coll. Richter.

Distribution: North Macedonia, Albania, Greece, Bulgaria, Romania, Armenia (Baldizzone *et al*. 2004). First record for Bulgaria. Only *Achillea coarctata* was known as a host plant and therefore the specimen bred by *A. collina* in North Macedonia adds a new datum on host plants.

C. corsicella Walsingham, 1898
North Macedonia: 1 ♀, Pepelište near Negotino, 3. IX. 2016, 1 ♂, 8.- 9. VI. 2017, 1 ♀, 28.- 29. V. 2018, 1 ♀, 22. VI. 2018, leg., coll. Richter; 1 ♀, Sirhan, 31. 8. 2016, leg., coll. Richter. BULGARIA: 1 ♀, Sandanski- Ploski 5. VI. 2016, leg., coll. Richter; 1 ♀, Petrich, Malak Kozhukh, 4. IX. 2016, leg., coll. Richter; 1 ♀, Melnik, 5. V. 2018, leg. Dvořák, det. & coll. Richter.

Distribution: Spain, France, Corsica, Italy, Slovakia, Hungary, North Macedonia, Greece, Ukraine, Russia (Southern Urals), Turkey (Baldizzone 2019a). New record for Bulgaria.

C. odorariella Mühlig & Frey, 1857
North Macedonia: 1 ♂, Pepelište near Negotino, 25. V. 2018, 1 ♂, 22. IV. 2019, 4 ♂♂, 3. -4. VIII. 2019, 3 ♂♂, 4 ♀♀, 5. VIII. 2019, leg., coll. Richter; 1 ♂, Krivolak near Negotino, 20.-24. IV. 2017, 9 ♂♂, 3 ♀♀, 16.- 17. V. 2018, 3 ♂♂, 23.- 24. V. 2018, 6 ♂♂, 19.- 20. IV. 2019, 1 ♀, 1.- 2. VIII. 2019, leg., coll. Richter.

Distribution: Spain, Italy, Germany, Austria, Czech Republic, Slovakia, Hungary, North Macedonia, Romania, Ukraine, Russia, Turkey (Baldizzone 2019a). Based on the data listed above, the species appears to be quite abundant in North Macedonia.

C. riffelensis Rebel, 1913
North Macedonia: 3 ♂♂, 1 ♀, Bjelovodica 9. IX. 2021, leg., coll. Richter; 3 ♂♂, 1 ♀, Galičica NP, Asan Gjura, 28. VIII. 2021, leg., coll. Richter; 1 ♀, Latovo, 11. 9. 2021, leg., coll. Richter.

Croatia: 1 ♂, Goriš, 14. IX. 2018, leg., coll. Richter.

Distribution: Spain, France, Italy, Switzerland, Austria, Czech Republic, Slovakia, Hungary, Latvia, Estonia, Russia, North Macedonia, Ukraine, Turkey, Iran (Baldizzone 2019a). New record for Croatia.

C. dianthivora Walsingham, 1901 (Figs. 27, 30)
Croatia: 1 ♀, Zaton, 13. X. 2019, leg. & coll. Laštuvka, det. Richter.

Distribution: Known only from Spain, southern France, southern Italy (Baldizzone 2019a). New record for Croatia.

C. amellivora Baldizzone, 1979
Slovenia: 1 ♂, Soča, 9. V. 2015, 1 ♂, 2 ♀♀, 10. VIII. 2018, leg. & coll. Skyva, det. Richter.

Distribution: Sweden, Finland, Estonia, Latvia, Belgium, France, Italy, Germany, Austria, Czech Republic, Slovakia, Hungary, Ukraine, Russia (Baldizzone 2019a). New record for Slovenia.

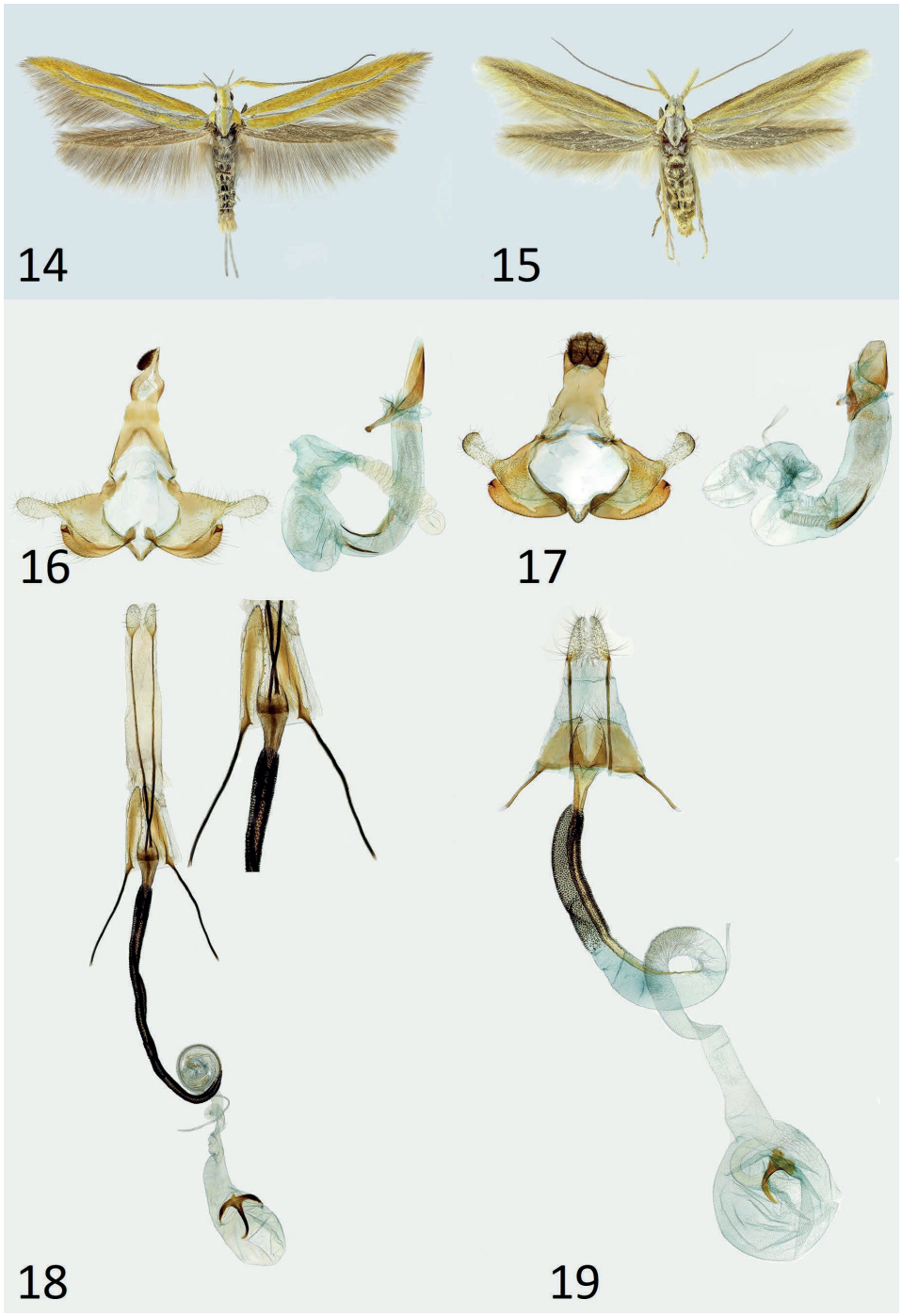
C. algidella Staudinger, 1857
North Macedonia: 2 ♂♂, 3 ♀♀, Mavrovo NP, Korab Mts., Kobilino Pole, 20.- 21. VII. 2015, 1 ♂, 3. VII. 2018, leg., coll. Richter; 2 ♂♂, Galičica NP, 15.- 16. VI. 2017, leg., coll. Richter; 1 ♂, 1 ♀, Bjelovodica, 13.- 14. 6. 2017, leg., coll. Richter.

Distribution: Iceland, Norway, Portugal, Spain, France, Italy, Turkey, China, Japan (Baldizzone 2019a). New record for North Macedonia.

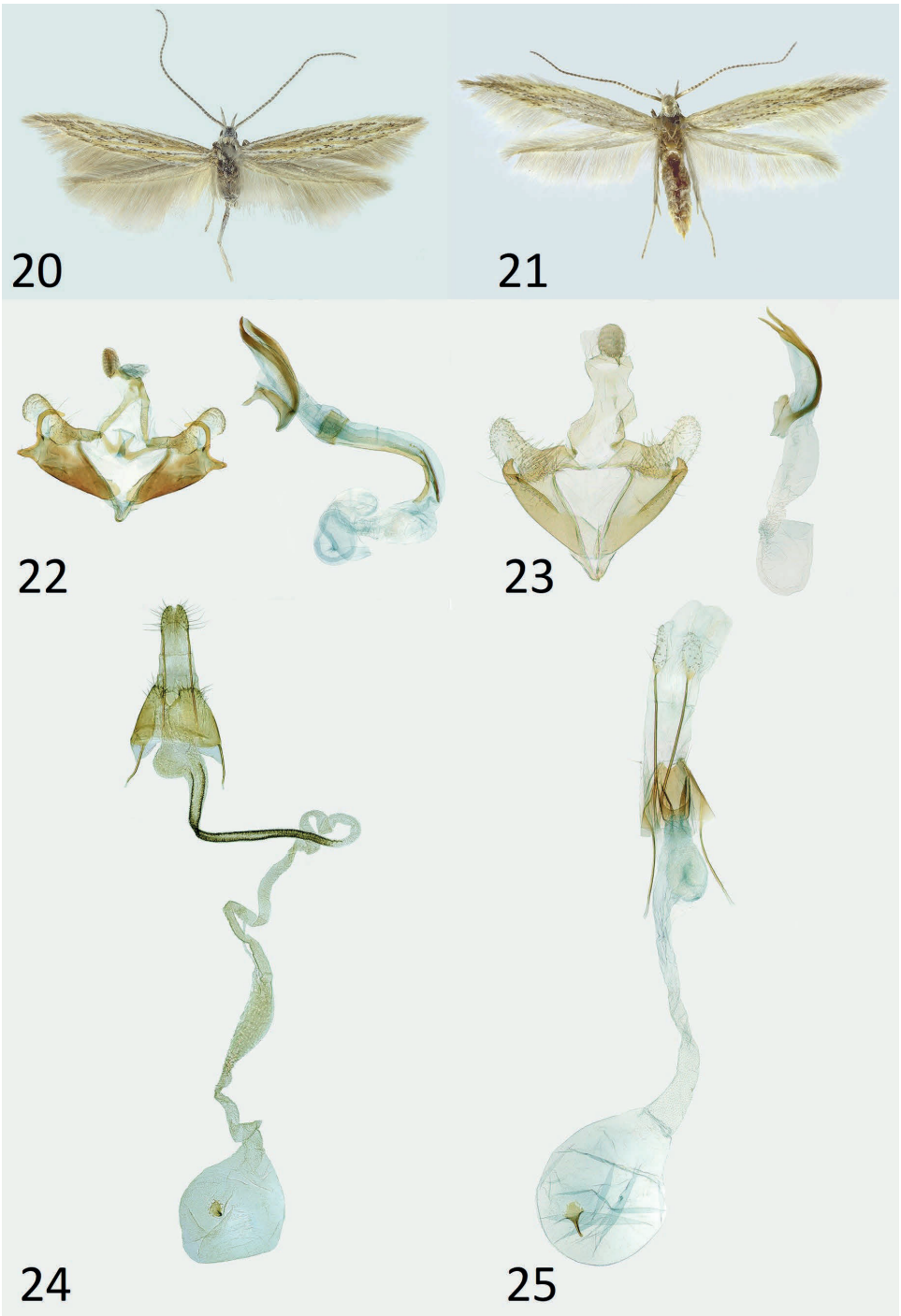
C. auroguttella (Zeller, 1849)
Croatia: 1 ♂, Tisno, 17. VIII. 2014, leg., coll. Richter.
North Macedonia: 1 ♀, Pepelište near Negotino 25.- 26. VIII. 2016, leg., coll. Richter.

Distribution: Portugal, Spain, France, Italy, Austria, Czech Republic, Slovakia, Poland, Hungary, Romania, Greece, Russia (Lower Volga), Kazakhstan, Caucasus (Baldizzone 2019a). New record for Croatia and North Macedonia.

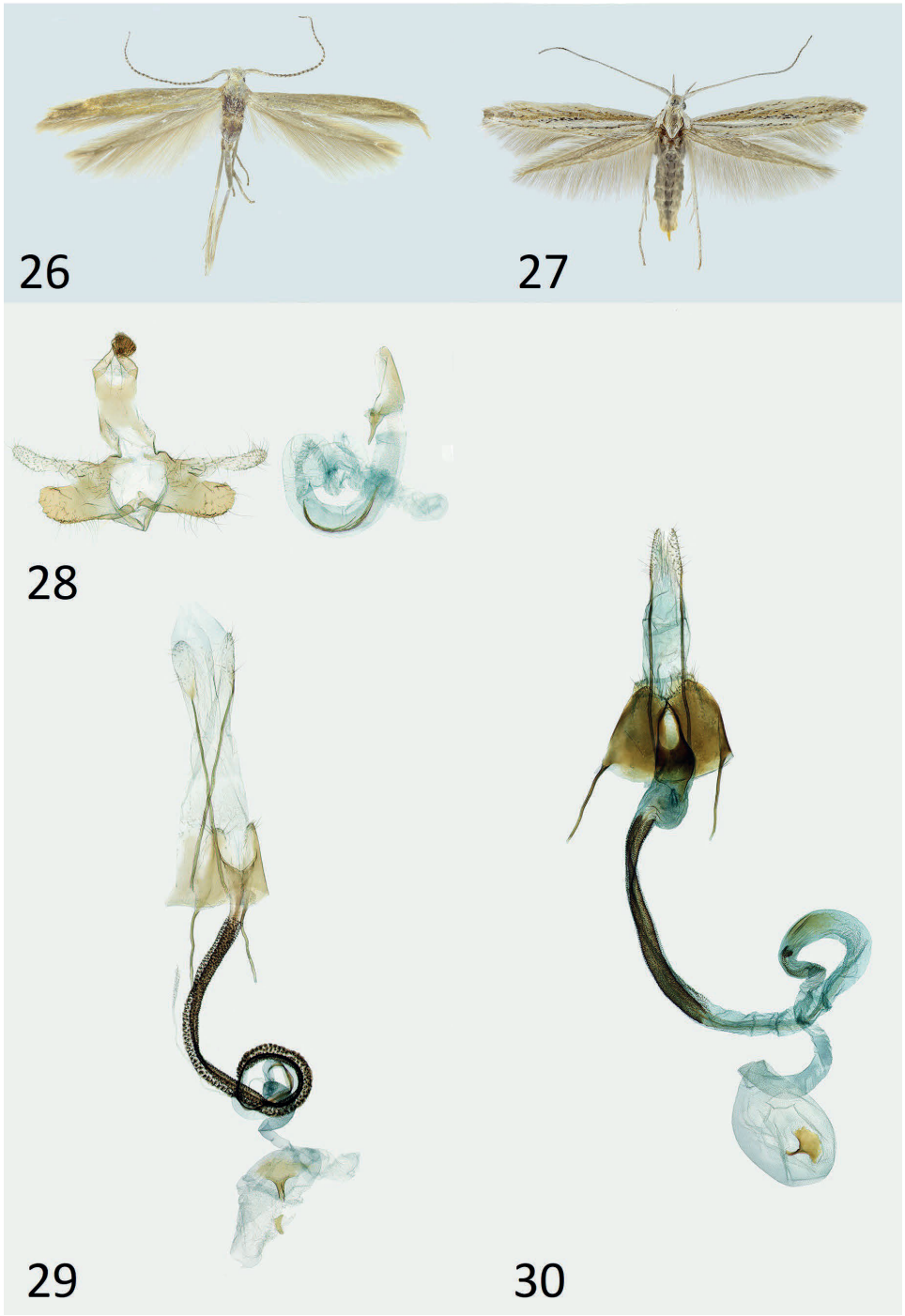
Acknowledgements. Thanks to all those who have sent material for the determination- several Czech and Slovenian colleagues and other friends, and personally Colin W. Plant - Hertfordshire, England.



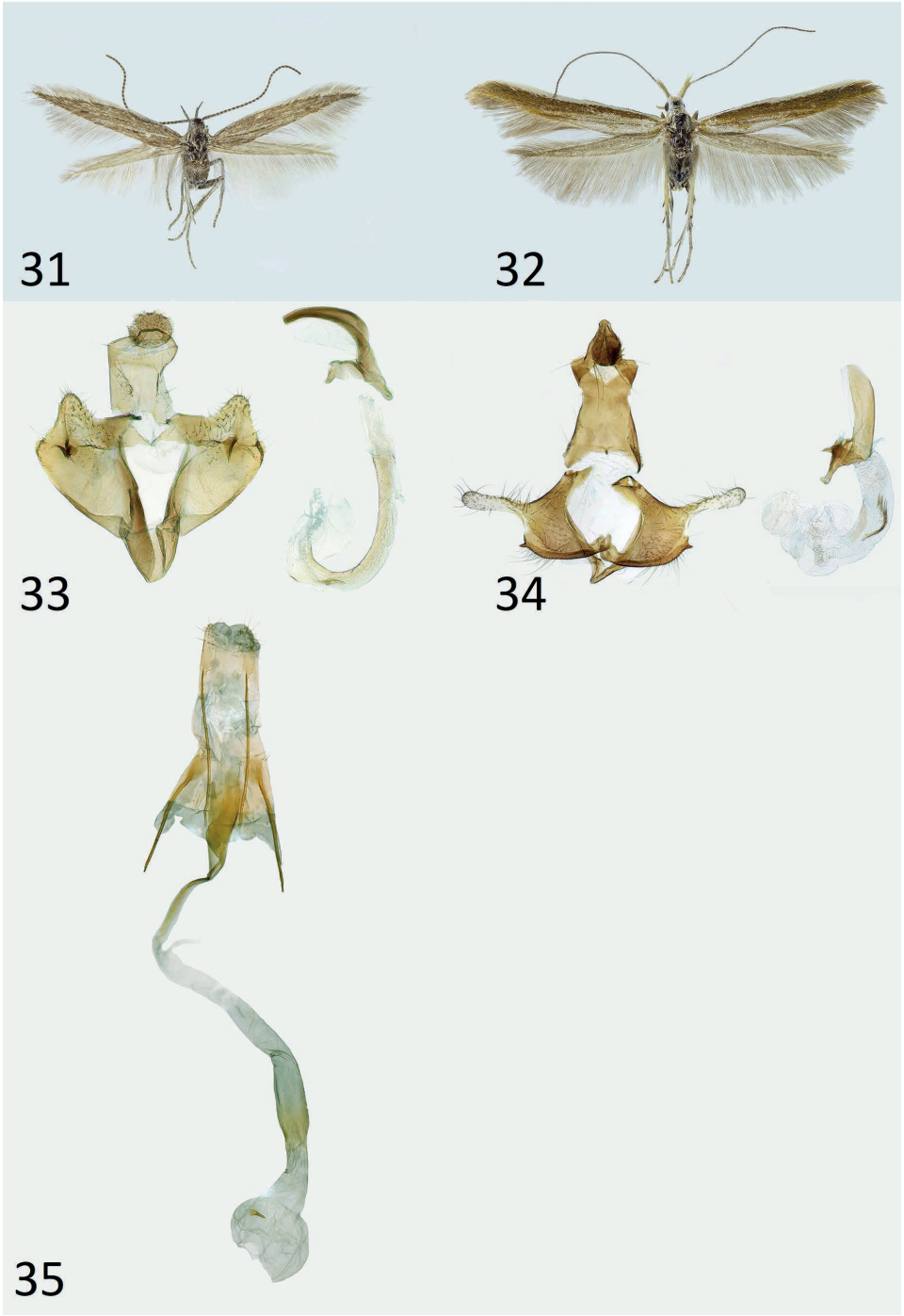
Tab. 3. 14. *Coleophora audeoudi* – adult; 15. *Coleophora agrianella* – adult; 16. *Coleophora audeoudi* – male genitalia GP 28803 IgR; 17. *Coleophora agrianella* – male genitalia GP 29057 IgR; 18. *Coleophora audeoudi* – female genitalia GP 32240 IgR; 19. *Coleophora agrianella* – female genitalia GP 23305 IgR.



Tab. 4. 20. *Coleophora autumnella* – adult; 21. *Coleophora coarctataephaga* – adult; 22. *Coleophora autumnella* – male genitalia GP 7160 Z. Tokár; 23. *Coleophora coarctataephaga* – male genitalia GP 24803 IgR; 24. *Coleophora autumnella* – female genitalia GP 28432 IgR; 25. *Coleophora coarctataephaga* – female genitalia GP 24786 IgR.



Tab. 5. 26. *Coleophora cytisanthi* – adult; 27. *Coleophora dianthivora* – adult; 28. *Coleophora cytisanthi* – male genitalia GP 32244 IgR; 29. *Coleophora cytisanthi* – female genitalia GP 32243 IgR; 30. *Coleophora dianthivora* – female genitalia GP 29489 IgR.



Tab. 6. 31. *Coleophora herniariae* – adult; 32. *Coleophora laconiae* – adult; 33. *Coleophora herniariae* – male genitalia GP 28880 IgR; 34. *Coleophora laconiae* – male genitalia GP 31565 IgR; 35. *Coleophora herniariae* – female genitalia GP 14310 Bldz.

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https://doi.org/10.24386/LepidHung.2022.18.1.71 HU ISSN 2732-3854 (print) | HU ISSN 2732-3498 (online)

Lepidopterologica Hungarica 18(1): 71–84. | https://epa.oszk.hu/04100/04144

Received 16.03.2022 | Accepted 30.03.2022 | Published: 07.04.2022 (online) | 26.06.2022 (print)
ZooBank: https://zoobank.org/References/08FA7DF5-5C04-455C-998E-12793DA79FBA

The genus *Zethes*, with the description of three new taxa from Asia (Lepidoptera, Erebidae)

Péter Gyulai

Citation. Gyulai P. 2022: The genus *Zethes*, with the description of three new taxa from Asia (Lepidoptera, Erebidae). – Lepidopterologica Hungarica 18(1): 71–84.

Abstract. Description of one new species and two new subspecies of *Zethes* Rambur, 1833, with 24 colour illustrations and 24 genitalia figures.

Keywords. Asia, taxonomy, Noctuidae, new descriptions.

Author's address. Péter Gyulai | 3530 Miskolc, Mélyvölgy 13/A | Hungary
E-mail: adriennegyulai@gmail.com

Introduction

The Palaearctic taxa of the genus *Zethes* Rambur, 1833 are distributed from the Mediterranean area through Turkey, Caucasus, Near East, Azerbaijan, Iran to Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Pakistan). The genus is most diverse in SE Turkey and Iran.

List of the Palaearctic taxa

Zethes insularis Rambur, 1833; **TL**: Corsica
Zethes narghisa Brandt, 1938; **TL**: Iran, Fort Sine-Sefid; Mian-Kotal
Zethes narghisa subrufa **subsp. n.**; **TL**: Pakistan, Waziristan
Zethes zahedanica **sp. n.**; **TL**: Iran, Baluchistan
Zethes propinquus Christoph, 1885; **TL**: Armenia, Caucasus, Lagodekhi
Zethes brandti Janzon, 1977; **TL**: Iran, Fars, Shiraz-Kazeroun road, Fort Sine-Sefid
Zethes brandti pakistana **subsp. n**.; **TL**: Pakistan, Hindukush Mts.
Zethes nemea Brandt, 1938; **TL**: Iran, Fort Sine-Sefid; Mian-Kotal
Zethes monotonus Wiltshire, 1938; **TL**: N Afghanistan, Herat, Bala Murghab
Zethes pistazina Weisert, 2000; **TL**: Kyrgyzstan, Kara-Kul, S of Arslanbab

The validity of *Z. propinquus* Christoph, 1885, which was described from Lagodekhi (C Caucasus, N Armenia) in Romanoff (1885) is an unsolved problem. This species was described from one female holotype, deposited in the Museum St. Petersburg, but the abdomen now missing, and genitalia dissection is impossible. As far as author knows, this holotype is the only existing specimen of this species. Comparing the coloured illustration in Romanoff with *Z. nemea* and *Z. brandti*, it is not impossible that it can be conspecific with one of them, although the type locality of *Z. propinquus* is geographically far to the North of the two similar species.This problem has already been mentioned by previous researchers of *Zethes* (Janzon 1977, Weisert 2000). Thus *Z. propinquus* must be left as a species. Lehmann & Zahiri (2011) mention *Z. propinquus* from Armenia, Azerbaijan, Turkmenistan and N Iran (Aras river valley and near Caspian Sea), but without genitalia evidence. Because the genitalia of the type of

Z. propinquus are unknown, these data unsupported and could refer to the similar *Z. nemea* and *Z. brandti*. A female specimen and genitalia from Armenia are figured here (Figs 10, 42), as a disputable species. However, it is much darker than the type of *Z. propinquus*, figured by Romanoff (1885), and the female genitalia show more affinities to *Z. narghisa* (Figs 38–39).

There are species pairs in the genus *Zethes*, the separation of which needs careful study due to the very strong resemblance in both external features and configuration of the genitalia. One of them is *Z. insularis* Rambur, 1833 and *Z. narghisa* Brandt, 1938 species pair, which are easily separated by the external and genitalia features and distributional pattern; however *Z. narghisa* has a South Iranian (S. Zagros Mts.) form which is very like *Z. insularis* and occurs sympatrically with typical *Z. narghisa* (Figs 4–7).

The most problematic species pair is *Z. nemea* and *Z. brandti* (Figs 4–7). The two occur sympatrically in many localities and some specimens of *Z. nemea* closely resemble *Z. brandti*, and can only be separated with certainty by genitalia investigation.

The taxonomic rank of the populations of *Z. pistazina* Weisert, 2000 is also doubtful, whether it is a distinct species, a subspecies or a mere synonym of *Z. monotonus* Wiltshire, 1938. Taking into consideration the figures of the types in the original descriptions and following dissection of some specimens of both taxa by the author, no constant, significant differences in the male and female genitalia were found. Furthermore, there are monochrome and contrasting forms of both (Figs 18–24, 34–36, 45–47).

One new species and two new subspecies of *Zethes* are described here. The male and female genitalia of all the new and known taxa are figured below, even though the differences between them are mostly slight.

Abbreviations for personal and institutional collections used here: HNHM= Hungarian Natural History Museum (Budapest, Hungary); HT= holotype; PT=paratype; PGM= collection of Péter Gyulai (Miskolc, Hungary); PO= collection of Oleg Pekarsky, Budapest, Hungary); GYP= genitalia slide of P. Gyulai; OP= genitalia slide of Oleg Pekarsky; **TL**= type locality; m =male, f= female

Description of new taxa

***Zethes narghisa subrufa* subsp. n.** (Figs 7, 8, 28, 29)

Holotype: male (Fig. 7), Pakistan, NWFP S. Waziristan Agency, near Tanai vill., 28. VII.-12. VIII. 2005, 1500-2500 m., leg. V. Gurko, slide no. GYP 5293 (coll. PGM, later to be deposited in HNHM).

Paratypes: male, Tajikistan, S Darwaz Mts., Planj river, Raynob river valley, 1,5 km N of Zhag vill., 1057 m, 23. V. 2017, leg. B. Benedek & S. Ilniczky, (coll. PGM); female, 35 mm Tajikistan, Hissar Mts., distr. Varzob, vill. Kondara, 1150-1200 m, 4-6. V. 2012, leg. E. Rutjan (coll. PO); female, Tajikistan, prov. Khatlon, distr. Kurgan-Tube, near Sarband (=Kalininabad), 750-850 m, 17.V.2012, leg. E. Rutjan (coll. PO).
slide nos. GYP 5685m, OP 1888f, OP 4921f

Diagnosis. *Zethes narghisa subrufa* **subsp. n.** (Figs 7, 8) is the eastern, Central Asiatic subspecies of the nominotypical *Z. narghisa* Brandt, 1938, (Figs 3–6), which occurs in SE Turkey and Iran. The new subspecies differs conspicuously from nominotypical *Z. narghisa* and all other taxa of the genus *Zethes* in the intense monochromatic reddish, violet, or pale ochre colouration in the marginal-submarginal area of all the four wings and the pale reddish colour of the underside of the wings. It also lacks (or in one of the females very pale) the light greyish, bluish-grey suffusion in the marginal-submarginal area, which is more or less typical of other *Zethes*.

The male genitalia of the new subspecies (Figs 28, 29) can be distinguished from those of the nominotypical *Z. narghisa* by the asymmetrical, long saccular extensions, of which the right one is somewhat shorter, and the smaller terminal part of the valvae. The female genitalia (Fig. 40) differ by the medially not asymmetrical, rather tubular ductus bursae.

Description. (Figs 7, 8). Wingspan 27-29 mm, length of forewing 13-15 mm. Antennae with fine whitish and brownish variegated segments, finely ciliated; third joint of palpi long, evenly thin. The vesture of the body and ground colour of the subapical patch in the forewings and basal and median area dark reddish brown on all wings, somewhat darker in the outer field; with monochromatic light reddish colouration in the marginal-submarginal area of all four wings. Orbicular and reniform stigmata dark brown, typical but tiny. Transverse lines brown; antemedian line semicircularly curved, with a fine outer ghost. The dark median field is sharply divided from the reddish subterminal area by the zigzag-arched postmedian crossline, as typical in the genus; its shape is most like that in *Z. insularis* and *Z. narghisa* and lacks the protrusion toward the outer costa in the lower section. The curved shade running from the costa toward the termen brown. The crosslines in the hindwings dark brown, wavy-sinuous. Cilia of all the wings brown.

Male genitalia. (Figs 28, 29). Uncus strong, curved, apically evenly pointed, slightly hooked; terminal part of the valvae enlarged, with a dorsal bifurcate prominence and a smaller, lateral, apically finely pointed process; saccular extensions very long, somewhat falciform, asymmetrical, the right one slightly shorter. Aedeagus strongly sclerotized, horse-shoe shaped, long and narrow; vesica with three membranous diverticula.

Female genitalia. (Fig. 40). Papillae anales setose, elongate, terminally angular; apophyses posteriores very long, about two times as long as apophyses anteriores. Ostium oval, antrum funnel-like with strongly sclerotized narrow edge, and angular plate, posteriorly with two elongate eversible wing-like extensions; ductus bursae tubular, appendix bursae small, not prominent; corpus bursae large, globular-ovoid, without signum.

Biology and distribution. The new subspecies is known only from Pakistan and Tajikistan; evidently local and rare.

Etymology. This subspecies is named from the intensive monochromatic light reddish colouration in the marginal-submarginal area of all the four wings mostly in the males and the pale reddish colour of the underside of the wings.

***Zethes zahedanica* sp. n.** (Figs 9, 40, 48)

Holotype: female (Fig. 9), Iran, Systanva Baluchistan, 200 km E of Bam, 20-21. IX. 2006, leg. P. Gyulai & A. Garai, slide no. GYP 2298 (coll. PGM, later to be deposited in HNHM).

Diagnosis. *Zethes zahedanica* **sp. n.** is a unique species within the genus *Zethes*, because in that it has a large, conspicuous, oval white subcostal patch on the forewings; the initial section of the postmedian line is finely zigzag, the white ghost of it clearly defined. These features provide an easy distinction from the closest relative *Z. narghisa* Brandt, 1938, (Figs 3–6), which occurs in SE Turkey and western Iran, and all other taxa of the genus *Zethes*. *Z. zahedanica* is distinctive also in geographical isolation and the late flight period; it is the only species of *Zethes* found in the end of September, all other *Zethes* are on the wing in spring or early- and mid-summer, apart from the Pakistani subspecies of *Z. brandti*.

The male genitalia are unknown. The female genitalia of the new species (Fig. 40) are easily distinguished from those of all the similar, related taxa by the strongly sclerotized larger, terminally more extended, funnel-like antrum and its larger, rectangular plate and the medially broadened, oval ductus bursae with the evenly thin appendix bursae.

Description (Fig. 9). Wingspan 23 mm, length of forewing 14 mm. Antennae ochreous with fine whitish and brownish variegated segments in the initial section; third joint of palpi long, evenly pointed, thin, white. The vesture of the body and ground colour of the wings more or less dark reddish brown sparsely with fine white scales; the darkest the subapical patch and the outer field of the median area in the forewings and the median area in the hindwings. The most conspicuous features in the forewing pattern are the oval white subcostal patch on the forewings, the finely zigzag initial section of the postmedian line, with clearly defined white ghost. Antemedian line brown with fine outer whitish ghost, semicircularly curved, somewhat wavy. Orbicular and reniform stigmata obscure. The curved brown shade running from the costa toward the termen brown. Transverse lines in the hindwings brown, the

Text-fig. 1. Type locality of *Zethes zahedanica* **sp. n.**, Iran, Systan-va-Baluchestan

basal one the strongest, the two outer finer, with lighter outer ghost. Cilia white and brown variegated in all the wings. Underside of wings brownish, with indication of all the wing patterns, even of the orbicular and reniform stigmata, which are hardly visible on the upper side.

Female genitalia. (Fig. 40). Papillae anales setose, elongate; apophyses posteriores very long, about three times as long as apophyses anteriores; ostium oval, antrum strongly sclerotized, somewhat funnel-like, terminally extended, with broadly rectangular plate, posteriorly with two elongate eversible wing-like extensions; ductus bursae medially broadened, oval; appendix bursae small, almost evenly thin, not prominent, corpus bursae large, globular, without signum.

Male genitalia. Unknown.

Biology and distribution. *Zethes zahedanica* **sp. n.** is known only from the south-eastern Province of Iran, Systan-va-Baluchistan (Text-fig. 1). It is an early autumnal species.

Etymology. *Zethes zahedanica* is named after the capital of the Province, because the type was collected travelling from Zahedan (Prov Systan-va-Baluchistan) toward Bam city (Prov. Kerman).

***Zethes brandti pakistana* subsp. n.** (Figs 13, 14, 31, 43).

Holotype: male, Pakistan, 2450 m, Hindukush Mts., E of Teru, Samaran village, 17-18. IX. 1998, leg. P. Gyulai & A. Garai, slide no. GYP 5695 (coll. PGM, later to be deposited in HNHM).

Paratypes: one male, three females, Pakistan, Himalaya Mts., valley of Indus, between Chilas and Dassu, motel Barseen, 27-28. IX. 1998, leg. P. Gyulai & A. Garai (coll. PGM) slide nos.: 5673f, 5683f, 5684 m

Diagnosis. *Zethes brandti pakistana* **subsp. n.** (Figs 13, 14, 31, 43) is the eastern subspecies of *Z. brandti* Janzon, 1977, (Figs 11, 12, 30, 42), from which it differs in the darker brown medial area of the wings, particularly in the forewings. The correct identification is supported by the geographical isolation and the late flight period, in late September, while that of the nominotypical subspecies is May and June. The male genitalia of the new subspecies differ from the nominotypical one in the longer and stronger left and right saccular extensions, the much longer, discoidal carina plate and the much larger, longer main diverticulum of the vesica, recurved dorsad. The female genitalia of the new subspecies (Fig. 43) have more sclerotized-ribbed appendix bursae with a discoidal plate, while the appendix bursae is less sclerotized and the plate is shorter, rather semiglobular in the nominotypical subspecies; the corpus bursae of the new subspecies is about twice the size of that in the nominotypical one.

Description (Figs. 13, 14). Wingspan 23-30 mm, length of forewing 12-14 mm. The vesture of the body and ground colour of the wings more or less brownish, greyish brown, the darkest in the subapical patch and the outer field of the median area in the forewings and the median area in the hindwings. The subterminal and terminal fields in all the four wings with greyish, bluish grey suffusion. Antemedian line oblique, almost straight, postmedian line typical of the *Zethes* species, prominent then arched; both lines brown with fine outer whitish ghost. Orbicular stigma dot-like, reniform typical but small; both dark brown, obscure. The curved shade which extends from costa towards termen greyish.

Male genitalia. (Fig. 31). Uncus strong, curved, apically with a small horn; distal part of valvae enlarged, laterally strongly, asymmetrically extended (the left one larger), apically finely rounded; saccular extensions asymmetrical, the left one strong, slightly curved; the right one much longer, somewhat falciform. Aedeagus strongly sclerotized, slightly curved, with a large carinal plate, densely covered with a field of tiny cornuti; the main diverticulum of the membranous vesica a long tube, recurved dorsad.

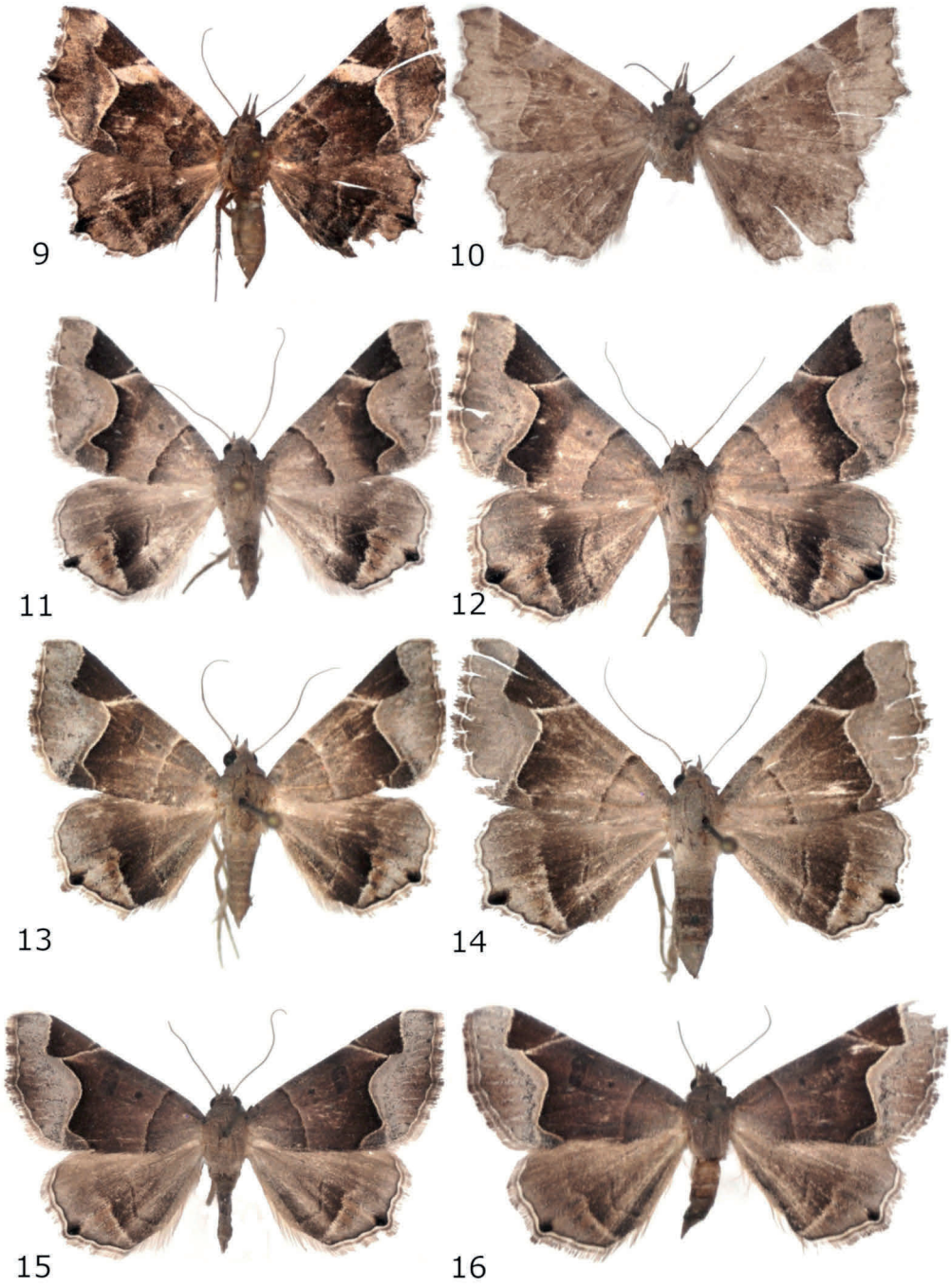
Female genitalia. (Fig. 43). Papillae anales setose, elongate, angular; apophyses posteriores very long, about three times as long as apophyses anteriores. Antrum strongly sclerotized, circular with strongly sclerotized narrow edge, posteriorly with two elongate eversible wing-like extensions terminally; ductus bursae rugose, appendix bursae sclerotized-ribbed with a discoid plate inside; corpus bursae large, globular, without signum.

Biology and distribution. *Zethes brandti pakistana* **subsp. n.** occurs in the Pakistani Himalaya and Hindukush, at medium high elevations. Flight period early autumn.

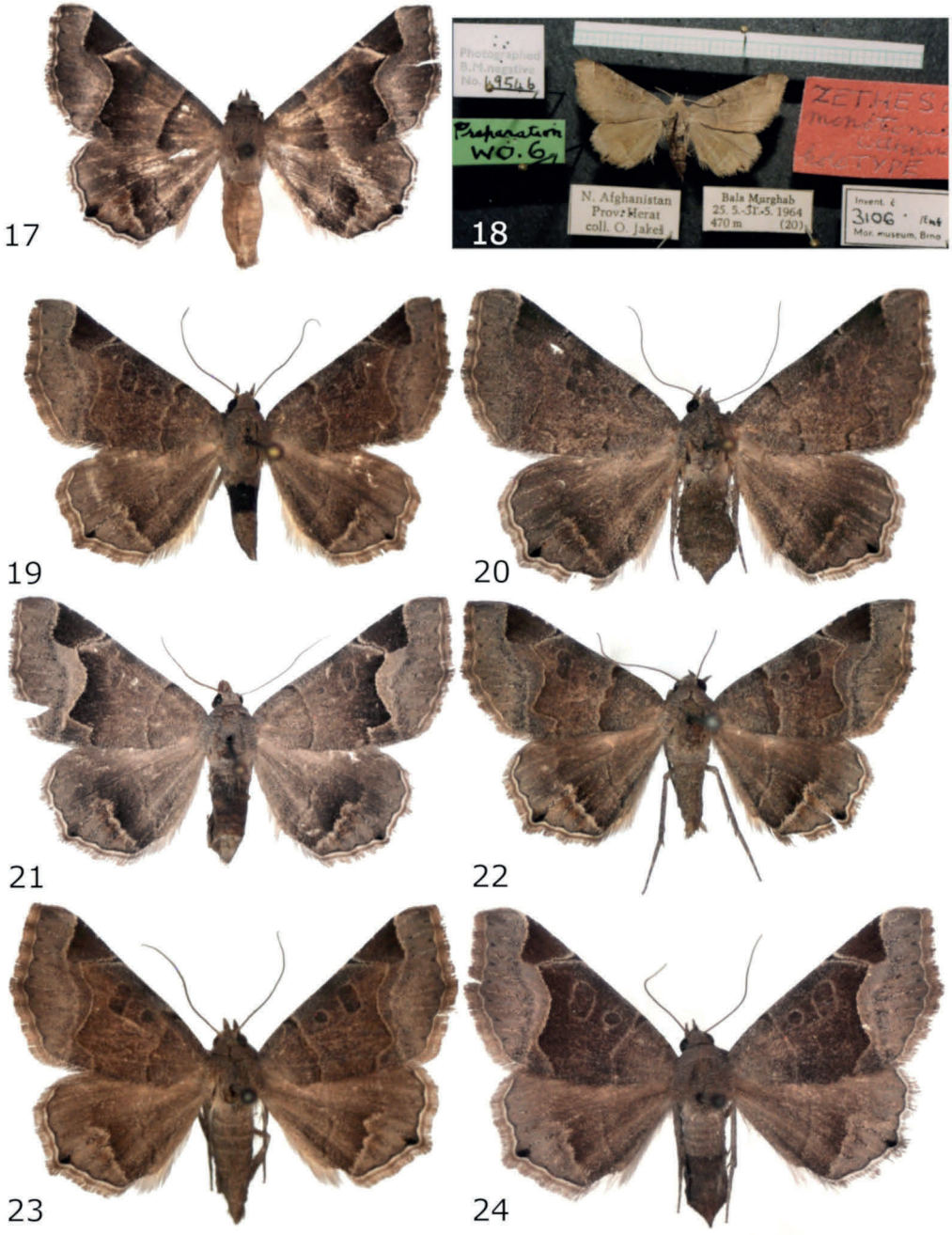
Etymology. This new subspecies is named after its distribution.

Acknowledgements. The author is grateful to his wife Adrienne Gyulai-Garai (Miskolc, Hungary) for much help in computer work; to Barry Goater (Hampshire, UK) for linguistic adjustments; to Marek Dvorak (Smrcná, near Jihlava, Czeh Republik) for the type documentation of *Zethes monotonus*; to Balázs Benedek (Törökbálint, Hungary) for Noctuidae material; to Oleg Pekarsky (Budapest, Hungary) for the photos of the female of *Zethes narghisa subrufa* ssp. n.; to Mohammad Mahdi Rabieh (Mashad, Iran) for the *Zethes nemea* specimen from Khorasan-e -Jonoubi; to Imre Fazekas (Pannon Institute, Pécs, Hungary) for the publication of the manuscript and for the reviewers.

Figs 1-8. 1. *Z. insularis* ♂, W Cyprus, Akamas paeninsula; 2. *Z. insularis*, ♀, Bulgaria, Struma v.; 3. *Z. narghisa*, ♂, Iran, Boyerahmad-va-Kohgiluyeh, SE- Zagros; 4. *Z. narghisa*, ♀, Iran, Boyerahmad-va-Kohgiluyeh, SE- Zagros; 5. *Z. narghisa*, ♂, Iran, Fars, 40 km SW of Sivand; 6. *Z. narghisa*, ♀, Iran, Fars, 5 km s of Thangebolhayat; 7. *Z. narghisa subrufa* **ssp. n.**, HT, ♂, Pakistan, NWFP S. Waziristan, GYP 5293; 8. *Z. narghisa subrufa* **ssp. n.**, PT, ♀, Tajikistan, Hissar Mts., OP 1888.

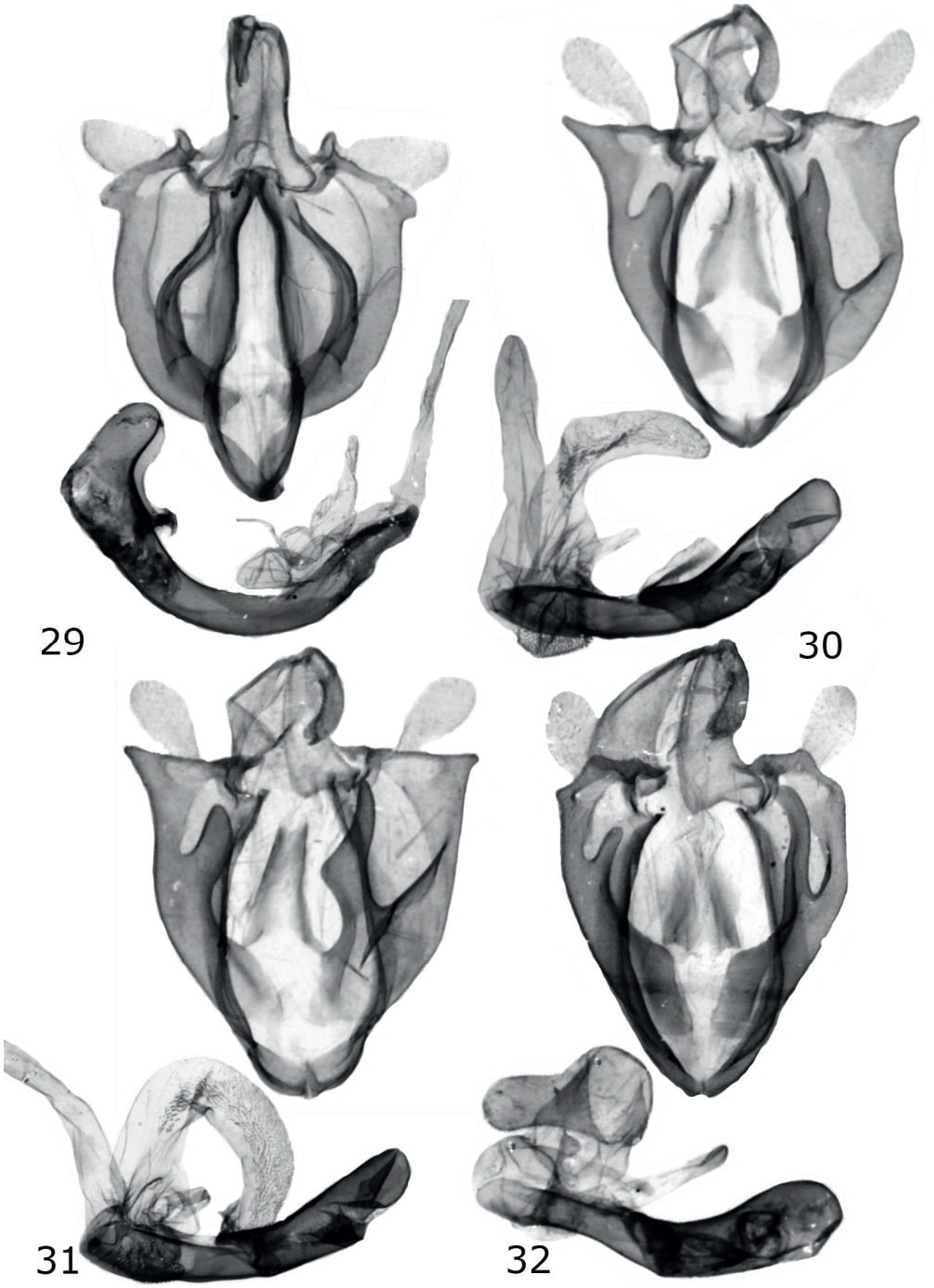


Figs 9-16. 9. *Z. zahedanica*, **sp. n**, HT, ♀, Iran, GYP 2298; 10. *Z. sp.,* ♀, Armenia, GYP 5677; 11. *Z. brandti*, ♂, Iran, SE- Zagros; 12. *Z. brandti*, ♀, Iran, S-Zagros, 8 km NE of Thangebolhayat 13. *Z. brandti pakistana* **ssp. n.,** HT, ♂, Pakistan, 2450m, Hindukush Mts., GYP 5695; 14. *Z. brandti pakistana* **ssp. n.,** PT, ♀, Pakistan, Himalaya Mts.; 15. *Z. nemea*, ♂, Iran, Fars, Zagros Mts.; 16. *Z. nemea*, ♀, Iran, Fars, Zagros Mts., GYP 5691.

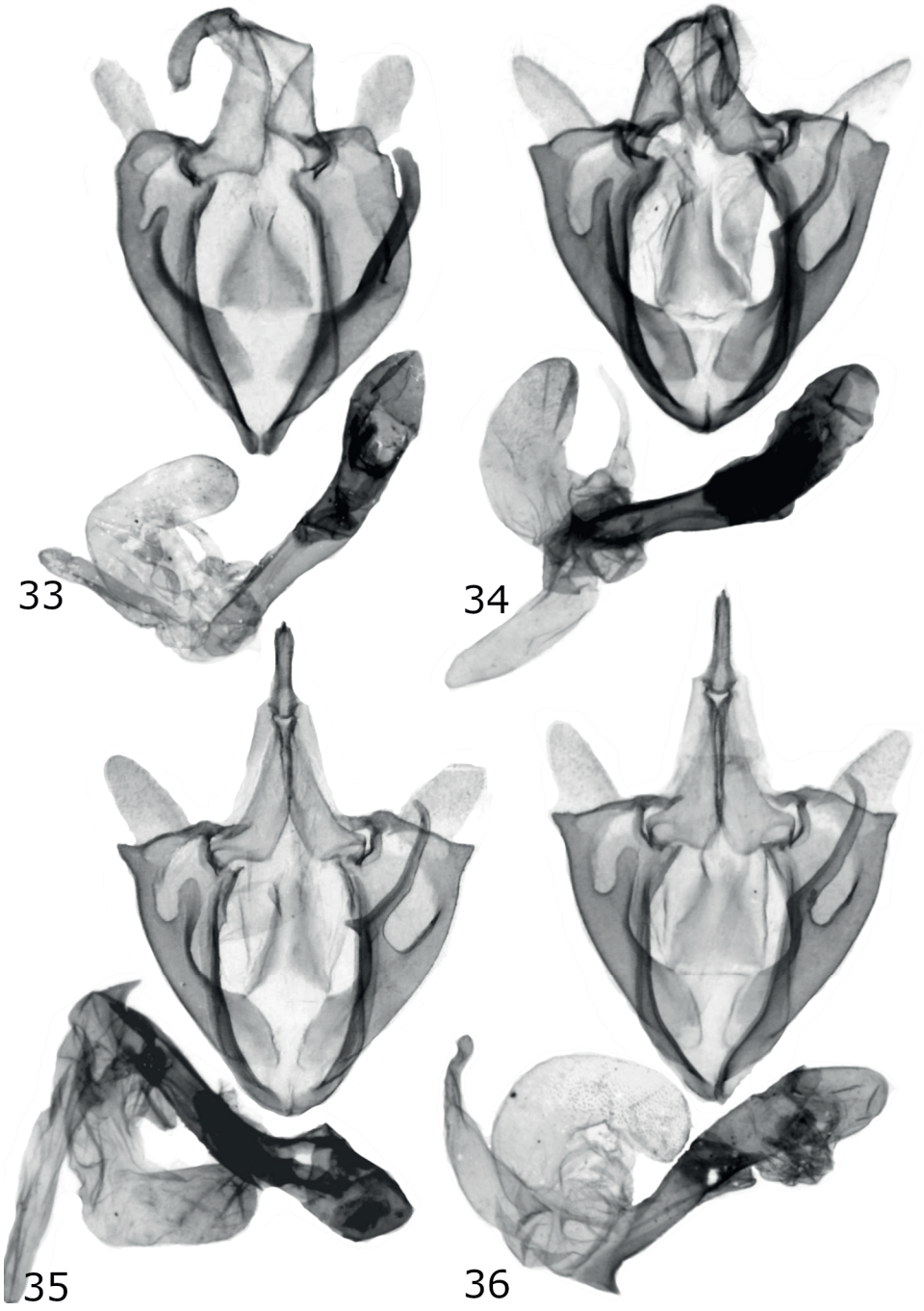


Figs 17–24. 17. *Z. nemea*, ♂, Iran, Khorasan-e-Jonoubi, Birjand, GYP 5696; 18. *Z. monotonus*, HT, ♂, Aghanistan, Herat; 19. *Z. monotonus*, ♂, Tajikistan, Khation, Vakhs; 20. *Z. monotonus*, ♀, Tajikistan, Khation, Vakhs, GYP 5690; 21. *Z. monotonus,* ♀, Tajikistan, Khation, Vakhs; 22. *Z. pistazina*, paratype, Kyrgyzstan, Kara-Kul, GYP 5681; 23. *Z. pistazina,* ♂, Tajikistan, 50 km W Kurgan Tyube, Babadag Mts, GYP 5686; 24. *Z. pistazina*, ♀, Tajikistan, 50 km W Kurgan Tyube, Babadag Mts.

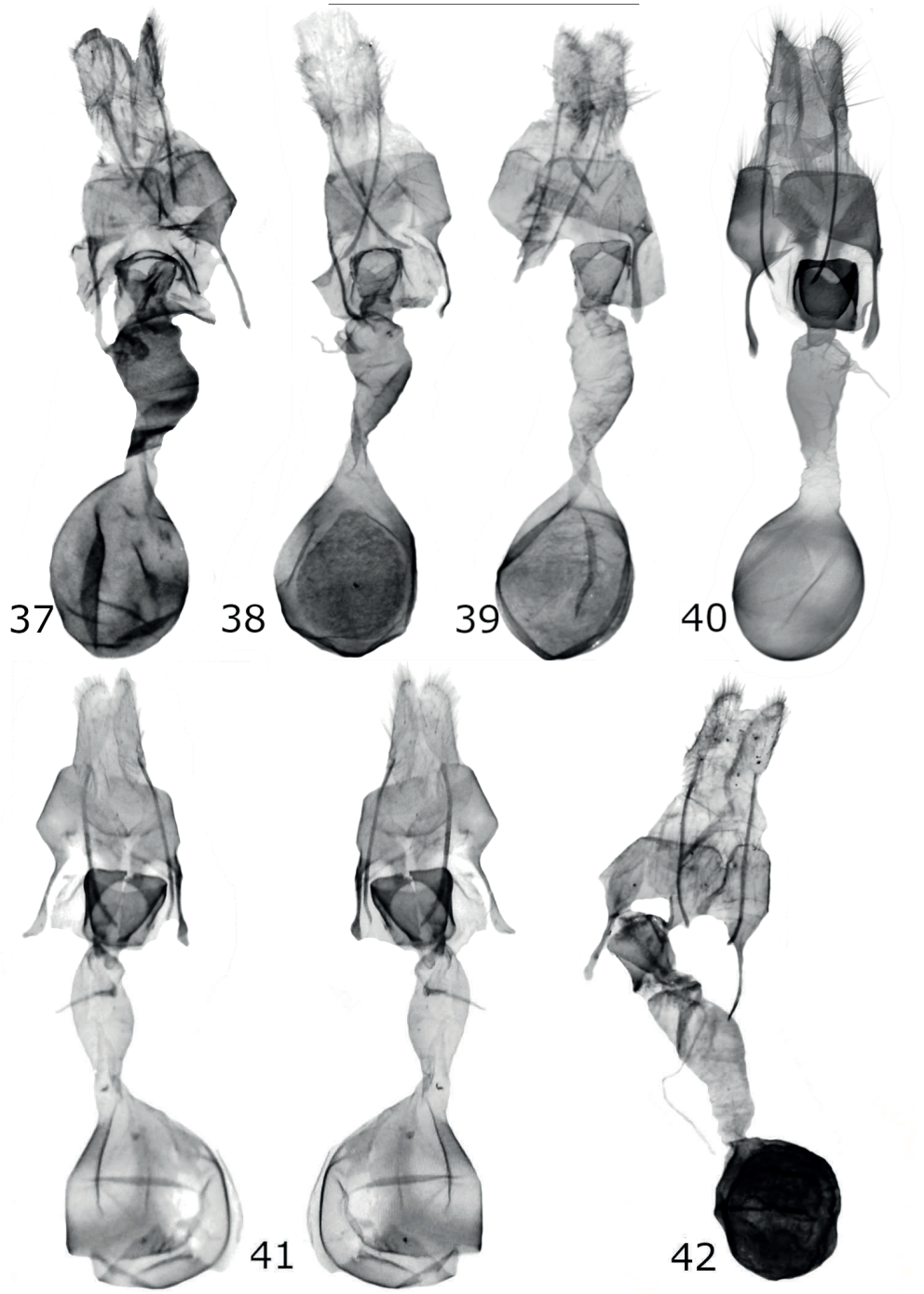
Figs 25–28. 25. *Z. insularis*, Bulgaria, Struma v., GYP 5689; 26. *Z. narghisa*, Iran, Boyerahmad, GYP 5676; 27. *Z. narghisa*, Iran, Fars, GYP 5698; 28. *Z. narghisa subrufa* **ssp. n**., HT, Pakistan, Waziristan, GYP 5699.



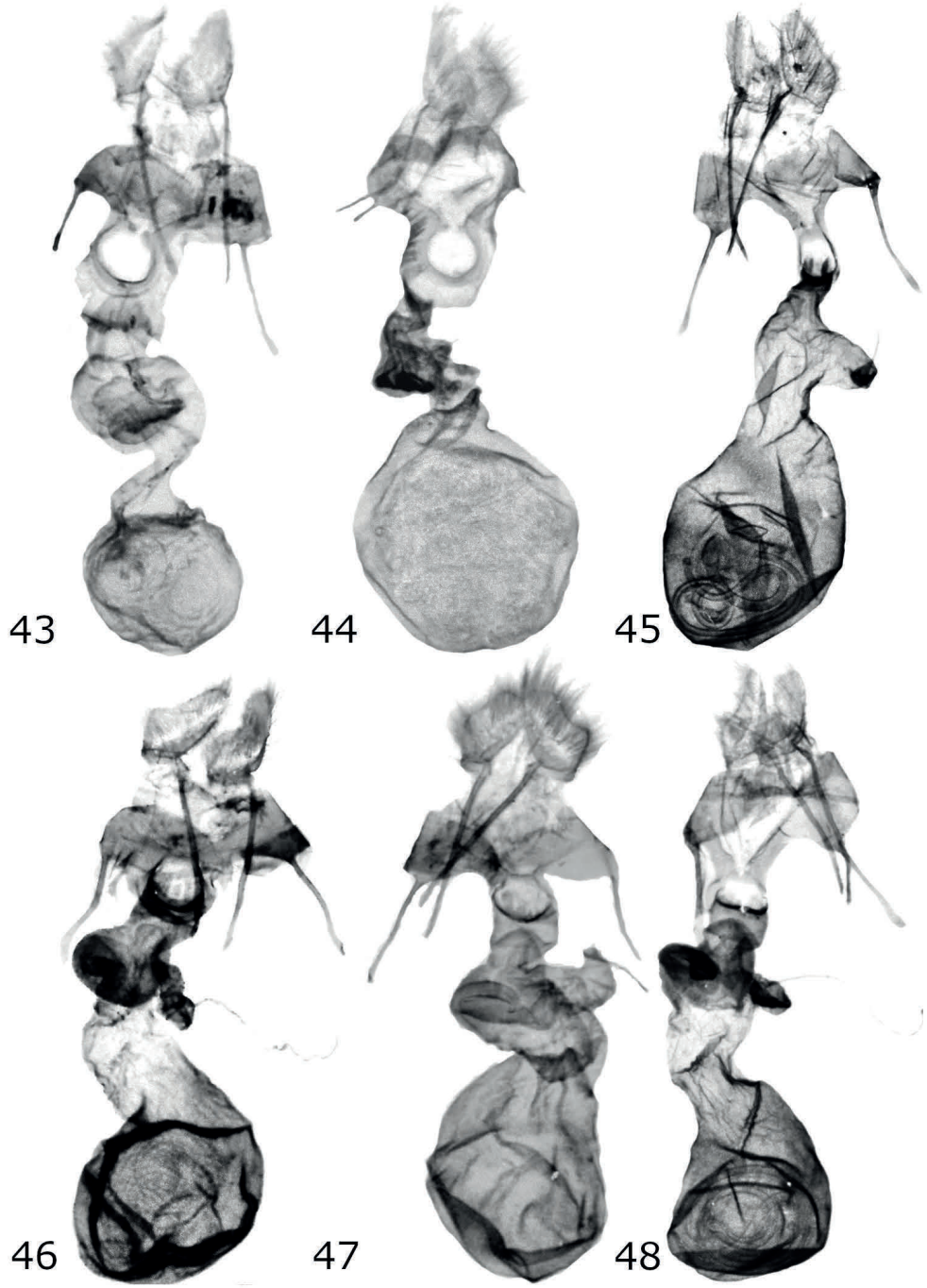
Figs 19–32. 29. *Z. narghisa subrufa* **ssp. n.**, PT, Tajikistan, S Darvaz, GYP 5685; 30. *Z. brandti*, Iran, Fars, GYP 5694; 31. *Z. brandti pakistana* **ssp. n.**, HT, Pakistan, Hindukush, GYP 5695; 32. *Z. nemea*, Iran, Fars, GYP 5692.



Figs 33–36. 33. *Z. nemea*, Iran, Khorasan, GYP 5696; 34. *Z. monotonus*, Tajikistan, Darvaz, GYP 5682; 35. *Z. pistazina*, paratype, Kyrgyzstan, Karakul, GYP 5681; 36. *Z. pistazina*, Tajikistan, Vakhs, GYP 5686.



Figs 37–42. 37. *Z. insularis*, Bulgaria, Struma v, GYP 5688; 38. *Z. narghisa*, Iran, Fars, GYP 5700; 39. *Z. narghisa*, Iran, Fars, GYP 5701; 40. *Z. narghisa subrufa* **ssp. n.**, PT, Tajikistan, Hissar Mts., OP 1888; 41. *Z. zahedanica* **sp. n**., HT, Iran, Baluchestan, GYP 2298, dorsal and ventral view; 42. *Z. sp.,* Armenia, Megri, GYP 5677.



Figs 43–48. 43. *Z. brandti*, Iran, Fars, GYP 5675; 44. *Z. brandti* **ssp. n**., PT, Pakistan, Himalaya, GYP 5683; 45. *Z. nemea*, Iran, Fars, GYP 5691; 46. *Z. monotonus,* Tajikistan, Vakhs, GYP 5690; 47. *Z. pistazina*, Kyrgyzstan, Ferganski basin, GYP 5697; 48. *Z. pistazina*, Tajikistan, Babadag, GYP 5674.

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https://doi.org/10.24386/LepidHung.2022.18.1.85 HU ISSN 2732-3854 (print) | HU ISSN 2732-3498 (online)

Lepidopterologica Hungarica 18(1): 95–116. | https://epa.oszk.hu/04100/04144

Received 05.05.2022| Accepted 16.05.2021 | Published: 17.06.2022 (online) | 26.06.2022 (print)

A magyarországi nappali lepkék hernyóinak tápnövényei (Lepidoptera, Rhopalocera)

Larval foodplants of Hungarian butterflies (Lepidoptera, Rhopalocera)

Gergely Péter

Citation. Gergely P. 2022: A magyarországi nappali lepkék hernyóinak tápnövényei (Lepidoptera, Rhopalocera) |Larval foodplants of Hungarian butterflies (Lepidoptera, Rhopalocera). – Lepidopterologica Hungarica 18(1): 85–116.

Abstract. This list of larval foodplants of Hungarian butterflies has been adapted from the provisional checklist written by H. E. Clarke [28]. Conservation of butterflies depends on the exact knowing of larval foodplants, in particular those of protected species. This list has been based on published literature and contains only data of butterflies and foodplants occurring in Hungary. However, some of the data are derived from countries with different climatic conditions and different biotopes. Therefore, this list applies to Hungarian butterflies with some reservation. A thorough investigation of foodplants in this country seems to be necessary. With 10 figures.

Keywords: Lepidoptera, butterflies, larval foodplants, Hungary

Author's address. Gergely Péter, 2014 Csobánka, Hegyalja lépcső 4. | Hungary
E-mail: pgergely@alexmed.hu

Summary. Conservation of butterflies depends on knowing their foodplants. This list, adapted from Clarke [28] contains all Hungarian butterflies and their foodplants occurring in Hungary. The list of Hungarian butterflies is based on the textbook Macrolepidoptera of Hungary [173], and the list of foodplants is based on the online floral database [95]. The list is based on published literature sources; however, some of the data derived from countries with different climatic conditions, e.g. Spain, Greece and Scandinavia and different biotopes, such as high mountains and coastal areas. Therefore, this list applies to Hungarian butterflies with certain reservations. A thorough investigation of larval foodplants in this country seems to be mandatory. It is of utmost importance to know the foodplants of oligophagous or oligophagous-polyphagous butterflies.
Courtney [29] classified butterflies according to the larval foodplants that they utilise into four main types:

1) Monophagous: feeding on only one species of plant throughout their range, e.g.,*Phengaris teleius* (Bergsträsser, 1779) on *Sanguisorba officinalis* L.

2) Oligophagous-monophagous: feeding on one plant species in one region, and another species in another region, e.g., *Zerynthia polyxena* ([Denis & Schiffermüller], 1775) utilizes *Aristolochia clematitis* L. in Hungary, but other *Aristolochia* species in other regions.

3) Oligophagous-polyphagous: feeding on several closely related species of plants throughout their range, usually in the same genus or a closely related genus, e.g., those on Poaceae, such as *Carterocephalus palaemon* [Pallas, 1771),

4) Polyphagous: feeding on many different species of plants throughout their range, usually in different families. e.g., *Vanessa cardui* (Linnaeus, 1758) that utilize Urticaceae, Asteraceae, Malvaceae, and other plants.

The easiest way to discover foodplants is by finding ovipositing butterflies and signs of larval feeding. A much more sophisticated, but less precise way is by observing egg-laying preferences and/or feeding activity in captivity [54]. Probably this latter is the only feasible method in case of larvae living on trees.

Bevezetés – Introduction

A lepkék tápnövényeinek pontos ismerete elengedhetetlenül szükséges, mert csak így ismerhetjük meg alaposabban a hazai fauna fajait, s ez kiváltképpen fontos a védett, veszélyezetett és a ritka fajok esetében. A legtöbb, általánosan használt magyar és európai kézikönyv valamelyik régebbi kiadású kézikönyv adatait vette át részleges vagy teljes forrás megjelölés nélkül. Emiatt sokszor meglepő, esetleg téves adatok is szerepelnek, vagy legalábbis szerepelhetnek. Például a barna gyöngyházlepke (*Brenthis hecate* ([Denis & Schiffermüller], 1775) esetében az egyik ilyen kézikönyv [55] egyedüli tápnövényként a *Dorycnium germanicum* L.-ot jelöli meg, ugyanakkor Tolman & Lewington könyvében [161] a *Filipendula ulmaria* (L.) Maxim, Tshikolovets könyvében [163] pedig a *Filipendula ulmaria* (L.) Maxim, *Filipendula vulgaris* Moench és *Spiraea crenata* L. szerepelnek tápnövényeként. Ezek és hasonló zavaró tényezők indokolták a Nota Lepidopterologicában megjelent tápnövény fajlistát, amelyet Harry E. Clarke [28] állított össze, és 471 európai nappali lepke adatait mutatja be.

Jelen közleménynek az a célja, hogy ezt a listát a magyarországi viszonyokra ültesse át, és legyen átfogó képünk a hernyók tápnövényeiről. A tanulmányban csak a hazánkban előforduló, illetve nemrégen kihalt nappali lepkék szerepelnek, és csak azok a tápnövények, melyek hazánkban is előfordulnak. A lepkék magyar elnevezésében a Magyarország nagylepkéi [173] könyvet, a növények kiválasztásában, megjelölésében a Magyarország edényes növényfajainak online adatbázisa [95] weboldal adatait használtam fel. Felhasználtam továbbá azon kevés publikált adatot is, amelyek a hazai lepkék tápnövényeivel (is) foglalkoztak. Problematikusnak véltem a dísznövények és szántóföldi/konyhakerti növények felvételét a listába. De mivel magam is tapasztaltam a fecskefarkú lepke (*Papilio machaon* Linnaeus, 1758) hernyóját kapron [*Anethum graveolens* L.) és köményen (*Carum carvi* L.), illetve a nagy fehérsávos lepke (*Neptis rivularis* Scopoli, 1763) tenyészését a kerti gyöngyveszőn [*Spiraea chamaedryfolia* L.], nem akartam kihagyni ezeket a növényeket sem.

A tápnövénylista minden egyes tétele irodalmi hivatkozást is tartalmaz. Meg kell azonban jegyezni, hogy sok esetben ezek az irodalmi adatok a hazai viszonyoktól merőben eltérő klimatikus, ökológiai viszonyokra vagy más biotópokra utalnak, mint pl. Spanyolország, Görögország vagy Svédország. Ezt különösen fontos figyelembe venni, ha nagy elterjedésű területen élő fajról van szó. Hűvösebb éghajlaton, hegyi környezetben vagy Dél-Európában ugyanaz a faj más-más tápnövényeket használhat. Ezeket az adatokat tehát óvatosan és kellő kritikával kell kezelni. Ugyancsak fontos figyelembe venni a tápnövény váltás lehetőségét is, mint pl. az *Euphydrya aurinia* esetében.

Nagyon fontos feladat lenne, hogy ezt a jelenlegi listát a hazai adatokkal aktualizáljuk. Ez különösen fontos az egyetlen vagy kevés tápnövényt használó fajokra. Courtney [29] négy csoportra osztotta a nappali lepkéket a tápnövény használatuk alapján:

1. Monofág: előfordulásának területén egyetlen tápnövényfajon él, pl. *Phengaris teleius* (Bergsträsser, 1779) – *Sanguisorba officinalis* L.

2. Oligofág-monofág: régiónként más-más tápnövényen él, pl. nálunk a *Zerynthia polyxena* ([Denis & Schiffermüller], 1775) tápnövénye az *Aristolochia clematitis* L., de más régiókban még hét másik *Aristolochia* fajon él.

3. Oligofág-polifág: több közeli rokon fajon – többnyire ugyanazon a nemen, vagy rokon nemen belül – él egész elterjedési területén. Ilyenek a legtöbb fűféléken (Poaceae) élő fajok, mint pl. a *Carterocephalus palaemon* [Pallas, 1771).

4. Polifág: sokféle növényen él, melyek különböző családokba tartoznak, pl. *Vanessa cardui* (Linnaeus, 1758), mely csalánon (Urticaceae), fészkesvirágzatúakon (Asteraceae), mályvaféléken (Malvaceae), stb. él.

Elsősorban a védett, oligofág-monofág, valamint oligofág-polifág fajok hazai tápnövényeinek pontos feltérképezése volna a legfontosabb cél.

A tápnövények megállapítása többféle módon lehetséges. Egyik biztos mód, ha a petéző nőstényt figyelünk meg (1., 2., 3., 4. ábra). A 2. ábrán a hajnalpírlepke (*Anthocaris cardamines* Linnaeus, 1758) tornyos ikravirágra (*Arabis turrita* L.) petézik, amely ebben a listában tápnövényként nem szerepel.

A másik biztos mód, hogy táplálkozó hernyót figyelünk meg, a rágás egyértelmű jeleivel (5., 6., 7., 8., 9., 10. ábra). A 7. ábrán egy kis tarkalepke (*Melitaea trivia* [Denis & Schiffermüller], 1775) hernyója látható a csilláros ökörfarkkóró levelén (*Verbascum lychnitis* L.). Azon az élőhelyen az imágó gyakori, és a hernyója csak a szintén gyakori csilláros ökörfarkkórón található. Ugyanarról az élőhelytől származik a fecskefarkú lepke (*Papilio machaon* Linnaeus, 1758) hernyójának képe is (8. ábra), mely az ott szintén gyakori szürke gurgolyán (*Seseli osseum* Cr.) táplálkozik, a lerágott gurgolya szárak is gyakoriak. E két utóbbi tápnövény sem szerepel a listában, ez is indokolja, hogy a hazai tápnövények feltérképezése menynyire fontos volna.

Vannak esetek, amikor nem állapítható meg a tápnövény (mert a lepke a magasban rakja le a petéit, és a hernyók is magasan táplálkoznak), ilyenkor a befogott nőstény peterakási preferenciáját, illetve a hernyók táplálkozási preferenciáját figyelhetjük. meg. Ilyen megfigyelésekre alapozták például az. L. betűs rókalepke (*Nymphalis vaualbum* [Denis & Schiffermüller], 1775) tápnövényeit [54]. Magasabb fákon élő lárvák esetében valószínűleg csak ez a járható út.

Nappali lepkék hernyóinak tápnövényei – Clarke [28] összeállítása alapján

Aglais io (Linnaeus, 1758) – Nappali pávaszem
Cannabaceae: *Humulus lupulus* L. [122], Urticaceae: *Urtica dioica* L. [9], *Urtica urens* L. [4], *Parietaria officinalis* L. [161].

Aglais urticae (Linnaeus, 1758) – Kis rókalepke
Cannabaceae: *Humulus lupulus* L. [120]
Urticaceae: *Urtica dioica* L. [9], *Urtica urens* L. [89].

Anthocaris cardamines (Linnaeus, 1758) – Hajnalpírlepke
Brassicaceae: *Alliaria petiolata* (M.B.) Cavara et Grande [161], *Biscutella laevigata* L. [148], *Brassica rapa* L.[185], *Capsella bursa pastoris* (L.) Medic. [185], *Cardamine amara* L. [148], *Cardamine bulbifera* (L.) Crantz [88], *Cardamine flexuosa* With. [88], *Cardamine hirsuta* L. [88], *Cardamine impatients* L. [148], *Cardamine pratensis* L. [9], *Cardaminopsis arenosa* (L.) Hay [161], *Diplotaxis erucoides* (L.) DC., [152], *Draba muralis* L. [185], *Erucastrum nasturtiifolium* (Poir.) O.E.Schulz [88], *Hesperis matronalis* L. [9], *Isatis tinctoria* L. [185], *Lepidium campestre* (L.) W.T.Aiton [122], *Lepidium draba* L. [89], *Lunaria annua* L. [89], *Lunaria rediviva* L. [122], *Nasturtium officinale* W.T.Aiton [148], *Pseudoturritis turrita* (L.) Al-Shehbaz [122], *Rorippa amphibia* (L.) Bresser [88], *Rorippa austriaca* (Crantz) Besser [88], *Sinapis alba* L. [89], *Sinapis arvensis* L. [9], *Sisymbrium loeselii* L. [122], *Sisymbrium officinale* (L,) Scop. [122], *Teesdalia nudicaulis* (L.) W.T.Aiton [148], *Thlaspi arvense* L. [41], *Turritis glabra* L. [89], Tropaeolaceae: *Tropaeolum majus* L. [88].

Apatura ilia ([Denis & Schiffermüller, 1775]) – Kis színjátszólepke
Betulaceae: *Alnus glutinosa* (L.) Gaertn. [106], Salicaceae: *Populus alba* L. [150], *Populus nigra* L. [106], *Populus tremula* L. [122], *Salix x fragilis* L. [122], *Salix alba* L. [106], *Salix caprea* L. [15], *Salix cinerea* L. [Stef 14], *Salix rosmarinifolia* L. [163], *Salix viminalis* L. [174].

* kipusztult fajok

Apatura iris ([Denis & Schiffermüller, 1775]) – Nagy színjátszólepke
Salicaceae: *Populus balsamifera* L. [108], *Populus nigra* L. [108], *Populus tremula* L. [56], *Salix x fragilis* L. [88], *Salix alba* L. [108], *Salix aurita* L. [108], *Salix caprea* L. [9], *Salix cinerea* L. [108], *Salix purpurea* L. [88].

Apatura metis (Freyer, 1829) – Magyar színjátszólepke
Salicaceae: *Salix alba* L. [183].

Aphantopus hyperanthus (Linnaeus, 1758) – Közönséges ökörszemlepke
Cyperaceae: *Carex brizoides* L. [88], *Carex fritschii* Waisb. [88], *Carex hirta* L. [88], Carex nigra (L.) Reichard [30] *Carex panicea* L. [88], *Carex remota* L. [15], Poaceae: *Agrostis capillaris* L. [88], *Agrostis stolonifera L.* [88], *Alopecurus pratensis* L. [15], *Arrhenatherum elatius* (L.) P.Beauv. ex J.Presl & C.Presl [88], *Brachypodium pinnatum* (L.) P.Beauv. [15], *Brachypodium sylvaticum* (Huds.) P.Beauv. [4], *Bromus erectus* Huds. [88], *Calamagrostis epigejos* (L.) Roth [122], *Cynosurus cristatus* L. [15], *Dactylis glomerata* L. [32], *Deschampsia cespitosa* (L.) P.Beauv. [9], *Elymus repens* (L.) Gould [32], *Festuca ovina* L. [88], *Festuca rubra* L. [88], *Holcus mollis* L. [88], *Milium effusum* L. [32], *Molinia caerulea* (L.) Moench [88], *Phalaris arundinacea* L. [174], *Phleum pratense* L. [15], *Poa annua* L. [32], *Poa pratensis* L. [174].

Aporia crataegi (Linnaeus, 1758) – Galagonyalepke
Cornaceae: *Cornus sanguinea* L. [88], Rhamnaceae: *Frangula alnus* Mill. [88], Rosaceae: *Amelanchier ovalis* Medik. [88], *Cotoneaster integerrimus* Medik. [41], *Crataegus laevigata* (Poir.) DC [15], *Crataegus monogyna* Jacq. [88], *Malus domestica* (Suckow) Borkh. [122], *Prunus amygdalus* Batsch. [89], *Prunus armeniaca* L. [102], *Prunus avium* (L.) L. [88], *Prunus cerasifera* Ehrh. [15], *Prunus cerasus* L. [102], *Prunus domestica* L. [122], *Prunus mahaleb* L. [69], *Prunus padus* L. [122], *Prunus persica* L. [102], *Prunus spinosa* L. [89], *Pyrus communis* L. [122], *Rosa canina* L. [174], *Sorbus aucuparia* L. [122], Grossulariaceae: *Ribes uva-crispa* L. [88].

Araschnia levana (Linnaeus, 1758) – Pókhálós lepke
Cannabaceae: *Humulus lupulus* L. [120], Urticaceae: *Urtica dioica* L. [122], *Urtica urens* L. [88].

Arethusana arethusa ([Denis & Schiffermüller], 1775) – Közönséges szemeslepke
Poaceae: *Brachypodium pinnatum* (L.) P.Beauv. [15], *Bromus erectus* Huds. [120], *Corynephorus canescens* (L.) P.Beauv. [15], *Cynosurus cristatus* L. [15], *Dactylis* spp. L. [174], *Danthonia decumbens* (L.) DC. [15], *Festuca ovina* L. [120], *Festuca rubra* L. [15], *Lolium* spp. L. [174], *Poa* spp. L. [174].

Argynnis laodice (Pallas 1771) – Keleti gyöngyházlepke
Violaceae: *Viola canina* L. [119] *Viola palustris* L. [41].

Argynnis pandora ([Denis & Schiffermüller], 1775) – Zöldes gyöngyházlepke
Violaceae: *Viola alba* Besser [109], *Viola arvensis* Murray [109], *Viola kitaibeliana* Schult. [89], *Viola tricolor* L. [43].

Argynnis paphia (Linnaeus, 1758) – Nagy gyöngyházlepke
Violaceae: *Viola alba* Besser [88], *Viola arvensis* Murray [122], *Viola canina* L. [9], *Viola hirta* L. [15], *Viola odorata* L. [89], *Viola palustris* L. [30], *Viola reichenbachiana* Jord. ex Boreau [15], *Viola riviniana* Rchb. [122], *Viola tricolor* L. [42], Rosaceae: *Filipendula ulmaria* (L.) Maxim. [88].

Aricia agestis ([Denis & Schiffermüller], 1775) – Szerecsenboglárka
Fabaceae: *Lotus corniculatus* L. [88], *Medicago* spp L. [88], Geraniaceae: *Erodium ciconium* (L.) L'Hér. [88], *Erodium cicutarium* (L.) L'Hér. [169], *Geranium columbinum* L. [89], *Geranium dissectum* L. [89], *Geranium molle* L. [89], *Geranium palustre* L. [62], *Geranium phaeum* L. [22], *Geranium pratense* L. [22], *Geranium pusillum* L. [122], *Geranium pyrenaicum* Burm.f. [120], *Geranium rotundifolium* L. [89], *Geranium sanguineum* L. [23], *Geranium sylvaticum* L. [62], Cistaceae: *Helianthemum nummularium* (L.) Mill. [169].

Aricia artaxerxes (Fabricius, 1767) – Bükki szerecsenboglárka
Geraniaceae: *Geranium sanguineum* L. [41], *Geranium sylvaticum* L. [41], Cistaceae: *Helianthemum nummularium* (L.) Mill. [87].

Boloria dia (Linnaeus, 1758) – Kis gyöngyházlepke
Lamiaceae: *Prunella vulgaris* L. [30], Violaceae: *Viola arvensis* Murray [122], *Viola canina* L. [15], *Viola hirta* L. [122], *Viola odorata* L. [42], *Viola pumila* Chaix [120], *Viola reichenbachiana* Jord. ex Boreau [174], *Viola riviniana* Rchb. [120], *Viola rupestris* F.W.Schmidt [15], *Viola tricolor* L. [122], Rosaceae: *Potentilla reptans* L. [52], *Rubus idaeus* L. [122].

Boloria euphrosyne (Linnaeus, 1758) – Árvácska gyöngyházlepke
Primulaceae: *Primula vulgaris* Huds. [9], Violaceae: *Viola arvensis* Murray [15], *Viola biflora* L. [174], *Viola canina* L. [9], *Viola elatior* L. [88], *Viola hirta* L. [8], *Viola odorata* L. [174], *Viola palustris* L. [4], *Viola reichenbachiana* Jord. ex Boreau [62], *Viola riviniana* Rchb. [8], *Viola tricolor* L. [15].

Boloria selene ([Denis & Schiffermüller], 1775) – Fakó gyöngyházlepke
Violaceae: *Viola canina* L. [9], *Viola hirta* L. [120], *Viola palustris* L. [18], *Viola reichenbachiana* Jord. ex Boreau [62], *Viola riviniana* Rchb [8], *Viola tricolor* L. [15].

Brenthis daphne ([Denis & Schiffermüller], 1775) – Málna gyöngyházlepke
Rosaceae: *Filipendula ulmaria* (L.) Maxim. [20], *Rubus caesius* L. [81], *Rubus canescens* DC. [88], *Rubus fruticosus* L. [122], *Rubus idaeus* L. [15].

Brenthis hecate ([Denis & Schiffermüller], 1775) – Rozsdaszínű gyöngyházlepke
Rosaceae: *Filipendula ulmaria* (L.) Maxim. [20], *Filipendula vulgaris* Moench [50], *Spiraea crenata* L. [163].

Brenthis ino (Rottenburg, 1775) – Lápi gyöngyházlepke
Rosaceae: *Aruncus dioicus* (Walter) Fernald [42], *Comarum palustre* L. [186], *Filipendula ulmaria* (L.) Maxim. [122], *Filipendula vulgaris* Moench [41], *Potentilla erecta* (L.) Raeusch. [186], *Rubus idaeus* L. [52].

Brintesia circe (Linnaeus, 1758) – Fehéröves szemeslepke
Cyperaceae: *Carex* spp. L. [103], Poaceae: *Anthoxanthum odoratum* L. [67], *Brachypodium pinnatum* (L.) P.Beauv. [15], *Brachypodium sylvaticum* (Huds.) P.Beauv. [109], *Bromus erectus* Huds. [67], *Bromus sterilis* L. [103], *Danthonia decumbens* (L.) DC. [15], *Elymus repens* (L.) Gould [103], *Festuca ovina* L. [120], *Festuca rubra* L. [15], *Holcus lanatus* L. [174], *Lolium perenne* L. [15], *Phleum pratense* L. [15], *Poa pratensis* L.[15].

Callophrys rubi (Linnaeus, 1758) – Zöldfonákú lepke
Cornaceae: *Cornus sanguinea* L. [167], Viburnaceae: *Viburnum lantana* L. [88], Ericaceae: *Andromeda polifolia* L. [41], *Vaccinium myrtillus* L. [167], *Vaccinium vitis-idaea* L. [167]
Fabaceae: *Anthyllis vulneraria* L. [163], *Cytisus nigricans* L. [167], *Cytisus scoparius* (L.) Link [9], *Genista germanica* L. [167], *Genista pilosa* L. [15], *Genista sagittalis* L. [167], *Genista tinctoria* L. [167], *Laburnum anagyroides* Medik [167], *Lotus corniculatus* L. [167], *Lotus pedunculatus* Cav. [167], *Medicago* × *varia* Martyn [122], *Medicago lupulina* L. [167], *Medicago sativa* L. [88], *Onobrychis viciifolia* Scop. [167], *Oxytropis pilosa* (L.) [88], *Vicia cracca* L. [174], Lamiaceae: *Teucrium chamaedrys* L. [88], Cistaceae: *Helianthemum nummularium* (L.) Mill. [167], Rhamnaceae: *Frangula alnus* Mill. [167], *Rhamnus cathartica* L. [167], Rosaceae: *Crataegus* ssp. L. [104], *Rubus fruticosus* L. [167], *Rubus idaeus* L. [167], *Rubus saxatilis* L. [30].

Carcharodus alceae (Esper 1780) – Mályva busalepke
Malvaceae: *Abutilon theophrasti* Medik. [149], *Alcea biennis* Winterl [89], *Alcea rosea* L. [89], *Althaea cannabina* L. [174], *Malva alcea* L. [122], *Malva neglecta* Wallr. [89], *Malva pusilla* Sm. [15], *Malva sylvestris* L. [149].

Carcharodus floccifera (Zeller, 1847) – Pemetefű busalepke
Lamiaceae: *Ballota nigra* L. [174], *Betonica officinalis* L. [1], *Leonurus cardiaca* L. [163], *Marrubium peregrinum* L. [163], *Marrubium vulgare* L. [174], *Stachys alpina* L. [163], *Stachys germanica* L. [163], *Stachys palustris* L. [163], *Stachys recta* L. [88], *Stachys sylvatica* L. [163], Malvaceae: *Malva neglecta* Wallr. [163].

Carcharodus lavatherae (Esper, 1783) – Tisztesfű busalepke*
Lamiaceae: *Stachys germanica* L. [163], *Stachys recta* L. [27].

Carterocephalus palaemon (Pallas 1771) – Kockás busalepke
Poaceae: *Alopecurus pratensis* L. [88], *Brachypodium pinnatum* (L.) P.Beauv. [118],

Brachypodium sylvaticum (Huds.) P.Beauv. [118], *Bromus ramosus* Huds. [118], *Calamagrostis canescens* (Weber) Roth [118], *Calamagrostis epigejos* (L.) Roth [118], *Calamagrostis villosa* (Chaix) J.F.Gmel. [83], *Cynosurus cristatus* L. [118], *Dactylis glomerata* L. [118], *Digitaria sanguinalis* (L.) Scop. [174], *Elymus repens* (L.) Gould [30], *Holcus lanatus* L. [88], *Milium effusum* L. [118], *Molinia caerulea* (L.) Moench [117], *Phalaris arundinacea* L. [120], *Phleum pratense* L. [88], *Poa trivialis* L. [88].

Celastrina argiolus (Linnaeus, 1758) – Bengeboglárka

Araliaceae: *Hedera helix* L. [167], Tamaricaceae: *Tamarix gallica* L. [88], Celastraceae: *Euonymus europaeus* L. [41], Cornaceae: *Cornus sanguinea* L. [167], Hydrangeaceae: *Philadelphus coronarius* L. [120], Caprifoliaceae: *Symphoricarpos albus* (L.) S.F.Blake [122]
Ericaceae: *Calluna vulgaris* (L.) Hull [122], *Vaccinium myrtillus* L. [41], Fabaceae: *Amorpha fruticosa* L. [81], *Astragalus glycyphyllos* L. [122], *Colutea arborescens* L. [49], *Galega officinalis* L. [163], *Genista germanica* L. [93], *Genista pilosa* L. [88], *Genista tinctoria* L. [88], *Lathyrus pratensis* L. [88], *Lotus pedunculatus* Cav. [163], *Medicago sativa* L. [165], *Melilotus albus* Medik [122], *Melilotus officinalis* (L.) Lam. [93], *Robinia pseudoacacia* L. [88], *Vicia dumetorum* L. [93], *Vicia villosa* Roth [89], Betulaceae: *Alnus glutinosa* (L.) Gaertn. [104], Oleaceae: *Ligustrum vulgare L.* [165], Scrophulariaceae: *Buddleja davidii* Franch. [120], Lythraceae: *Lythrum salicaria L.* [122], Ranunculaceae: *Clematis vitalba* L. [120], Cannabaceae: *Humulus lupulus* L. [122], Rhamnaceae: *Frangula alnus* Mill. [167], *Rhamnus cathartica* L. [41], Rosaceae: *Filipendula ulmaria* (L.) Maxim. [163], *Pyracantha coccinea* M.Roem. [163], *Rubus caesius* L. [88], *Rubus canescens* D.C. [88], *Rubus fruticosus* L. [167], *Rubus idaeus* L. [163].

Chazara briseis (Linnaeus, 1764) – Tarka szemeslepke

Cyperaceae: *Carex leporina* L. [15], Poaceae: *Brachypodium pinnatum* (L.) P.Beauv. [15], *Bromus erectus* Huds. [79], *Festuca ovina* L. [72], *Festuca pallens* Host [88], *Festuca rubra* L. [15], *Lolium* spp. L. [174], *Poa* spp. L. [174], *Sesleria albicans* Kit ex Schult. [85], *Sesleria caerulea* (L.) [79], *Stipa* capillata L. [30], *Stipa* pennata L. [15].

Coenonympha arcania (Linnaeus 1761) – Fehéröves szénalepke

Cyperaceae: *Carex brizoides* L. [62], *Carex pilulifera* L. [183], Poaceae: *Agrostis vinealis* Schreb. [183], *Brachypodium pinnatum* (L.) P.Beauv. [183], *Cynosurus cistatus* L. [183], *Danthonia decumbens* (L.) DC. [183], *Festuca ovina* L. [183], *Festuca rubra* L. [183], *Holcus lanatus* L. [183], *Melica ciliata* L. [174], *Melica nutans* L. [41], *Melica uniflora* Retz. [88], *Poa* spp. L. [82].

Coenonympha glycerion (Borkhausen, 1788) – Közönséges szénalepke

Poaceae: *Brachypodium pinnatum* (L.) P.Beauv. [183], *Brachypodium sylvaticum* (Huds.) P.Beauv. [174], *Briza media* L. [174], *Bromus erectus* Huds. [183], *Cynosurus cristatus* L. [183], *Festuca ovina* L. [183], *Festuca rubra* L. [183], *Melica ciliata* L. [174], *Molinia caerulea* (L.) Moench [183], *Phleum pratense* L. [183], *Poa trivialis* L. [103].

Coenonympha oedippus (Fabricius, 1787) – Ezüstsávos szénalepke

Cyperaceae: *Carex acuta* L. [140], *Carex davalliana* Sm. [25], *Carex hostiana* DC. [25], *Carex humilis* Leyss. [26], *Carex panicea* L. [26], *Carex remota* L. [15], *Carex tomentosa* L. [133], *Eriophorum angustifolium* Honck. [15], Poaceae: *Deschampsia cespitosa* (L:) P.Beauv. [15], *Festuca rupicola* Heuff. [26], *Lolium* spp. L. [82], *Molinia caerulea* (L.) Moench [26], *Poa annua* L. [136], *Poa palustris* L. [136], *Poa pratensis* L. [136].

Coenonympha pamphilus (Linnaeus, 1758) – Kis szénalepke

Cyperaceae: *Carex leporina* L. [15], Poaceae: *Agrostis capillaris* L. [15], *Agrostis stolonifera* L. [88], *Agrostis vinealis* Schreb. [15], *Anthoxanthum odoratum* L. [136], *Brachypodium pinnatum* (L.) P.Beauv. [15], *Corynephorus canescens* (L.) P.Beauv. [122], *Cynosurus cristatus* L. [9], *Danthonia decumbens* (L.) [15], *Digitaria sanguinalis* (L.) Scop. [88], *Festuca ovina* L. [41], *Festuca rubra* L. [15], *Nardus stricta* L. [9], *Poa annua* L. [109], *Poa nemoralis* L. [174], *Poa pratensis* L. [88].

Colias alfacariensis (Ribbe, 1905) – Déli kéneslepke

Fabaceae: *Hippocrepis comosa* L. [41], *Lotus corniculatus* L. [163], *Securigera varia* (L) Lassen. [36].

Colias chrysotheme (Esper, 1781) – Dolomit kéneslepke
Fabaceae: *Astragalus austriacus* Jacq. [163, 99], *Astragalus glycyphyllos* L. [163], *Astragalus onobrychis* L. [99], *Vicia cracca* L. [99], *Vicia hirsuta* (L.) Gray [163, 99], *Vicia lathyroides* L. [99].

Colias crocea (Geoffroy in Fourcroy, 1785) – Sáfránylepke
Fabaceae: *Astragalus glycyphyllos* L. [88], *Colutea arborescens* L. [89], *Hippocrepis comosa* L. [89], *Lotus augustissimus* L. [89], *Lotus corniculatus* L. [89], Cav. [89], *Medicago* × *varia* Martyn [122], *Medicago arabica* (L.) Huds. [15], *Medicago falcata* L. [89], *Medicago lupulina* L. [89], *Medicago minima* (L.) Bartal. [89], *Medicago orbicularis* (L.) Bartal. [89], *Medicago rigidula* (L.) All. [88], *Medicago sativa* L. [89], *Melilotus albus* Medik. [52], *Melilotus officinalis* (L.) Lam. [89], *Onobrychis viciifolia* Scop. [30], *Ononis spinosa* L. [89], *Robinia pseudoacacia* L. [89], *Securigera varia* (L.) Lassen [36], *Trifolium dubium* Sibth. [89], *Trifolium fragiferum* L. [149], *Trifolium repens* L. [89], *Vicia cracca* L. [52], *Vicia sativa* L. [89], *Vicia villosa* Roth. [89].

Colias erate (Esper, 1805) – Cigány kéneslepke
Fabaceae: *Medicago* × *varia* Martyn [122], *Medicago sativa* L. [96], *Melilotus officinalis* (L.) Lam. [163], *Onobrychis* spp. Mill. [163], *Trifolium* spp. Tourn. ex L. [163].

Colias hyale (Linnaeus, 1758) –Kénes lepke
Fabaceae: *Hippocrepis comosa* L. [36], *Lotus corniculatus* L. [122], *Medicago* × *varia* Martyn [122], *Medicago falcata* L. [163], *Medicago lupulina* L. [122], *Medicago sativa* L. [9], *Melilotus albus* Medik. [163], *Melilotus officinalis* (L.) Lam. [163], *Securigera varia* (L.) Lassen [15, 122], *Trifolium pratense* L. [120], *Trifolium repens* L. [122], *Trifolium subterraneum* L. [9], *Vicia cracca* L. [122], *Vicia hirsuta* (L.) Gray [88], *Vicia sativa* L. [122], *Vicia tetrasperma* (L.) Schreb. [36].

Colias myrmidone (Esper, 1781) – Narancslepke*
Fabaceae: *Chamaecytisus austriacus* (L.) Link [46], *Chamaecytisus ratisbonensis* (Schaeff.) Rothm. [46], *Chamaecytisus supinus* (L.) Link [46].

Cupido alcetas (Hoffmannsegg, 1804) – Palakék boglárka
Fabaceae: *Colutea arborescens* L. [174], *Galega officinalis* L. [89], *Lathyrus latifolius* L. [88], *Lotus corniculatus* L. [165], *Medicago lupulina* L. [89], *Medicago minima* (L.) Bartal. [104], *Securigera varia* (L.) Lassen [165, 41], *Trifolium pratense* L. [165], *Vicia cracca* L. [163], *Vicia dumetorum* L. [93], *Vicia sativa* L. [93].

Cupido argiades (Pallas, 1771) – Ékes boglárka
Fabaceae: *Colutea arborescens* L. [88], *Lathyrus latifolius* L. [88], *Lathyrus pratensis* L. [122], *Lotus corniculatus* L. [168], *Lotus pedunculatus* Cav. [122], *Medicago* × *varia* Martyn [122], *Medicago falcata* L. [88], *Medicago lupulina* L. [168], *Medicago minima* (L.) Bartal. [104], *Medicago sativa* L. [8], *Melilotus albus* Medik. [89], *Melilotus officinalis* (L.) Lam. [88], *Securigera varia* (L.) Lassen [138], *Trifolium campestre* Schreb. [122], *Trifolium pratense* L. [168], *Trifolium repens* L. [174], *Vicia cracca* L. [138], *Vicia sativa* L. [138], *Vicia villosa* L. [89].

Cupido decoloratus (Staudinger, 1886) – Fakó boglárka
Fabaceae: *Medicago sativa* L. [163], *Medicago lupulina* L. [93], *Trifolium pratense* L. [163], *Vicia sativa* L. [163].

Cupido minimus (Fuessly, 1775) – Törpeboglárka
Fabaceae: *Anthyllis vulneraria* L. [168], *Astragalus cicer* L. [88], *Astragalus glycyphyllos* L. [88] *Colutea arborescens* L. [174], *Lotus corniculatus* L. [163], *Melilotus officinalis* (L.) Lam. [163], *Securigera varia* (L.) Lassen [163].

Cupido osiris (Meigen, 1829) – Hegyi törpeboglárka
Fabaceae: *Anthyllis vulneraria* L. [163], *Colutea arborescens* L. [174], *Lathyrus linifolius* (Reichard) Bässler [82], *Onobrychis arenaria* (Kit.) DC. [89], *Onobrychis viciifolia* Scop. [103].

Cyaniris semiargus (Rottenburg, 1775) – Aprószemes boglárka
Fabaceae: *Anthyllis vulneraria* L. [168], *Genista tinctoria* L. [30], *Lotus corniculatus* L. [165],

Melilotus officinalis (L.) Lam. [174], *Onobrychis viciifolia* Scop. [88], *Securigera varia* (L.) Lassen [163], *Trifolium alpestre* L. [89], *Trifolium arvense* L. [89], *Trifolium hybridum* L. [89], *Trifolium medium* L. [89], *Trifolium ochroleucon* Huds. [89], *Trifolium pratense* L. [168], *Trifolium repens* L. [89].

Erebia aethiops (Esper, 1777) – Közönséges szerecsenlepke
Cyperaceae: *Carex nigra* (L.) Reichard [145], Poaceae: *Agrostis canina* L. [174], *Anthoxanthum odoratum* L. [145], *Brachypodium pinnatum* (L.) P.Beauv. [145], *Briza media* L. [145], *Bromus erectus* Huds. [145], *Calamgrotis epigejos* (L.) Roth [142], *Dactylis glomerata* L. [145], *Festuca ovina* L. [145], *Festuca rubra* L. [145], *Molinia caerulea* (L.) Moench [174], *Phleum pratense* L. [15], *Poa annua* L. [30], *Poa trivialis* L. [145], *Sesleria coerulea* (L.) Ard. [163].

Erebia ligea (Linnaeus 1758) – Fehércsíkú szerecsenlepke
Cyperaceae: *Carex pilulifera* L. [15], *Carex remota* L. [15], *Carex strigosa* Huds. [163], *Carex sylvatica* Huds. [145], Poaceae: *Bromus erectus* Huds. [88], *Dactylis glomerata* L. [15], *Danthonia decumbens* (L.) DC. [15], *Deschampsia cespitosa* (L.) P.Beauv. [15], *Digitaria sanguinalis* (L.) Scop. [174], *Festuca rubra* L. [15], *Melica nutans* L. [145], *Milium effusum* L. [156], *Molinia caerulea* (L.) Moench [15], *Poa annua* L. [163], *Sesleria albicans* Kit. ex Schult. [42], *Sesleria coerulea* (L.) Ard. [145].

Erebia medusa (([Denis & Schiffermüller], 1775) – Tavaszi szerecsenlepke
Cyperaceae: *Carex nigra* (L.) Reichard [15], *Carex pilulifera* L. [15], Poaceae: *Agrostis capillaris* L. [134], *Avenella flexuosa* (L.) Drejer [155], *Brachypodium pinnatum* (L.) P.Beauv. [120], *Bromus erectus* Huds. [145], *Deschampsia cespitosa* (L.) P.Beauv. [155], *Digitaria sanguinalis* (L.) Scop. [30], *Festuca ovina* L. [120], *Festuca rubra* L. [120], *Milium effusum* L. [30], *Molinia caerulea* (L.) Moench [120], *Nardus stricta* L. [120], *Panicum miliaceum* L. [30], *Poa annua* L. [174].

Erynnis tages (Linnaeus, 1758) – Cigánylepke
Apiaceae: *Eryngium campestre* L. [30], Fabaceae: *Anthyllis* spp. L. [52], *Hippocrepis comosa* L. [89], *Lotus corniculatus* L. [166], *Lotus pedunculatus* Cav. [19], *Lotus uliginosus* Schkuhr. [166], *Medicago lupulina* L. [30], *Securigera varia* (L.) Lassen [15, 122]

Eumedonia eumedon (Esper, 1780) – Gólyaorr-boglárka
Geraniaceae: *Geranium palustre* L. [128, 38], *Geranium phaeum* L. [88], *Geranium pratense* L. [120], *Geranium pyrenaicum* Burm.f. [70], *Geranium sanguineum* L. [89], *Geranium sylvaticum* L. [89].

Euphydryas aurinia (Rottenburg, 1775) – Lápi tarkalepke
Asteraceae: *Centaurea scabiosa* L. [60], Menyanthaceae: *Menyanthes trifoliata* L. [114], Caprifoliaceae: *Dipsacus fullonum* L. [15], *Knautia arvensis* (L.) Coult. [40], *Lonicera caprifolium* L. [114], *Lonicera xylosteum* L. [52], *Scabiosa columbaria* L. [132], *Scabiosa ochroleuca* L. [15], *Succisa pratensis* Moench [40], *Valeriana dioica* L. [114], *Valeriana officinalis* L. [88], Gentianaceae: *Gentiana asclepiadea* L. [88], *Gentiana cruciata* L. [114], Plantaginaceae: *Plantago lanceolata* L. [30], *Plantago media* L. [174].

Euphydryas maturna (Linnaeus, 1758) – Díszes tarkalepke
Caprifoliaceae: *Dipsacus fullonum* L. [15], *Lonicera xylosteum* L. [40], *Succisa pratensis* Moench [21], Valeriana dioica L. [88], Valeriana officinalis L. [15], Viburnaceae: *Viburnum lantana* L. [120], *Viburnum opulus* L. [39], Ericaceae: *Vaccinium myrtillus* L. [40], Betulaceae: *Betula pubescens* Ehrh. [88], Fagaceae: *Fagus sylvatica* L. [30], Oleaceae: *Fraxinus angustifolia* Vahl [123, 183], *Fraxinus excelsior* L. [39], *Fraxinus ornus* L. [123, 183], *Ligustrum vulgare* L. [183], *Syringa vulgaris* L. [88], Orobanchaceae: *Melampyrum nemorosum* L. [40], *Melampyrum pratense* L. [178], Planataginaceae: *Plantago lanceolata* L. [15], *Plantago major* L. [34], *Plantago media* L. [88], *Veronica chamaedrys* L. [21], *Veronica hederifolia* L. [34], *Veronica longifolia* L. [88], Salicaceae: *Populus tremula* L. [183], *Salix caprea* L. [40], *Salix cinerea* L. [15], Rosaceae: *Prunus spinosa* L. [88].

Fabriciana adippe ([Denis & Schiffermüller], 1775) – Ezüstös gyöngyházlepke
Violaceae: *Viola canina* L. [9], *Viola hirta* L. [180], *Viola odorata* L. [15], *Viola reichen-*

bachiana Jord ex Boreau [15], *Viola riviniana* Rchb. [180], *Viola tricolor* L. [15].

Fabriciana niobe (Linnaeus, 1758) – Ibolya gyöngyházlepke

Violaceae: *Viola alba* Besser [88], *Viola arvensis* Murray [122], *Viola canina* L. [129], *Viola hirta* L. [146], *Viola odorata* L. [146], *Viola palustris* L. [163], *Viola reichenbachiana* Jord ex Boreau [146], *Viola riviniana* Rchb [146], *Viola rupestris* F.W.Schmidt [15], *Viola tricolor* L. [129].

Favonius quercus (Linnaeus, 1758) – Tölgyfalepke

Fagaceae: *Quercus cerris* L. [20], *Quercus petraea* (Matt.) Liebl. [120], *Quercus pubescens* Wild. [167], *Quercus robur* L. [122], *Quercus rubra* L. [15].

Glaucopsyche alexis (Poda, 1761) – Nagyszemes boglárka

Fabaceae: *Anthyllis vulneraria* L. [88], *Astragalus glycyphyllos* L. [41], *Astragalus onobrychis* L. [88], *Colutea arborescens* L [174], *Galega officinalis* L. [163], *Genista germanica* L. [93], *Genista sagittalis* L [15], *Genista tinctoria* L. [75], *Lathyrus niger* (L.) Bernh. [93], *Lathyrus pratensis* L. [163], *Lotus corniculatus* L. [41], *Medicago falcata* L. [75], *Medicago sativa* L. [103], *Melilotus albus* Medik. [75], *Melilotus officinalis* (L.) Lam. [75], *Onobrychis viciifolia* Scop. [103], *Securigera varia* (L.) Lassen [75, 131], *Vicia cracca* L. [75], *Vicia sepium* L. [163], *Vicia tenuifolia* Roth. [131], *Vicia villosa* Roth. [89].

Gonepteryx rhamni (Linnaeus, 1758) – Citromlepke

Rhamnaceae: *Frangula alnus* Mill. [122], *Rhamnus cathartica* L. [122].

Hamearis lucina (Linnaeus, 1758) – Kockáslepke

Primulaceae: *Lysimachia nemorum* L. [88], *Primula elatior* (L.) Hill [2], *Primula veris* L [9], *Primula vulgaris* Huds. [9].

Hesperia comma (Linnaeus, 1758) – Vesszős busalepke

Poaceae: *Agrostis vinealis* Schreb. [15], *Avenella flexuosa* (L.) Drejer [88], *Corynephorus canescens* (L.) P.Beauv. [15], *Deschampsia cespitosa* (L.) P.Beauv. [174], *Elymus repens* (L.) Gould [30], *Festuca ovina* L. [166], *Festuca rubra* L. [15], *Nardus stricta* L. [88], *Poa annua* L. [30].

Heteropterus morpheus (Pallas, 1771) – Tükrös busalepke

Poaceae: *Brachypodium sylvaticum* (Huds.) P.Beauv. [21], *Calamagrostis canescens* (Weber) Roth [16], *Molinia caerulea* (L.) Moench [16], *Phalaris arundinacea* L. [122].

Hipparchia fagi (Scopoli, 1763) – Szürkeöves szemeslepke

Poaceae: *Brachypodium pinnatum* (L.) P.Beauv. [15], *Bromus erectus* Huds. [120], *Dactylis glomerata* L. [163], *Festuca ovina* L. [88], *Festuca rubra* L. [15], *Holcus lanatus* L. [174], *Holcus mollis* L. [174], *Poa pratensis* L. [163].

Hipparchia semele (Linnaeus, 1758) – Barna szemeslepke

Cyperaceae: *Carex leporina* L. [15], *Carex pilulifera* L. [15], Poaceae: *Agrostis capillaris* L. [88], *Agrostis vinealis* Schreb. [15], *Aira caryophyllea* L. [88], *Arrhenatherum elatius* (L.) P.Beauv. ex J.Presl & C.Presl [51], *Avenella flexuosa* (L.) Drejer [88], *Brachypodium pinnatum* (L.) P.Beauv. [15], *Briza media* L. [88], *Bromus erectus* Huds. [88], *Corynephorus canescens* (L.) P.Beauv. [122], *Deschampsia cespitosa* (L.) P.Beauv. [4], *Elymus repens* (L.) Gould [174], *Festuca ovina* L. [4], *Festuca rubra* L. [4], *Koeleria pyramidata* (Lam.) P.Beauv. [88], *Lolium perenne* L. [88], *Phleum phleoides* (L.) H.Karst. [88], *Poa annua* L. [30], *Sesleria albicans* Kit. ex Schult. [88], *Stipa pennata* L. [103].

Hipparchia statilinus (Hufnagel, 1766) – Homoki szemeslepke

Cyperaceae: *Carex halleriana* Asso [51], *Carex pilulifera* L. [15], Poaceae: *Agrostis vinealis* Schreb. [15], *Botriochloa ischaemum* (L.) Keng [136], *Bromus erectus* Huds. [136], *Bromus secalinus* L. [30], *Bromus sterilis* L. [30], *Calamagrostis epigejos* (L.) Roth. [122], *Corynephorus canescens* (L.) P.Beauv. [122], *Dactylis glomerata* L. [51], *Danthonia decumbens* (L.) DC. [15], *Festuca ovina* L. [120], *Festuca rubra* L. [88], *Molinia caerulea* (L.) Moench [122], *Nardus stricta* L. [51], *Poa annua* L. [30], *Stipa pennata* L. [136].

Hyponephele lupina (Costa, 1836) – Homoki ökörszemlepke

Poaceae: *Bromus erectus* Huds. [163], *Festuca* spp. Tourn. ex L. [88], *Festuca ovina* L. [163], *Festuca rubra* L. [163], *Poa annua* L. [163], *Stipa pennata* L. [163].

Hyponephele lycaon (Kühn, 1774) – Erdei ökörszemlepke*
Poaceae: *Brachypodium pinnatum* (L.) P.Beauv. [15], *Bromus erectus* Huds. [41], *Festuca ovina* L. [41], *Festuca rubra* L. [41], *Poa* spp. L. [174], *Stipa pennata* L. [136].

Iolana iolas (Ochsenheimer, 1816) – Magyar boglárka
Fabaceae: *Colutea arborescens* L. [89].

Iphiclides podalirius (Linnaeus, 1758) – Kardoslepke
Rosaceae: *Crataegus laevigata* (Poir.) [30], *Crataegus monogyna* Jacq. [174], *Malus domestica* (Suckow) Bork. [89], *Malus sylvestris* (L.) Mill. [30], *Prunus amygdalus* Batsch. [89], *Prunus armeniaca* L. [89], *Prunus avium* (L.) L. [122], *Prunus cerasifera* Ehrh. [122], *Prunus cerasus* L. [62], *Prunus domestica* L. [89], *Prunus mahaleb* L. [122], *Prunus padus* L. [30], *Prunus persica* (L.) Batsch. [89], *Prunus spinosa* L. [93], *Prunus communis* L. [81], *Sorbus aucuparia* L. [163].

Issoria lathonia (Linnaeus, 1758) – Közönséges gyöngyházlepke
Boraginaceae: *Borago officinalis* L. [88], Violaceae: *Viola arvensis* Murray [122], *Viola canina* L. [15], *Viola hirta* L. [42], *Viola kitaibeliana* Schult. [89], *Viola odorata* L. [174], *Viola reichenbachiana* Jord ex Boreau [174], *Viola riviniana* Rchb. [88], *Viola rupestris* F.W.Schmidt [15], *Viola tricolor* L. [122].

Kretania sephirus (Frivaldszky, 1835) – Fóti boglárka
Fabaceae: *Astragalus dasyanthus* Pall. [5,6, 65], *Astragalus exscapus* L. [5,6, 65, 175], *Astragalus onobrychis* L. [89].

Lampides boeticus (Linnaeus, 1767) – Vándor boglárka
Fabaceae: *Astragalus glycyphyllos* L. [88], *Colutea arborescens* L. [167], *Cytisus scoparius* (L.) Link [98], *Genista* spp L. [104], *Lathyrus latifolius* L. [152], *Lathyrus sylvestris* L [88], *Lotus corniculatus* L. [151], *Lupinus polyphyllus* Lindl. [88], *Medicago sativa* L. [167], *Onobrychis viciifolia* Scop. [98], *Phaseolus vulgaris* L. [89], *Robinia pseudoacacia* L. [68], *Trifolium pratense* L. [151], *Wisteria sinensis* (Sims) DC. [151]

Lasiommata maera (Linnaeus, 1758) – Nagyfoltú szemeslepke
Juncaceae: *Luzula luzuloides* (Lam.) Dandy & Wilmott [163], Poaceae: *Agrostis capillaris* L. [41], *Agrostis stolonifera* L. [184], *Avenella flexuosa* (L.) Drejer [41], *Brachypodium pinnatum* (L.) P.Beauv. [89], *Bromus erectus* Huds. [41], *Bromus sterilis* L. [88], *Calamagrostis arundinacea* (L.) Roth [163], *Calamagrostis epigejos* (L.) Roth. [41], *Calamagrostis varia* (Schrad.) Host [42], *Dactylis glomerata* L. [184], *Elymus repens* (L.) Gould [184], *Festuca ovina* L. [184], *Festuca rubra* L. [42], *Glyceria fluitans* (L.) R.Br. [174], *Holcus mollis* L. [41], *Hordelymus europaeaus* (L.) Jess ex Harz [60], *Hordeum murinum* Huds. [174], *Lolium* spp. L. [174], *Melica nutans* L. [184], *Nardus stricta* L. [41], *Phleum pratense* L. [184], *Poa annua* L. [174], *Poa bulbosa* L. [88], *Poa pratensis* L. [88].

Lasiommata megera (Linnaeus, 1767) – Vörös szemeslepke
Poaceae: *Agrostis capillaris* L. [120], *Agrostis gigantea* Roth. [163], *Agrotis stolonifera* L. [184], *Avenella flexuosa* (L.) Drejer [4], *Brachypodium pinnatum* (L.) P.Beauv. [120], *Brachypodium sylvaticum* (Huds.) P.Beauv. [4], *Bromus erectus* Huds. [15], *Bromus hordeaceus* L. [30], *Bromus sterilis* L. [30], *Corynephorus canescens* (L.) P.Beauv. [184], *Cynodon dactylon* (L.) Pers. [89], *Cynosurus cristatus* L. [41], *Dactylis glomerata* L. [9], *Danthonia decumbens* (L.) DC. [41], *Elymus repens* (L.) Gould [184], *Festuca ovina* L. [184], *Festuca rubra* L. [120], *Holcus lanatus* L. [4], *Lolium perenne* L. [120], *Poa annua* L. [9], *Poa bulbosa* L. [88], *Poa pratensis* L. [41], *Stipa pennata* L. [103].

Leptidea juvernica (Williams, 1946) – Mustárlepke
Fabaceae: *Lathyrus linifolius* (Reichard) Bässler [163], *Lathyrus pratensis* L. [122], *Lotus corniculatus* L. [110], *Lotus pedunculatus* Cav. [110], *Medicago falcata* L. [88], *Securigera varia* (L) Lassen [88], *Vicia cracca* L. [120], *Vicia sepium* L. [88].

Leptidea morsei (Fenton, 1882) – Keleti mustárlepke
Fabaceae: *Lathyrus niger* (L.) Bernh. [53], *Lathyrus vernus* (L.) Bernh. [183].

Leptidea reali (Reissinger, 1990) – Szibériai mustárlepke
Fabaceae: *Lathyrus pratensis* L. [41].

Leptidea sinapis (Linnaeus, 1758) – Mustárlepke
Fabaceae: *Lathyrus aphaca* L. [163], *Lathyrus linifolius* (Reichard) Bässler [9], *Lathyrus niger* (L.) Bernh. [163], *Lathyrus pratensis* L. [120], *Lathyrus syslvestris* L. [88], *Lathyrus tuberosus* L. [88], *Lathyrus vernus* (L.) Bernh. [163], *Lotus augustissimus* L. [89], *Lotus corniculatus* L. [89], *Lotus pedunculatus* Cav. [4], *Lotus uliginosus* Schkuhr. [163], *Medicago falcata* L. [88], *Securigera varia* (L) Lassen [120], *Trifolium arvense* L. [122], *Trifolium dubium* Sibth. [52], *Trifolium repens* L. [88], *Vicia cracca* L. [122], *Vicia sativa* L. [88], *Vicia tenuifolia* Roth. [89].

Leptotes pirithous (Linnaeus, 1767) – Déli boglárka
Polygonaceae: *Polygonum aviculare* L. [89], Viburnaceae: *Sambucus ebulus* L. [88], Ericaceae: *Calluna vulgaris* (L.) Hull [105], Fabaceae: *Anthyllis* spp. L. [104], *Astragalus* spp. L. [104], *Cytisus scoparius* (L.) Link [98], *Galega officinalis* L. [89], *Medicago* × *varia* Martyn [98], *Medicago sativa* L. [89], *Melilotus albus* Medik. [89], *Melilotus officinalis* (L.) Lam. [174], *Onobrychis viciifoli*a Scop. [98], *Trifolium pratense* L. [88], Lythraceae: *Lythrum salicaria* L. [89], Cannabaceae: *Humulus lupulus* L. [89].

Libythea celtis (Laicharting, 1782) – Csőröslepke
Cannabaceae:*Celtis australis* L. [89], Moraceae: *Morus alba* L. [88], Rosaceae: *Prunus avium* (L.) L. [88].

Limenitis camilla (Linnaeus, 1764) – Kis lonclepke
Caprifoliaceae: *Lonicera caprifolium* L. [174], *Lonicera nigra* L. [88], *Lonicera xylosteum* L. [122], *Symphoricarpos albus* (L.) S.F.Blake [122].

Limenitis populi (Linnaeus, 1758) – Nagy nyárfalepke
Salicaceae: *Populus alba* L. [163], *Populus nigra* L. [17], *Populus tremula* L. [122].

Limenitis reducta (Staudinger, 1901) – Kék lonclepke
Caprifoliaceae: *Lonicera caprifolium* L. [15], *Lonicera xylosteum* L. [120], *Symphoricarpos albus* (L.) S.F.Blake [174].

Lopinga achine (Scopoli, 1763) – Sápadt szemeslepke
Cyperaceae: *Carex alba* Scop. [154], *Carex brizoides* L. [120], *Carex flacca* Schreb. [120], *Carex fritschii* Waisb. [76], *Carex michelii* Host [76], *Carex montana* L. [14], *Carex sylvatica* Huds. [35], Juncaceae: *Luzula pilosa* (L.) Wild. [14], Poaceae: *Brachypodium pinnatum* (L.) P.Beauv. [154], *Brachypodium sylvaticum* (Huds.) P.Beauv. [35], *Bromus* spp. L. [174], *Calamagrostis arundinacea* (L.) Roth. [82], *Dactylis glomerata* L. [174], *Deschampsia cespitosa* (L.) P.Beauv. [14], *Elymus caninus* (L.) L. [82], *Festuca rubra* L. [14], *Lolium perenne* L. [174], *Melica nutans* L. [82], *Poa annua* L. [174], *Poa nemoralis* L. [82], *Poa pratensis* L. [14], *Poa trivialis* L. [174].

Lycaena alciphron (Rottenburg, 1775) – Ibolyás tűzlepke
Polygonaceae: *Rumex acetosa* L. [122], *Rumex acetosella* L. [122], *Rumex pulcher* L. [88].

Lycanea dispar ([Haworth], 1802) – Nagy tűzlepke
Iridaceae: *Iris pseudacorus* L. [122], Polygonaceae: *Rumex acetosa* L. [85], *Rumex acetosella* L. [136], *Rumex aquaticus* L. [122], *Rumex conglomeratus* Murray [92], *Rumex crispus* L. [122], *Rumex hydrolapathum* Huds. [116], *Rumex obtusifolius* L. [122], *Rumex sanguineus* L. [153], *Rumex stenophyllus* Ledeb. [153].

Lycaena hippothoë (Linnaeus, 1761) – Havasi tűzlepke
Polygonaceae: *Bistorta officinalis* Delarbre [42], *Rumex acetosa* L. [122], *Rumex acetosella* L. [122, 33], *Rumex confertus* Eilld. [139], *Rumex crispus* L. [41], *Rumex hydrolapathum* Huds. [139], *Rumex obtusifolius* L. [139], *Rumex thyrsiflorus* Fingerh. [122].

Lycaena phlaeas (Linnaeus, 1761) – Közönséges tűzlepke
Polygonaceae: *Rumex acetosa* L. [166], *Rumex acetosella* L. [166], *Rumex conglomeratus* Murray [88], *Rumex crispus* L. [15], *Rumex hydrolapathum* Huds. [122], *Rumex obtusifolius* L. [90], *Rumex pulcher* L. [89], *Rumex sanguineus* L. [52], *Rumex thyrsiflorus* Fingerh. [122].

Lycaena thersamon (Esper, 1784) – Kis tűzlepke
Polygonaceae: *Bistorta officinalis* Delarbre [93], *Polygonum aviculare* L. [89].

Lycaena tityrus (Poda, 1761) – Barna tűzlepke
Polygonaceae: *Rumex acetosa* L. [41], *Rumex acetosella* L. [89], *Rumex crispus* L. [174], *Rumex hydrolapathum* Huds. [30], *Rumex scutatus* L. [59], *Rumex thyrsiflorus* Fingerh. [122].

Lycaena virgaureae (Linnaeus, 1758) – Arany-tűzlepke
Polygonaceae: *Rumex acetosa* L. [122], *Rumex acetosella* L. [41], *Rumex crispus* L. [57], *Rumex obtusifolius* L. [88].

Lysandra bellargus (Rottenburg, 1775) – Égszínű boglárka
Fabaceae: *Genista germanica* L. [30], *Hippocrepis comosa* L. [168], *Lotus corniculatus* L. [97], *Securigera varia* (L) Lassen [42, 89].

Lysandra coridon (Poda, 1761) – Ezüstkék boglárka
Fabaceae: *Astragalus glycyphyllos* L. [135], *Hippocrepis comosa* L. [169], *Lotus corniculatus* L. [88], *Securigera varia* (L) Lassen [122].

Maniola jurtina (Linnaeus, 1758) – Nagy ökörszemlepke
Cyperaceae: *Carex pilulifera* L. [15], Poaceae: *Agrostis canina* L. [163], *Agrostis capillaris* L. [15], *Agrostis stolonifera* L. [163], *Alopecurus pratensis* L. [15], *Anthoxanthum odoratum* L. [15], *Avenula pubescens* (Huds.) Dumort. [4], *Brachypodium pinnatum* (L.) P.Beauv. [15], *Brachypodium sylvaticum* (Huds.) P.Beauv. [4], *Bromus erectus* Huds. [15], *Cynosurus cristatus* L. [15], *Dactylis glomerata* L. [122], *Danthonia decumbens* (L.) DC. [15], *Elymus repens* (L.) Gould [103], *Festuca ovina* L. [88], *Festuca rubra* L. [15], *Glyceria fluitans* (L.) R.Br. [15], *Holcus lanatus* L. [88], *Lolium perenne* L. [15], *Phleum pratense* L. [15], *Poa annua* L. [103], *Poa pratensis* L. [164], *Poa trivialis* L. [103].

Melanargia galathea (Linnaeus, 1758) – Sakktáblalepke
Cyperaceae: *Carex alba* Scop. [88], Poaceae: *Agrostis capillaris* L. [88], *Anthoxanthum odoratum* L. [88], *Arrhenatherum elatius* (L.) P.Beauv. ex J.Presl & C.Presl [88], *Avenula pubescens* (Huds.) Dumort. [88], *Brachypodium pinnatum* (L.) P.Beauv. [42], *Brachypodium sylvaticum* (Huds.) P.Beauv. [42], *Bromus erectus* Huds. [136], *Cynosurus cristatus* L. [15], *Dactylis glomerata* L. [9], *Festuca ovina* L. [4], *Festuca rubra* L. [4], *Holcus lanatus* L. [4], *Phleum pratense* L. [15], *Poa annua* L. [30], *Poa trivialis* L. [42].

Melanargia russiae (Esper, 1784) – Magyar sakktáblalepke*
Poaceae: *Agrostis capillaris* L. [88], Briza spp. L. [174], *Bromus erectus* Huds. [88], *Festuca* spp. Tourn. ex L. [174], *Festuca sulcata* (Hack.) Nym. [55], *Poa annua* L. [50].

Melitaea athalia (Rottemburg, 1775) – Közönséges tarkalepke
Asteraceae: *Centaurea jacea* L. [30], Lamiaceae: *Teucrium scorodonia* L. [9],, Orobanchaceae: *Melampyrum arvense* L. [163], *Melampyrum nemorosum* L. [40], *Melampyrum pratense* L. [37], *Rhinanthus alectrolophus* (Scop.) Pollich [88], *Rhinanthus minor* L. [174], Plantaginaceae: *Digitalis ferruginea* L. [161], *Digitalis grandiflora* Mill. [88], *Linaria vulgaris* Mill. [136], *Plantago lanceolata* L. [136], *Plantago major* L. [179], *Plantago media* L. [40], *Veronica chamaedrys* L. [122], *Veronica hederifolia* L [179], *Veronica montana* L. [163], *Veronica officinalis* L. [136], *Veronica serpyllifolia* L. [179], *Veronica spicata* L. [41].

Melitaea aurelia (Nickerl, 1850) – Recés tarkalepke
Orobanchaceae: *Melampyrum pratense* L. [30], *Rhinanthus minor* L. [15], Plataginaceae: *Plantago lanceolata* L. [15], *Plantago media* L. [181], *Veronica austriaca* L. [120].

Melitaea britomartis (Assmann, 1847) – Barnás tarkalepke
Asteraceae: *Tanacetum* spp. L. [111], Orobanchaceae: *Rhinanthus minor* L. [37], Plantaginaceae: *Plantago lanceolata* L. [15], *Plantago media* L. [15], *Veronica austriaca* L. [15], *Veronica chamaedrys* L. [136], *Veronica officinalis* L. [136], *Veronica spicata* L. [40], *Veronica teucrium* L. [37].

Melitaea cinxia (Linnaeus, 1758) – Réti tarkalepke
Asteraceae: *Centaurea jacea* L. [30], Plantaginaceae: *Plantago lanceolata* L. [80], *Plantago major* L. [80], *Plantago maritima* L. [80], *Plantago media* L. [80], *Veronica chamaedrys* L. [80], *Veronica incana* L. [80], Veronica *longifolia* L [80], *Veronica officinalis* L. [80], *Veronica serpyllifolia* L [80], *Veronica spicata* L. [80], *Veronica teucrium* L. [80].

Melitaea diamina (Lang, 1789) – Kockás tarkalepke
Polygonaceae: *Bistorta officinalis* Delarbre [82], Caprifoliaceae: *Valeriana dioica* L. [136], *Valeriana officinalis* L. [176], Orobanchaceae: *Melampyrum nemorosum* L. [82], *Melampyrum pratense* L. [30], Plantaginaceae: *Plantago lanceolata* L. [30], *Veronica chamaedrys* L. [30].

Melitaea didyma (Esper, 1778) – Tüzes tarkalepke
Asteraceae: *Achillea millefolium* L. [88], *Centaurea scabiosa* L. [136], Caprifoliaceae: *Valeriana officinalis* L. [78], Lamiaceae: *Galeopsis angustifolia* Ehr. ex Hoffm. [120], *Melittis melissophyllum* L. [88], *Stachys recta* L. [136], Orobanchaceae: *Melampyrum arvense* L. [15], *Odontites luteus* (L.) Clairv. [88], Plantaginaceae: *Antirrhinum majus* L. [52], *Cymbalaria muralis* G.Gaertn., B.Mey.&Scherb. [88], *Digitalis grandiflora* Mill. [37], *Plantago lanceolata* L. [89], *Plantago major* L. [37], *Plantago media* L. [15], *Veronica chamaedrys* L. [37], *Veronica teucrium* L. [37], Scrophulariaceae: *Verbascum lychnitis* L. [37], *Verbascum nigrum* L. [136], *Verbascum thapsus* L. [88].

Melitaea ornata (Christoph, 1893) – Magyar tarkalepke
Asteraceae: *Carduus collinus* Waldst, & Kit. [126], *Carduus nutans* L. [131], *Centaurea calcitrapa* L. [124], *Centaurea nigrescens* Wild. [24], *Centaurea scabiosa* L. [125], *Cirsium arvense* (L.) Scop. [130], *Cirsium pannonicum* (L.f.) Link [171, 172], *Cirsium vulgare* (Sävi) Ten [130].

Melitaea phoebe ([Denis & Schiffermüller], 1775) – Nagy tarkalepke
Asteraceae: *Arctium lappa* L. [88], *Carduus nutans* L. [88], *Carlina acaulis* L. [74], *Centaurea calcitrapa* L. [88], *Centaurea jacea* L. [15], *Centaurea nigrescens* Wild. [136], *Centaurea scabiosa* L. [162], *Cirsium acaule* (L.) Scop. [15], *Cirsium arvense* (L.) Scop. [162], *Cirsium eriophorum* (L.) Scop. [89], *Cirsium palustre* (L.) Scop. [88], *Cirsium pannonicum* (L.f.) Link [162], *Cirsium vulgare* (Sävi) Ten. [162], *Serratula tinctoria* L. [30], Caprifolicaeae: *Scabiosa columbaria* L. [136], Plantaginaceae: *Plantago lanceolata* L. [88].

Melitaea trivia ([Denis & Schiffermüller], 1775) – Kis tarkalepke
Plantaginaceae: *Veronica* spp. L. [170], Scrophulariaceae: *Verbascum chaixii* Vill. [74], *Verbascum nigrum* L. [174], *Verbascum phlomoides* L. [89], *Verbascum phoeniceum* L. [81], *Verbascum thapsus* L. [59].

Minois dryas (Scopoli, 1763) – Fekete szemeslepke
Cyperaceae: *Carex acuta* L. [88], *Carex acutiformis* Ehrh. [88], *Carex alba* Scop. [120], *Carex cariophyllea* Latour. [88], *Carex panicea* L. [120], Poaceae: *Arrhenatherum elatius* (L.) P.Beauv. ex J.Presl & C.Presl [73], *Avena fatua* L. [174], *Avenula pubescens* (Huds.) Dumont. [88], *Brachypodium pinnatum* (L.) P.Beauv. [15], *Briza media* L. [88], *Bromus erectus* Huds. [73], *Calamagrostis epigejos* (L.) Roth. [73], *Calamagrostis varia* (L) (Schrad.) Host [120], *Dactylis glomerata* L. [174], *Festuca ovina* L. [88], *Festuca rubra* L. [73], *Lolium perenne* L. [73], *Molinia coerulea* (L.) Moench [136].

Neptis rivularis (Scopoli, 1763) – Nagy fehérsávoslepke
Rosaceae: *Aruncus dioicus* (Walter) Fernald [174], *Filipendula ulmaria* (L.) Maxim [59], *Spiraea chamaedryfolia* L. [71], *Spiraea salicifolia* L. [59].

Neptis sappho (Pallas, 1771) – Kis fehérsávoslepke
Fabaceae: *Lathyrus niger* (L.) Bernh [71], *Lathyrus vernus* (L.) Bernh [174], *Robinia pseudoacacia* L. [137, 71].

Nymphalis antiopa (Linnaeus, 1758) – Gyászlepke
Betulaceae: *Alnus glutinosa* (L:) Gaertn. [88], *Betula pendula* Roth. [122], *Betula pubescens* Ehrh. [8], Salicaceae: *Populus alba* L. [163], *Populus nigra* L.[88], *Populus tremula* L.[60], *Salix alba* L. [89], *Salix aurita* L. [60], *Salix caprea* L. [122], *Salix cinerea* L. [8], *Salix eleagnos* Scop. [88], *Salix pentandra* L. [88], *Salix purpurea* L. [88], *Salix triandra* L. [88], *Salix viminalis* L. [112], Ulmaceae: *Ulmus glabra* Huds. [88], *Ulmus minor* Mill. [120].

Nymphalis polychloros (Linnaeus, 1758) – Nagy rókalepke
Betulaceae: *Ostrya carpinifolia* Scop. [136], Fagaceae: *Quercus pubescens* Wild. [88], Salicaceae: *Populus alba* L. [88], *Populus deltoides* W.Bartram ex Marshall [88], *Populus nigra*

L. [88], *Populus tremula* L [41], *Salix alba* L. [89], *Salix caprea* L. [41], *Salix cinerea* L. [41], *Salix eleagnos* Scop. [88], *Salix purpurea* L. [88], *Salix viminalis* L. [88], Cannabaceae: *Celtis australis* L. [89], Rosaceae: *Crataegus laevigata* (Poir.) DC. [88], *Crataegus monogyna* Jacq. [109], *Malus domestica* (Suckow) Borkh. [88], *Malus sylvestris* (L.) Mill. [30], *Prunus avium* (L.) L. [89], *Prunus domestica* L. [163], *Prunus padus* L. [163], *Pyrus communis* L. [122], Ulmaceae: *Ulmus glabra* Huds. [9], *Ulmus laevis* Pall. [102], *Ulmus minor* Mill. [89].

Nymphalis vaualbum ([Denis & Schiffermüller], 1775) – L-betűs rókalepke
Betulaceae: *Betula pubescens* Ehrh. [54], Fagaceae: *Fagus sylvatica* Ł. [41], Salicaceae: *Populus tremula* L. [41], *Salix x fragilis* L. [54], *Salix cinerea* L. [54], Cannabaceae: *Humulus lupulus* L. [41], Eleagnaceae: *Hippophae rhamnoides* L. [54], Rosaceae: *Malus domestica* (Suckow) Borkh. [54], Ulmaceae:*Ulmus glabra* Huds. [41].

Nymphalis xanthomelas (Linnaeus, 1758) – Vörös rókalepke
Salicaceae: *Populus nigra* L. [52], *Populus tremula* L. [52], *Salix alba* L. [88], *Salix caprea* L. [88].

Ochlodes sylvanus (Esper, 1779) – Erdei busalepke
Cyperaceae: *Carex diandra* Schrank. [15], Juncaceae: *Juncus effusus* L. [88], *Luzula pilosa* (L.) Willd. [174], Poaceae: *Agrostis capillaris* L. [88], *Agrostis stolonifera* L. [88], *Agrostis pratensis* L. [15], *Brachypodium pinnatum* (L.) P.Beauv. [120], *Brachypodium sylvaticum* (Huds.) P.Beauv. [166], *Bromus erectus* Huds. [88], *Bromus sterilis* L. [88], *Calamagrostis canescens* (Weber) Roth. [122], *Calamagrotis epigejos* (L.) Roth [122], *Cynodon dactylon* (L.) Pers. [52], *Dactylis glomerata* L. [166], *Danthonia decumbens* (L.) DC. [15], *Deschampsia cespitosa* (L:) P.Beauv. [15], *Elymus repens* (L.) Gould [9], *Glyceria fluitans* (L.) R.Br. [15], *Holcus lanatus* L. [9], *Lolium perenne* L. [88], *Molinia caerulea* (L.) Moench [166], *Phalaris arundinacea* L. [122], *Phleum pratense* L. [15], *Poa annua* L. [30], *Poa compressa* L. [88], *Poa nemoralis* L. [88], *Poa pratensis* L. [122].

Papilio machaon (Linnaeus, 1758) – Fecskefarkú lepke
Apiaceae: *Aegopodium podagraria* L. [81], *Anethum graveolens* L. [122], *Angelica sylvestris* L. [31], *Berula erecta* (Huds.) Coville [122], *Bupleurum falcatum* L. [88], *Carum carvi* Ł. [120], *Conium maculatum* L.[89], *Coriandrum sativum* L. [96], *Daucus carota* L. [93], *Eryngium campestre* L. [88], *Foeniculum vulgare* Mill. [149], *Heracleum sphondylium* L. [88], *Laserpitium latifolium* L. [163], *Levisticum officinale* W.D.J.Koch [88], *Oenanthe aquatica* (L.) Poir. [122], *Orlaya grandiflora* (L.) Hoffm. [88], *Pastinaca sativa* L. [149], *Petroselinum crispum* (Mill.) Fuss [122], *Peucedanum cervaria* (L.) Lapeyr. [88], *Peucedanum officinale* L. [15], *Peucedanum oreoselinum* (L.) Moench [122], *Peucedanum palustre* (L.) Moench [31], *Pimpinella major* (L.) Huds. [15], *Pimpinella saxifraga* L. [122], *Seseli varium* Trev. [163], *Silaum silaus* (L.) Schinz & Thell. [15], *Trinia glauca* (L.) Dumort. [136], Asteraceae: *Artemisia austriaca* Jacq. [81], Rutaceae: *Dictamnus albus* L. [122], *Ruta graveolens* L. [149].

Pararge egeria (Linnaeus, 1758) – Erdei szemeslepke
Cyperaceae: *Carex sylvatica* Huds. [120], *Schoenus nigricans* L. [88], Poaceae: *Agrostis gigantea* Roth. [88], *Agrostis stolonifera* L. [88] *Arrhenatherum elatius* (L.) P.Beauv. ex J.Presl & C.Presl [120], *Avena sterilis* L. [89], *Brachypodium pinnatum* (L.) P.Beauv. [30], *Brachypodium sylvaticum* (Huds.) P.Beauv. [89], *Calamagrostis arundinacea* (L:) Roth. [88], *Calamagrostis epigejos* (L.) Roth. [88], *Cynodon dactylon* (L.) Pers. [163], *Dactylis glomerata* L. [9], *Deschampsia cespitosa* (L.) P.Beauv. [120], *Elymus caninus* (L.) L. [88], *Elymus repens* (L.) Gould [4], *Festuca* spp. Tourn. ex L. [174], *Glyceria notata* Chevall. [88], *Holcus lanatus* L. [4], *Lolium perenne* L. [30], *Melica nutans* L. [15], *Melica uniflora* Retz. [60], *Molinia caerulea* (L.) Moench [88], *Poa annua* L. [30], *Poa bulbosa* L. [88], *Poa nemoralis* L. [122], *Poa pratensis* L. [120], *Poa trivialis* L. [174].

Parnassius mnemosyne (Linnaeus, 1758) – Kis apollólepke
Papaveraceae: *Corydalis cava* (L.) Schweigg. & Körte [93], *Corydalis intermedia* (L.) Mérat [77], *Corydalis pumila* (Host.) Rchb. [77], *Corydalis solida* (L.) Clav.[100].

Phengaris alcon ([Denis & Schiffermüller], 1775) – Szürkés hangyaboglárka

Gentianaceae: *Gentiana asclepiadea* L. [101], *Gentiana cruciata* L. [159, 3, 11, 12], *Gentiana pneumonanthe* L. [159, 11, 12], *Gentianella amarella* (L.) Börner [88], *Gentianopsis ciliata* (L.) Ma [88].

Phengaris arion (Linnaeus, 1758) – Nagyfoltú hangyaboglárka
Lamiaceae: *Clinopodium vulgare* L. [88], *Origanum vulgare* L. [159], *Thymus pannonicus* All. [13], *Thymus praecox* Opiz [159], *Thymus pulegoides* L. [13, 41], *Thymus serpyllum* L. [9, 13].

Phengaris nausithous (Bergsträsser, 1779) – Sötétaljú hangyaboglárka
Rosaceae: *Sanguisorba officinalis* L. [158, 123].

Phengaris teleius (Bergsträsser, 1779) – Vérfű hangyaboglárka
Rosaceae: *Sanguisorba officinalis* L. [158].

Pieris brassicae (Linnaeus, 1758) – Káposztalepke
Amaryllidaceae: *Allium oleraceum* L. [120]., Brassicaceae: *Alliaria petiolata* (M.Bieb) Cavara & Grande [45], *Arabis alpina* L. [45], *Armoracia rusticana* G.Gaertn., B.Mey. & Scherb. [45], *Aurinia saxatilis* (L.) Desv. [45], *Barbarea stricta* Andrz. ex Besser [45]. *Barbarea vulgaris* W.T.Aiton [45], *Biscutella laevigata* L. [45], *Brassica napus* L. [45], *Brassica nigra* (L.) W.D.J.Koch [45], *Brassica oleracea* L. [45], *Brassica rapa* L. [15], *Bunias orientalis* L. [41], *Cardamine hirsuta* L. [45], *Conringia orientalis* (L.) C.Presl [88], *Descurainia sophia* (L.) Webb ex Prantl [45], *Diplotaxis erucoides* (L.) DC. [45], *Diplotaxis muralis* (L.) DC. [45], *Diplotaxis tenuifolia* (L.) DC. [45], *Eruca vesicaria* (L.) Cav. [45], *Erysimum odoratum* Ehrh. [45], *Hesperis matronalis* L. [45], *Hornungia petraea* (L.) Rchb. [45], *Isatis tinctoria* L. [45], *Lunaria annua* L. [45], *Matthiola incana* (L.) W.T.Aiton [45], *Nasturtium officinale* W.T.Aiton [45], *Raphanus raphanistrum* L. [45], *Rorippa amphibia* (L.) Besser [15], *Rorippa sylvestris* (L.) Besser [45], *Sinapis alba* L. [88], *Sinapis arvensis* L. [45], *Sisymbrium officinale* (L.) Scop. [45], *Sisymbrium strictissimum* L. [45], *Thlaspi arvense* L. [45], Resedaceae: *Reseda lutea* L. [45], *Reseda luteola* L. [45], Tropeolaceae: *Tropaeolum majus* L. [45], Fabaceae: *Genista tinctoria* L. [45, *Medicago sativa* L. [45], *Vicia cracca* L. [45].

Pieris bryoniae (Hübner, [1981-1793]) – Hegyi fehérlepke
Brassicaceae: *Alliaria petiolata* (M.Bieb) Cavara & Grande [61], *Arabis alpina* L. [61], *Arabis hirsuta* (L.) Scop. [61], *Biscutella laevigata* L. [115], *Cardamine amara* L. [61], *Cardamine trifolia* L. [61], *Hesperis matronalis* L. [115], *Lunaria rediviva* L. [61, 7], *Nasturtium officinale* (L.) W.T.Aiton [115], *Sinapis arvensis* L. [115].

Pieris ergane (Geyer, 1828) – Sziklai fehérlepke
Brassicaceae: *Aethionema saxatile* (L.) W.T.Aiton [123, 93], *Isatis tinctoria* L. [161].

Pieris napi (Linnaeus, 1758) – Repcelepke
Brassicaceae: *Alliaria petiolata* (M.Bieb.) Cavara & Grande [89], *Arabidopsis thaliana* (L.) Heynh. [122], *Arabis alpina* L. [115], *Arabis hirsuta* (L.) Scop. [89], *Aurinia saxatilis* (L.) Desv. [88], *Barbarea vulgaris* W.T.Aiton [47], *Berteroa incana* (L.) DC. [122], *Biscutella laevigata* L. [115], *Brassica napus* L. [88], *Brassica nigra* (L.) W.D.J.Koch [149], *Brassica oleracea* L. [122], *Brassica rapa* L. [156], *Cardamine amara* L. [115], *Cardamine flexuosa* With. [88], *Cardamine hirsuta* L. [96], *Cardamine impatiens* L. [88], *Cardamine pratensis* L. [122], *Cardamine trifolia* L. [88], *Diplotaxis tenuifolia* (L.) DC. [88], *Erucastrum gallicum* (Willd.) O.E.Schulz [115], *Erysimum cheiranthoides* L. [122], *Hesperis matronalis* L. [115], *Isatis tinctoria* L. [15], *Lepidium campestre* (L.) W.T.Aiton [88], *Lunaria annua* L. [89], *Lunaria rediviva* L. [120], *Nasturtium officinale* W.T.Aiton [9], *Pseudoturritis turrita* (L.) Al-Shehbaz [174], *Raphanus raphanistrum* L. [4], *Rorippa amphibia* (L.) Besser [120], *Rorippa palustris* (L.) Besser [122], *Rorippa sylvestris* (L.) Besser [89], *Sinapis* alba L. [15],
Sinapis arvensis L. [115], *Sisymbrium loeselii* L. [122], *Sisymbrium officinale* (L.) Scop. [121], *Thlaspi arvense* L. [15], *Turritis glabra* L. [88], Resedaceae: *Reseda lutea* L. [88], Tropeolaceae: *Tropaeolum majus* L. [4].

Pieris mannii (Mayer, 1851) – Magyar fehérlepke*
Brassicaceae: *Aethionema saxatile* (L.) W.T.Alton [88], *Aurinia saxatilis* (L.) Desv. [88], *Cardamine impatiens* L. [88], *Cardamine pratensis* L. [55], *Cardaminopsis arenosa* (L.) Hay.

[55], *Diplotaxis erucoides* (L.) DC. [152], *Diplotaxis muralis* (L.) DC. [152], *Diplotaxis tenuifolia* (L:) DC. [120], *Lepidium campestre* (L.) W.T.Aiton [88], *Lepidium graminifolium* L. [88], *Lepidium ruderale* L. [93], *Peltaria alliacea* Jacq. [93], *Sinapis arvensis* L. [174], Resedaceae: *Reseda luteola* L. [93].

Pieris rapae (Linnaeus, 1758) – Répalepke

Brassicaceae: *Alliaria petiolata* (M.Bieb.) Cavara & Grande [121], *Alyssum alyssoides* (L.) L. [122], *Arabis hirsuta* (L.) Scop. [15], *Armoracia rusticana* G.Gaertn., B.Mey. & Scherb. [121], *Aurinia saxatilis* (L.) Desv. [89], *Barbarea stricta* Andrz. ex Besser [88], *Barbarea vulgaris* W.T.Aiton [47], *Berteroa incana* (L.) DC. [122], *Biscutella laevigata* L. [88], *Brassica napus* L. [122], *Brassica nigra* (L.) W.D.J.Koch [121], *Brassica oleracea* L. [121], *Brassica rapa* L. [121], *Bunias orientalis* L. [58], *Calepina irregularis* (Asso) Thell. [89], *Capsella bursa-pastoris* (L.) Medik. [52], *Cardamine amara* L. [89], *Cardamine hirsuta* L. [121], *Cardamine pratensis* L. [47], *Diplotaxis erucoides* (L.) DC. [152], *Diplotaxis muralis* (L.) DC. [15], *Diplotaxis tenuifolia* (L.) DC. [122], *Eruca vesicaria* (L.) Cav. [89], *Erucastrum gallicum* (Willd.) O.E.Schulz [91], *Erysimum cheiranthoides* L. [122], *Erysimum odoratum* Ehrh. [91], *Hesperis matronalis* L. [15], *Isatis tinctoria* L. [122], *Lepidium campestre* (L.) W.T.Aiton [88], *Lepidium virginicum* L. [88], *Lunaria annua* L. [89], *Nasturtium officinale* W.T.Aiton [89], *Pseudoturritis turrita* (L.) Al-Shehbaz [89], *Raphanus raphanistrum* L. [89], *Rorippa amphibia* (L.) Besser [122], *Rorippa austriaca* (Crantz) Besser [88], *Rorippa palustris* (L.) Besser [122], *Rorippa sylvestris* (L.) Besser [89], *Sinapis alba* L. [89], *Sinapis arvensis* L. [120], *Sisymbrium altissimum* L. [91], *Sisymbrium loeselii* L. [122], *Sisymbrium officinale* (L.) Scop. [121], *Sisymbrium orientale* L. [89], *Thlaspi arvense* L. [15], *Turritis glabra* L. [15], Resedaceae: *Reseda lutea* L. [89], *Reseda luteola* L. [15], *Reseda odorata* L. [88], *Reseda phyteuma* L. [152]. Tropeolaceae: *Tropaeolum majus* L. [121], Rutaceae: *Ruta graveolens* L. [122].

Plebejus argus (Linnaeus, 1758) – Ezüstös boglárka

Ericaceae: *Calluna vulgaris* (L.) Hull [122], *Vaccinium myrtillus* L. [88], Fabaceae: *Astragalus glycyphyllos* L. [82], *Colutea arborescens* L. [174], *Cytisus scoparius* (L.) Link [159], *Genista sagittalis* L. [93], *Hippocrepis comosa* L. [4], *Laburnum anagyroides* Medik. [82], *Lotus corniculatus* L. [41], *Medicago lupulina* L. [131], *Medicago sativa* L. [93], *Onobrychis viciifolia* Scop. [62], *Ononis arvensis* L. [163], *Ononis spinosa* L. [60], *Securigera varia* (L.) Lassen [141, 88], *Thymus praecox* Opiz [88], *Thymus serpyllum* L. [41], Cistaceae: *Helianthemum canum* (L.) Hornem. [157], *Helianthemum nummularium* (L.) Mill. [157].

Plebejus argyrognomon (Bergsträsser, 1779) – Tintakék boglárka

Fabaceae: *Astragalus glycyphyllos* L. [41], *Hippocrepis comosa* L. [174], *Lotus corniculatus* L. [174], *Melilotus officinalis* (L.) Lam. [163], *Onobrychis viciifolia* Scop. [163], *Securigera varia* (L.) Lassen [15, 88].

Plebejus idas (Linnaeus, 1758) – Északi boglárka

Ericaceae: *Calluna vulgaris* (L.) Hull [122], *Anthyllis vulneraria* L. [113], *Astragalus glycyphyllos* L. [93], *Astragalus onobrychis* L. [165], *Colutea arborescens* L. [88], *Cytisus scoparius* (L.) Link [122], *Genista germanica* L. [88], *Genista tinctoria* L. [120], *Hippocrepis comosa* L. [113], *Laburnum anagyroides* Medik. [30], *Lotus corniculatus* L. [156], *Medicago* × *varia* Martyn [88], *Medicago falcata* L. [30], *Medicago lupulina* L. [113], *Medicago sativa* L. [136], *Melilotus albus* Medik. [136], *Melilotus officinalis* (L.) Lam. [88], *Onobrychis viciifolia* Scop. [174], *Ononis spinosa* L. [174], *Securigera varia* (L.) Lassen [15], *Trifolium campestre* Schreb. [136], *Trifolium pratense* L. [113], *Trifolium repens* L. [88], *Vicia lutea* L. [88], Cistaceae: *Helianthemum nummularium* (L.) Mill. [113], Eleagnaceae: *Hippophae rhamnoides* L. [41].

Polygonia c-album (Linnaeus, 1758) – C-betűs lepke

Betulaceae: *Betula pubescens* Ehrh. [88], *Corylus avellana* L. [94], Salicaceae: *Salix alba* L. [163], *Salix caprea* L. [89], *Salix cinerea* L. [15], Cannabaceae: *Humulus lupulus* L. [9], Rosaceae: *Prunus spinosa* L. [81], *Rubus idaeus* L. [88], Ulmaceae: *Ulmus glabra* Huds. [122], *Ulmus laevis* Pall. [122], *Ulmus minor* Mill. [122], Urticaceae: *Urtica dioica* L. [9], *Urtica*

urens L. [88], Grossulariaceae: *Ribes nigrum* L. [163], *Ribes rubrum* L. [122], *Ribes uva-crispa* L. [89].

Polyommatus admetus (Esper, 1783) – Bundás boglárka
Fabaceae: *Onobrychis arenaria* (Kit.) DC. [86], *Onobrychis viciifolia* Scop. [163].

Polyommatus amandus (Schneider, 1792) – Csillogó boglárka
Fabaceae: *Lathyrus pratensis* L. [89], *Lathyrus sylvestris* L. [88], *Medicago sativa* L. [41], *Securigera varia* (L.) Lassen [165],*Vicia cassubica* L. [89], *Vicia cracca* L. [122], *Vicia hirsuta* (L.) Gray [15], *Vicia tenuifolia* Roth [89], *Vicia tetrasperma* (L.) Schreb. [15], *Vicia villosa* Roth [89].

Polyommatus damon ([Denis & Schiffermüller], 1775) – Csíkos boglárka
Fabaceae: *Onobrychis arenaria* (Kit.) DC. [143], *Onobrychis viciifolia* Scop. [59].

Polyommatus daphnis ([Denis & Schiffermüller], 1775) – Csipkés boglárka
Fabaceae: *Astragalus glycyphyllos* L. [136], *Astragalus onobrychis* L. [136], *Hippocrepis comosa* L. [120], *Lathyrus niger (*L.) Bernh. [163], *Onobrychis viciifolia* Scop. [163], *Securigera varia* (L.) Lassen [97, 107], Lamiaceae: *Thymus serpyllum* L. [163].

Polyommatus dorylas ([Denis & Schiffermüller], 1775) – Fénylő boglárka
Fabaceae: *Anthyllis vulneraria* L. [89], *Astragalus glycyphyllos* L. [30], Lamiaceae: *Thymus serpyllum* L. [30].

Polyommatus icarus (Rottemburg, 1775) – Közönséges boglárka
Fabaceae: *Astragalus glycyphyllos* L. [98], *Cytisus scoparius* (L.) Link [98], *Genista pilosa* L. [88], *Genista tinctoria* L. [30], *Hippocrepis comosa* L. [120], *Lotus corniculatus* L. [169], *Lotus pedunculatus* Cav. [4], *Medicago* × *varia* Martyn [122], *Medicago falcata* L. [89], *Medicago lupulina* L. [169], *Medicago minima* (L.) Bartal. [89], *Medicago sativa* L. [89], *Melilotus albus* Medik. [89], *Melilotus officinalis* (L.) Lam. [98], *Onobrychis viciifolia* Scop. [122], *Ononis arvensis* L. [98], *Ononis spinosa* L. [169], *Securigera varia* (L.) Lassen [97, 122], *Trifolium arvense* L. [122], *Trifolium campestre* Schreb. [89], *Trifolium dubium* Sibth. [89], *Trifolium fragiferum* L. [89], *Trifolium montanum* L. [136], *Trifolium ochroleucon* Huds. [88], *Trifolium pratense* L. [169], *Trifolium repens* L. [169], *Vicia hirsuta* (L.) Gray [122], Rosaceae: *Fragaria vesca* L. [98].

Polyommatus thersites (Cantener, 1835) – Ibolyaszín boglárka
Fabaceae: *Onobrychis arenaria* (Kit.) DC. [89], *Onobrychis viciifolia* Scop. [131], *Securigera varia* (L) Lassen [97].

Pontia edusa (Fabricius, 1777) – Rezedalepke
Brassicaeae: *Alliaria petiolata* (M.Bieb.) Cavara & Grande [120], *Arabidopsis thaliana* (L.) Heynh. [122], *Berteroa incana* (L.) DC. [89], *Brassica napus* L. [122], *Brassica nigra* (L.) W.D.J.Koch [89], *Descurainia* sophia (L.) Webb ex Prantl [122], *Diplotaxis tenuifolia* (L.) DC. [122], *Erysimum cheiranthoides* L. [122], *Lepidium graminifolium* L. [89], *Lepidium ruderale* L. [122], *Pseudoturritis turrita* (L.) Al-Shehbaz [122], *Raphanus raphanistrum* L. [122], *Rorippa palustris* (L.) Besser [122], *Sinapis arvensis* L. [120], *Sisymbrium altissimum* L. [122], *Sisymbrium officinale* (L.) Scop. [89], *Sisymbrium orientale* L. [89], *Teesdalia nudicaulis* (L.) W.T.Aiton [163], Resedaceae: *Reseda lutea* L. [89], *Reseda luteola* L. [122], *Reseda odorata* L. [15].

Pseudophilotes vicrama (Moore, 1865) – Apró boglárka
Lamiaceae: *Hyssopus officinalis* L. [81], *Mentha spicata* L. [89], *Thymus praecox* Opiz [89], *Thymus pulegioides* L. [81], *Thymus serpyllum* L. [122].

Pyrgus alveus (Hübner, [1803]) – Hegyi busalepke
Cistaceae: *Helianthemum nummularium* (L.) Mill. [56], Rosaceae: *Potentilla argentea* L. [56], *Potentilla erecta* (L.) Raeusch. [144], *Potentilla pusilla* Host [88], *Potentilla reptans* L. [Sobczyk],

Pyrgus armoricanus (Oberthür, 1910) – Feles busalepke
Cistaceae: *Helianthemum nummularium* (L.) Mill. [177], Rosaceae: *Filipendula vulgaris* Moench [41], *Fragaria vesca* L. [88], *Potentilla argentea* L. [89], *Potentilla erecta* (L.) Raeusch. [88], *Potentilla pusilla* Host [177], *Potentilla recta* L. [63], *Potentilla reptans* L. [174].

Pyrgus carthami (Hübner, [1813]) – Nagy busalepke
Rosaceae: *Potentilla pusilla* Host [30], *Potentilla reptans* L. [63].

Pyrgus malvae (Linnaeus, 1758) – Kis busalepke
Cistaceae: *Helianthemum nummularium* (L.) Mill.[30], Malvaceae: *Malva sylvestris* L. [60], Rosaceae: *Agrimonia eupatoria* L. [89], *Argentina anserina* (L.) Rydb. [88], *Comarum palustre* L. [15], *Filipendula ulmaria* (L.) Maxim. [177], *Fragaria moschata* Duchesne ex Weston [15], *Fragaria vesca* L. [89], *Fragaria viridis* Weston [177], *Geum urbanum* L. [4], *Potentilla argentea* L. [15], *Potentilla erecta* (L.) Raeusch. [41], *Potentilla pusilla* Host [88], *Potentilla recta* L. [89], *Potentilla reptans* L. [89], *Rosa canina* L. [4], *Rubus caesius* L. [62], *Rubus canescens* DC. [63], *Rubus fruticosus* L. [166], *Rubus idaeus* L. [89], *Sanguisorba minor* Scop. [177].

Pyrgus serratulae (Rambur, 1839) – Homályos busalepke
Rosaceae: *Potentilla erecta* (L.) Raeusch. [120], *Potentilla pusilla* Host [88], *Potentilla recta* L. [63], *Potentilla reptans* L. [15].

Pyronia tithonus (Linnaeus, 1771) – Kis ökörszemlepke
Cyperaceae: *Carex caryophyllea* Latour. [88], Poaceae: *Agrostis canina* L. [88], *Agrostis capillaris* L. [15], *Agrostis vinealis* Schreb. [163], *Alopecurus pratensis* L. [15], *Anthoxanthum odoratum* L. [88], *Brachypodium pinnatum* (L.) P.Beauv. [15], *Bromus erectus* Huds. [88], *Cynosurus cristatus* L. [15], *Dactylis glomerata* L. [9], *Deschampsia cespitosa* (L.) P.Beauv. [15], *Elymus repens* (L.) Gould [9], *Festuca ovina* L. [88], *Festuca rubra* L. [120], *Lolium perenne* L. [88], *Milium effusum* L. [30], *Molinia caerulea* (L.) Moench [120], *Phleum pratense* L. [88], *Poa annua* L. [9], *Poa compressa* L. [88], *Poa nemoralis* L. [163], *Poa pratensis* L. [15], *Poa trivialis* L. [103].

Satyrium acaciae (Fabricius, 1787) – Akáclepke
Rosaceae: *Cotoneaster integerrimus* Medik. [88], *Prunus amygdalus* Batsch [88], *Prunus spinosa* L.103].

Satyrium ilicis (Esper, 1779) – Tölgyfa-csücsköslepke
Fagaceae: *Quercus cerris* L. [15], *Quercus pubescens* Willd. [66], *Quercus robur* L. [122], Rosaceae: *Prunus spinosa* L. [88], Ulmaceae: *Ulmus minor* Mill. [88].

Satyrium pruni (Linnaeus, 1758) – Szilvafalepke
Rosaceae: *Prunus domestica* L. [122], *Prunus fruticosa* Pall. [165], *Prunus mahaleb* L. [122], *Prunus padus* L. [122], *Prunus spinosa* L. [167].

Satyrium spini ([Denis &Schiffermüller], 1775) – Kökénylepke
Rhamnaceae: *Frangula alnus* Mill. [103], *Rhamnus cathartica* L. [122], *Rhamnus saxatilis* Jacq. [103], Rosaceae: *Prunus padus* L. [30], *Prunus spinosa* L. [30].

Satyrium w-album (Knoch, 1782) – Szilfa-csücsköslepke
Rhamnaceae: *Rhamnus cathartica* L. [88], Ulmaceae: *Ulmus glabra* Huds. [167], *Ulmus laevis* Pall. [120], *Ulmus minor* Mill. [120], *Ulmus pumila* L. [81].

Scolitantides orion (Pallas, 1771) – Szemes boglárka
Crassulaceae: *Sedum acre* L. [165], *Sedum album* L. [59], *Sedum hispanicum* L. [163].

Speyeria aglaja (Linnaeus, 1758) – Kerekfoltú gyöngyházlepke
Polygonaceae: *Bistorta officinalis* Delarbre [48], Violaceae: *Viola canina* L. [9], *Viola elatior* Fr. [15], *Viola hirta* L. [62], *Viola odorata* L. [88], *Viola palustris* L. [120], *Viola reichenbachiana* Jord. ex Boreau [174], *Viola riviniana* Rchb. [8], *Viola rupestris* F.W.Schmidt [15], *Viola tricolor* L [136].

Spialia orbifer (Hübner, 1823) – Törpe busalepke
Rosaceae: *Rubus idaeus* L. [163], *Sanguisorba minor* Scop. [44].

Spialia sertorius (Hoffmannsegg, 1804) – Lápi busalepke
Rosaceae: *Potentilla pusilla* Host [30], *Rubus idaeus* L. [44], *Sanguisorba minor* Scop. [63, 127], *Sanguisorba officinalis* L. [88].

Thecla betulae (Linnaeus, 1758) – Tölgyfalepke
Betulaceae: *Betula pendula* Roth. [88], *Corylus avellana* L.[88], Rosaceae: *Chaenomeles japonica* (Thunb.) Lindl. ex Spach [88], *Crataegus monogyna* Jacq. [165], *Prunus amygdalus*

Batsch [167], *Prunus armeniaca* L. [81], *Prunus avium* (L.) L. [120], *Prunus cerasifera* Ehrh. [122], *Prunus cerasus* L. [120], *Prunus domestica* L. [167], *Prunus padus* L. [167], *Prunus persica* (L.) Batsch [122], *Prunus serotina* Ehrh. [30], *Prunus spinosa* L. [167].

Thymelicus acteon (Rottemburg, 1775) – Csíkos busalepke

Cyperaceae: *Carex caryophyllea* Latour. [88], Poaceae: *Brachypodium pinnatum* (L.) P.Beauv. [166], *Brachypodium sylvaticum* (Huds.) P.Beauv. [174], *Bromus erectus* Huds. [15], *Calamagrostis epigejos* (L.) Roth [120], *Calamagrostis villosa* (Chaix) J.F.Gmel. [88], *Elymus repens* (L.) Gould [120], *Poa annua* L. [30], *Setaria verticillata* (L.) P.Beauv. [109], *Stipa pennata* L. [88].

Thymelicus lineola (Ochsenheimer, 1808) – Vonalas busalepke

Cyperaceae: *Carex acutiformis* Ehrh. [120], Poaceae: *Agrostis capillaris* L. [88], *Alopecurus pratensis* L. [4], *Anthoxanthum odoratum* L. [88], *Arrhenatherum elatius* (L.) P.Beauv. ex J.Presl & C.Presl [42], *Avenella flexuosa* (L.) Drejer [122], *Brachypodium pinnatum* (L.) P.Beauv. [4], *Brachypodium sylvaticum* (Huds.) P.Beauv. [4], *Bromus erectus* Huds. [88], *Bromus hordeaceus* L. [88], *Bromus racemosus* L. [88], *Bromus sterilis* L. [88], *Calamagrostis epigejos* (L.) Roth [120], *Cynosurus cristatus* L. [166], *Dactylis glomerata* L. [120], *Elymus repens* (L.) Gould [9], *Festuca ovina* L. [83], *Holcus lanatus* L. [15], *Holcus mollis* L. [4], *Lolium perenne* L. [166], *Phleum pratense* L. [60], *Poa pratensis* L. [15],

Thymelicus sylvestris (Poda, 1761) – Barna busalepke

Poaceae: *Aegilops* spp. L. [89], *Alopecurus pratensis* L. [166], *Anthoxanthum odoratum* L. [88], *Avenella flexuosa* (L.) Drejer [166], *Brachypodium pinnatum* (L.) P.Beauv. [122], *Brachypodium sylvaticum* (Huds.) P.Beauv. [166], *Bromus erectus* Huds. [88], *Calamagrostis canescens* (Weber) Roth [15], *Cynosurus cristatus* L. [88], *Dactylis glomerata* L. [89], *Deschampsia cespitosa* (L.) P.Beauv. [30], *Elymus repens* (L.) Gould [15], *Eragrostis cilianensis* (All.) Vignolo ex Janch. [166], *Holcus lanatus* L. [166], *Holcus mollis* L. [122], *Melica ciliata* L. [88], *Phleum phleoides* (L.) H.Karst. [174], *Phleum pratense* L. [166].

Vanessa atalanta (Linnaeus, 1758) – Atalantalepke

Cannabaceae: *Humulus lupulus* L. [4], Urticaceae: *Parietaria officinalis* L. [9], *Urtica dioica* L. [9], *Urtica urens* L. [89].

Vanessa cardui (Linnaeus, 1758) – Bogáncslepke

Apiaceae: *Anthriscus sylvestris* (L.) Hoffm. [88], *Heracleum sphondylium* L. [88], Asteraceae: *Achillea millefolium* L. [30], *Arctium lappa* L. [88], *Arctium minus* (Hill) Bernh. [149], *Arctium* tomentosum Mill. [88], *Artemisia* campestris L. [88], *Artemisia* vulgaris L. [122], *Carduus crispus* L. [88], *Carduus nutans* L. [9], *Carlina acaulis* L. [147], *Carlina vulgaris* L. [88], *Cichorium intybus* L. [88], *Cirsium acaule* (L.) Scop. [88], *Cirsium arvense* (L.) Scop. [9], *Cirsium eriophorum* (L.) Scop. [147], *Cirsium oleraceum* (L.) Scop. [88], *Cirsium palustre* (L.) Scop. [88], *Cirsium rivulare* (Jacq.) All. [88], *Cirsium vulgare* (Savi) Ten. [9], *Filago arvensis* L. [122], *Helichrysum arenarium* (L.) Moench [88], *Onopordum acanthium* L. [9], *Pulicaria dysenterica* (L.) Bernh. [88], *Silybum marianum* (L.) Gaertn. [147], *Tussilago farfara* L. [30], Boraginaceae: *Borago officinalis* L. [88], *Cynoglossum officinale* L. [88], *Echium italicum* L. [89], *Echium vulgare* L. [147], *Symphytum officinale* L. [122], *Symphytum tuberosum* L. [174], Plantaginaceae: *Plantago lanceolata* L. [147], *Plantago major* L. [88] Malvaceae: *Alcea rosea* L. [122], *Althaea officinalis* L. [147], *Malva alcea* L. [88], *Malva moschata* L. [88], *Malva neglecta* Wallr. [147], *Malva sylvestris* L. [147], Rosaceae: *Argentina anserina* (L.) Rydb. [88], Urticaceae: *Urtica dioica* L. [122], *Urtica urens* L. [147].

Zerynthia polyxena ([Denis & Schiffermüller], 1775) – Farkasalmalepke

Aristolochiaceae: *Aristolochia clematitis* L. [10].

1–10. ábra | Figures 1–10.
Részletes leírás a következő oldalon. A méretarányok eltérőek. (A szerkesztő megjegyzése.)
Detailed description on the next page. Scales vary. (Editor's note.)

1–10. ábra | Figures 1–10.

1. ábra. Tojásrakás: Sziklai fehérlepke – *Pieris ergane* (Geyer, 1828) – *Aethionema saxatile* (L.) W. T. Aiton
Figure 1. Oviposition: Mountain Small Wihe, *Pieris ergane* (Geyer, 1828) – *Aethionema saxatile* (L.) W. T. Aiton

2. ábra. Tojásrakás: Hajnalpírlepke – *Anthocaris cardamines* (Linnaeus, 1758) – *Arabis turrita* L.
Figure 2. Oviposition: Orange Tip – *Anthocaris cardamines* (Linnaeus, 1758) – *Arabis turrita* L.

3. ábra. Tojásrakás: Farkasalmalepke – *Zerynthia polyxena* ([Denis & Schiffermüller], 1775) – *Aristolochia clematitis* L.
Figure 3. Oviposition: Southern Festoon – *Zerynthia polyxena* ([Denis & Schiffermüller], 1775) – *Aristolochia clematitis* L.

4. ábra. Tojásrakás: Szürkés hangyaboglárka – *Phengaris alcon* ([Denis & Schiffermüller], 1775) – *Gentiana cruciata* L.
Figure 4. Oviposition: Alcon Blue – *Phengaris alcon* ([Denis & Schiffermüller], 1775) – *Gentiana cruciata* L.

5. ábra. Lárva (hernyó): Málna gyöngyházlepke – *Brenthis daphne* ([Denis & Schiffermüller], 1775) – *Rubus fruticosus* L.
Figure 5. Larva: Marbled Fritillary – *Brenthis daphne* ([Denis & Schiffermüller], 1775) – *Rubus fruticosus* L.

6. ábra. Lárva (hernyó): Tüzes tarkalepke – *Melitaea didyma* (Esper, 1778) – *Plantago media* L.
Figure 6. Larva: Spotted Fritillary – *Melitaea didyma* (Esper, 1778) – *Plantago media* L.

7. ábra. Lárva (hernyó): Kis tarkalepke – *Melitaea trivia* ([Denis & Schiffermüller], 1775) – *Verbascum lychnitis* L.
Figure 7. Larva: Lesser Spotted Fritillary – *Melitaea trivia* ([Denis & Schiffermüller], 1775) – *Verbascum lychnitis* L.

8. ábra. Lárva (hernyó): Fecskefarkú lepke – *Papilio machaon* (Linnaeus, 1758) – *Seseli osseum* Cr.
Figure 8. Larva: Swallowtail – *Papilio machaon* (Linnaeus, 1758) – *Seseli osseum* Cr.

9. ábra. Lárva (hernyó): Nappali pávaszem – *Aglais io* (Linnaeus, 1758) – *Urtica dioica* L.
Figure 9. Larva: Peacock Butterfly – *Aglais io* (Linnaeus, 1758) – *Urtica dioica* L.

10. ábra. Lárva (hernyó): Farkasalmalepke – *Zerynthia polyxena* ([Denis & Schiffermüller], 1775) – *Aristolochia clematitis* L.
Figure 10. Southern Festoon – *Zerynthia polyxena* ([Denis & Schiffermüller], 1775) – *Aristolochia clematitis* L.

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DOI: https://doi.org/10.24386/LepidHung.2022.18.1.117 HU ISSN 2732-3854 (print) | HU ISSN 2732-3498 (online)

Lepidopterologica Hungarica 18(1): 117–126. | https://epa.oszk.hu/04100/04144

Received 30.05.2022 | Accepted 01.06.2022 | Published: 25.06.2022 (online) | 26.06.2022 (print)

A magyarországi *Cochylimorpha* Razowski, 1959 fajok bionómiája és földrajzi elterjedése
The bionomics and geographical distribution of *Cochylimorpha* Razowski, 1959 species in Hungary (Lepidoptera: Tortricidae, Cochylini)

Fazekas Imre

Citation. Fazekas I. 2022: A magyarországi *Cochylimorpha* Razowski, 1959 fajok bionómiája és földrajzi elterjedése The bionomics and geographical distribution of *Cochylimorpha* Razowski, 1959 species in Hungary (Lepidoptera: Tortricidae). – Lepidopterologica Hungarica 18(1): 117–126.

Abstract. So far 10 species of *Cochylimorpha* Razowski, 1959 have been recorded from Hungary. The study presents partial flight data, food plants and preferred habitats of species. A distribution map of each species has been produced. The species *Cochylimorpha perfusana* (Guenée, 1845) was misidentified and published in Hungary. The published data are identified as the species *Cochylimorpha straminea* (Haworth, 1811).

Keywords. Tortricidae, Cochylimorpha, bionomics, distribution, Hungary

Author's address. Fazekas Imre | Pannon Intézet/Pannon Institute | H-7625 Pécs, Magaslati út 24. | Hungary | e-mail: fazekas@lepidoptera.hu

Summary. According to previous knowledge, 10 species of Cochylimorpha are known in Hungary. The occurrence of several species is known only from old literature, and no authentic specimens have been found in Hungarian collections. It is known that many specimens collected in Hungary are preserved in other collections, especially in Austria, Germany, Italy, and England, but their presence has been greatly neglected by Hungarian researchers who have limited their investigations to the material in Hungarian collections. This is clearly wrong, and the problem should be addressed. The author has been studying the Hungarian *Cochylimorpha* species for several decades. He has published several papers (Fazekas, 1984, 1992, 1996, 1998, 2001, 2004, 2018). He has critically reviewed the Hungarian faunistic literature. He considered only those publications where the authors' identification could be verified. The exact identification of species was done by examination of the genitalia. Genitalia dissections were done in accordance with Robinson (1976). Some of the genitalia were mounted in Euparal on slides; others are preserved in micro-vials filled with glycerol. Genital analysis of worn, damaged specimens of *Cochylimorpha* was performed using the simple and rapid method of Wanke and Rajaei (2018).

In this paper, the flight times, feeding habitats, and preferred habitats of the species are described. Maps show the preliminary geographic distribution patterns of the species. Refinement of the maps will be the work of the coming years.

In this summary study, the flight periods, food plants, preferred habitats, and geographic distribution of *Cochylimorpha* species known from Hungary are described. The distribution of each species in Hungary is mapped using the standard Hungarian natural geographic landscape classification. This type of map shows the topography, hydrology, vegetation, and general ecology of Hungary better than the so-called UTM grid map, where only points indicate the occurrence of species. This mapping method has already been used in "Atlas of the Sesiidae of Hungary" (Fazekas 2022) and "The Eupitheciini of Hungary" (Fazekas 2020). This is a completely new mapping concept in Hungary.

The distribution maps are based on the division of the natural geographic landscape of Hungary (Marosi & Somogyi 1990), into ecologically distinct large, medium, and small landscapes. The names and geographical locations of these areas are shown in Figure 13.

In the Hungarian fauna, the zoogeographical position of several *Cochylimorpha* species is important both in European and Palaearctic terms. The literature data should be revised. These species are:

Cochylimorpha elongana (Fischer von Röslerstamm, 1839): collected in Hungary only between 1893 and 1958 from late April to mid-July. No recent observations have been made for more than half a century. It is questionable whether the metapopulations still exist in the agglomeration of the capital.

Cochylimorpha perfusana (Guenée, 1845): The species *C. perfusana* was erroneously identified and published in Hungary (Buschmann 2004, Gozmány 1968, 1971, Pastorális & Buschmann 2018). No *C. perfusana* specimens have been found in collections so far. All specimens identified as *C. perfusana* belong to the species *Cochylimorpha straminea (*see Figs 11-12).

Cochylimorpha subwoliniana (Danilevsky, 1962): reaches the westernmost limit of its geographic range in Hungary (see map).

Cochylimorpha jucundana (Treitschke, 1835): only two specimens are known from southern Hungary, from 1937 (Mecsek Mountains). No recent sightings in Hungary in the last 85 years. It is probably extinct in the country.

Cochylimorpha obliquana (Eversmann, 1844): the species reaches the western border of its range in Hungary, Slovakia, and Burgenland west of the Carpathian Basin, the range is in strong regression. The habitats of *C. obliquana* are mainly on the alkaline steppes and the drifting sandy plains of the Pannonian lowlands. The abundance of the population is very low. Potentially endangered species (Fazekas 1994). The western part of the Carpathian Basin (the area around Lake Fertő at the Austrian-Hungarian border) is the fluctuation zone of the species. Only old observation data is available. It is highly questionable whether there is significant gene flow in the set of local populations (metapopulations) that are connected to each other.

The list of references is by no means comprehensive but been provided should the reader wish to enquire further into the various of *Cochylimorpha* species bionomic, taxonomic and distribution.

The material examined is in the following collections: Bakonyi Természettudományi Múzeum (Zirc); Janus Pannonius Múzeum (Pécs); Jász Múzeum (Jászberény); Magyar Természettudományi Múzeum (Budapest); Mátra Múzeum (Gyöngyös); Pannon Intézet (Pécs); Ripp-Rónai Múzeum (Kaposvár); Savaria Múzeum (Szombathely).

Bevezetés – Introduction

Magyarországon 10 *Cochylimorpha* előfordulását tartjuk számon (vö. Fazekas 1995a, Pastorális & Buschmann 2018), Eddig több tanulmányomban vizsgáltam egy-egy faj vagy földrajzi terület Cochylini faunáját (Fazekas 1984, 1992, 1996, 1998, 2001, 2004, 2018). Ebben a munkában először foglalom össze a hazai *Cochylimorpha* fajok bionómiáját és földrajzi elterjedést. Minden fajról elterjedési térképet készítettem. A Magyarországon több tanulmányban publikált *Cochylimorpha perfusana* (Guenée, 1845) fajt (vö. Gozmány 1968, 1971 [= *callosana* HS.], Buschmann 2004, Pastorális & Buschmann 2018) tévesen azonosították, azok kivétel nélkül mind *Cochylimorpha straminea* (Haworth, 1811) fajnak bizonyultak (rev. et det. Buschmann). Jelen tanulmány egy előzetes munka, a készülőben lévő magyar Tortricidae atlasz megírásához.

Anyag és módszer

A megvizsgált példányok identifikációját magam végeztem rendszerint a genitáliák elemzésével.

Azért, hogy az ivarszervek térszerkezetét a későbbiekben is tanulmányozni lehessen, a vizsgálati anyag példányainak genitáliáját 97%-os glicerinben tartósítva, szilikon csőben, a rovartűre tűztem. Több problematikus fajról, fajpárról tartós, euparal preparátum készült. A térképi ábrázolásnál az általánosan elterjedt pont- és UTM-térképek helyett a természetföldrajzilag egzaktabban definiálható magyarországi közép- és részben kistájakat (vö. Fazekas 2017, 2020, 2022) alkalmaztam, egy általam elkészített ún. interaktív, színezhető térképpel.

Az irodalmi hivatkozások listája nem átfogó, de alkalmas arra, hogy az olvasó tovább kutasson a különböző, a *Cochylimorpha* fajok taxonómiájában, bionómiájában és földrajzi elterjedésében.

A vizsgált anyag a következő gyűjteményekben található: Bakonyi Természettudományi Múzeum (Zirc); Janus Pannonius Múzeum (Pécs); Jász Múzeum (Jászberény); Magyar Természettudományi Múzeum (Budapest); Mátra Múzeum (Gyöngyös); Pannon Intézet (Pécs); Ripp-Rónai Múzeum (Kaposvár); Savaria Múzeum (Szombathely).

Eredmények – Results

Tribus **Cochylini** Guenée, 1845

Ez egy igen nagy sodrómoly tribus, több mint 1000 leírt fajjal. A Cochylini-k minden fauna régióban előfordulnak, de elsősorban a holarktikus és neotropikus területeken. A lárvák a gyökerekkel, a szárakkal és a magvakkal táplálkoznak. A csoport szinapomorfiái közé tartozik a szárnymintázat, az erezet, valamint a hímek genitáliáinak szerkezete.

Genus ***Cochylimorpha*** Razowski, 1960

A *Cochylimorpha* Razowski, 1960 (*Stenodes* Guenée, 1845, nec Dujardin, 1844) nemzetséget Razowski írta le. A Palearktikumban Japántól a Brit-szigetekig ismertek a fajok. A nemzetség Közép-Ázsiában a legfajgazdagabb, a Kelet-Palearktikumban csak néhány fajról tudunk (Razowski 2009). A nemzetségben eddig 89–95 fajt írtak le, de több taxon státusza még vitatott. A legtöbb fajt eddig Oroszország területéről ismerjük (ca. 25 spp.). Közép-Európában Razowski (2001) még csak kilenc fajt mutatott ki, európai kötetében (Razowski 2002) 34 fajról írt. A nemzetség fajainak bionómiája, földrajzi elterjedése csak részben ismert. Általában két nemzedékben repülnek, de a déli régiókban egy további nemzedék is megjelenhet. A lárvák magvakkal, a szárakban vagy elfonnyadt Asteraceae növényekkel táplálkoznak.

1. *Cochylimorpha hilarana* (Herrich-Schäffer, [1815])

Bionómia – Bionomics: az imágók július és augusztusban repülnek. Tápnövény: *Artemisia campestris*, monofág faj. Habitat: száraz gyepek, szikes legelők és ruderáliák.

Area: Mongóliától Közép-Ázsián és Kis-Ázsián át egészen Nyugat-Európáig, Skandináviáig gyűjtötték. Közép-Európában elterjedt, de többnyire lokális; az Alpokban eléri a 2000–2200 m-es magasságot is.

Magyarországi elterjedése – Distribution in Hungary: Aggteleki-karszt, Budapest és környéke, Dél-Dunántúl, Duna–Tisza köze, Szigetköz.

Jegyzet – Notes: A gyűjteményekben főleg 50 évnél régebben gyűjtött példányok vannak. Szőcs (1977) szerint a fehéres, sötét barna fejű hernyó a tápnövény hajtásának alsó felében egy 50–60 mm hosszú, és 10 mm vastag, orsó alakú vöröses „daganatot", gubacsot képez.

2. *Cochylimorpha halophilana* (Christoph, 1872)

Bionómia – Bionomics: az imágókat főleg júliustól szeptember elejéig gyűjtötték. Tápnövény: *Artemisia* spp. Buschmann (2004) szerint a hernyó *Artemisia santonicum*-on él, Razowski (2001) Közép-Európából az *Artemisia gallica*-t közölte. Ez a faj hazánkban nem él, csak nyugati tengerpartokon, illetve a Földközi-tenger partján Habitat: száraz gyepek, szikes-, homokos legelők. Huemer (2020) „halofita" fajnak tekinti.

Area: Iránától Afganisztánon, a Volga- és Kaukázus vidékén át Délkelet-Európáig, Olaszországig ismert.

Magyarországi elterjedése – Distribution in Hungary: kevés adata ismert; Farmos, Fegyvernek, Jászberény, Kenderes, Királyhegyes, Kisújszállás, Kunmadaras, Nagyiván, Nagykáta, Újszentmargita.

Jegyzet – Notes: Politipikus faj; *C. halophilana adriatica* Huemer, 2000 (locus typicus: I-Gorizia), *C. halophilana clavana* (Constant, 1888). A nevezéktani alfaj típuslelőhelye Oroszország (Sarepta). A magyarországi populációk alfaji státuszát még nem vizsgálták.

3. Cochylimorpha elongana (Fischer von Röslerstamm, 1839)

Bionómia – Bionomics: bivoltin faj; IV–V és VI–VII. A hernyó oligophag: *Achillea millefolium, Artemisia campestris, A. vulgaris, Helichrysum arenarium*. A hernyók a tápnövények szárában élnek, ott hibernálnak, és tavasszal bábozódnak. Habitatok: mezofil rétek, száraz gyepek, sztyeprétek, sziklagyepek, homoki gyepek, ruderális gyomtársulások; xerotherm faj.

Area: Kis-Ázsiától a Balkánon át az Ural vidékéig, Közép-Európában pedig Lengyelországig fragmentáltan elterjedt. Lokális Németországban (pl. Szászország; rekultivált bányavidéken) és Spanyolországban (Andalúzia).

Magyarországi elterjedése – Distribution in Hungary: Budafok, Budaörs (Csiki-hegyek), Budapest (Csillag-hegy, Farkas-völgy, Sas-hegy, Sváb-hegy).

Jegyzet – Notes: Lengyelországból leírt faj (Szilézia) a mely Magyarországon igen lokális és ritka. Hazánkban csak 1893 és 1958 között gyűjtötték április végétől július közepéig (in coll. MTM, Budapest), s több mint fél évszázada nincs újabb megfigyelés. A populációk monitoring vizsgálata sürgető feladat. Kérdéses, hogy a metapopulációk egzisztálnak-e még a főváros agglomerációjában.

4. [***Cochylimorpha perfusana*** (Guenée, 1845)]

Bionómia – Bionomics: Razowski (2009) szerint bivoltin; V–VII és VIII. Tápnövények: *Centaurea stoebe* és a *C. triumfettii*. Habitat: sziklagyepek, cserjések, sztyeprétek, legelők, száraz gyepek, parlagok és ruderáliák.

Area: európai faunaelem; Ausztria, Franciaország, Horvátország, Olaszország, Svájc, Románia. Kovács & Kovács (2005) szerint a Kárpátokban 1500 m-től 2100 m-ig figyelték meg a xeromontán és nedves szubalpin réteken. Ezek a megfigyelések igen figyelemre méltóak, és széles ökológiai plaszticitására utalnak.

Magyarországi elterjedése – Distribution in Hungary: A Buschmann (2004) által közölt adatai (Jászberény, Nagykáta Cseh-domb) sajnálatos elírások, illetve téves határozáson alapultak.

Jegyzet – Notes: Hazai előfordulását Gozmány (1968, 1971) „*callosana* HS." néven közölte, s ennek nyomán az ezredfordulót követő névjegyzékek jelezték, de az MTM-ben sehonnan nincs *perfusana* példány. Az említett listákon kívül eddig csak Buschmann (2004) közölte a Mátra Múzeum gyűjteményével kapcsolatban, az általa oda behelyezett példányok (Jászberény és Nagykáta Cseh-domb) viszont tévesen határozott, igen világos *C. straminea* egyedek voltak (rev. & det. Buschmann): a faj magyarországi előfordulását semmi nem bizonyítja. A fajok összehasonlítását lásd a 11–12. ábrákon.

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

Bionómia – Bionomics: A hernyók tápnövénye és fejlődési szakaszai ez idáig ismeretlenek. Egy nemzedékes faj, repülési ideje április végétől július közepéig tart. Romániában (Kovács & Kovács 2004) a faj száraz sztyepp jellegű lejtőkön, homokos területeken volt megfigyelve. A bélmegyeri példányok szikes területen lettek begyűjtve fűhálózással a koraesti szürkületkor, este a fényre nem repült (Tokár 2015).

Area: Nyugat-Kínától Közép-Ázsián és Románián át Magyarországig diszjunkt elterjedésű. Hazánkban a Tiszántúlon éri el földrajzi elterjedésnek legnyugatibb határát.

Magyarországi elterjedése – Distribution in Hungary: Bélmegyer, Fáspuszta, 2014.V.9, 1 ♂, 1 ♀ (Gp. ♂ 12193, ♀ 12245 ZT), Zdenko Tokár leg. & coll.

Jegyzet – Notes: A Kazahsztánból leírt faj erősen izolált közép-európai populációit csak részben ismerjük, további kutatásokra van szükség.

6. ***Cochylimorpha woliniana*** (Schleich, 1868)

Bionómia – Bionomics: univoltin; VI–VIII. Magyarországon május eleji példányok is előkerültek. A májusi repülés a palearktikus irodalomban még nem ismert. A hernyók augusztustól – áttelelés után – *Artemisia absinthium*-on élnek. Habitat: száraz rétek, ugarok, legelők, ruderália-gyepek; általában homokos talajon, de szórványosan mészköves, vulkanikus sziklagyepekben és lejtősztyepeken is (Fazekas 2018).

Area: Főként Dél- és Közép-Európából ismert, igen lokálisan; európai faunaelem (Razowski 2009). Nupponen et al. (2001) vizsgálatai alapján azonban a faj Európától egészen Mongóliáig előkerült. Ennek alapján erősen vitatható Razowski európai faunaelem besorolása, minden bizonnyal egy szibériai faunaelem.

Magyarországi elterjedése – Distribution in Hungary: Eddig csupán a Balaton és a Velencei-tó térségében ismert igen lokális populációja: Kis-Balaton (Zalavári-erdő), Tihany, Csopak, Agárd (Fazekas 1993, 2018, Petrich 2001, Szabóky 1982).

Jegyzet – Notes: a faj populációinak elterjedése, bionómiája a teljes Pannon életföldrajzi régióban felülvizsgálatot igényel. Mivel a most feltárt élőhelyek túlnyomóan a Balaton-felvidéki Nemzeti Park területére esnek fontos volna egy monitoring vizsgálat elindítása.

7. *Cochylimorpha obliquana* (Eversmann, 1844)

Bionómia – Bionomics: bivoltin faj; V–VI., VII–IX. Tápnövényei: *Artemisia maritima*, *A. stepposa* (Razowski 2001, 2009), hazánkban valószínűleg az *A. santonicum*. A hernyók a gyökérben élnek, ott hibernálnak, s tavasszal bábozódnak. Habitat: száraz homokos rétek és szikes puszták.

Area: Mongóliától Dél-Szibérián és Közép-Ázsián át Magyarországig, Nyugat-Ausztriáig ismert.

Magyarországi elterjedése – Distribution in Hungary: A Soproni-hegység, a Kisalföld, a Mezőföld, a Duna menti síkság, a Jászság, és a Tiszántúl lokális és ritka faja; Alattyán, Biatorbágy, Budaörs, Csorna, Dinnyés, Dömsöd, Fegyvernek, Gyoma, Kenderes, Kunmadaras, Mikepércs, Nadap, Nagyiván, Nagykáta, Pákozd, Sárkeresztúr, Sopron, Sukoró, Szeged, Szigetszentmiklós, Újszentmargita, Velence.

Jegyzet – Notes: a nyugati area határa a Fertő-tó vidéke (Burgenland). Ebben a fluktuációs övezetben csak régi megfigyelési adatok vannak. Hazai vonatkozásban kérdéses, hogy az egymással kapcsolatban levő lokális populációk halmazában (metapopulációk) van-e szignifikáns génáramlás.

8. *Cochylimorpha jucundana* (Treitschke, 1835)

Bionómia – Bionomics: univoltin; VI–VIII. Nappal és éjszaka (fénnyel) is gyűjthető száraz, déli expozíciójú sziklagyepekben, hegyi réteken, cserjésekben egészan 1000 m magasságig (Balkán). Tánövénye valószínűleg valamelyik *Artemisia* faj.

Area: Baskíriától Dél-Oroszországon, a Balkánon, a Pannon-medencén és Észak-Olaszországon át egészen Spanyolországig, Franciaországig, Belgiumig kimutatták, de mindenütt lokális és ritka. A belgiumi adat valószínűleg téves identifikáción alapul.

Magyarországi elterjedése – Distribution in Hungary: csak két példánya ismert eddig hazánkból (14-15.VI.1937. Pécs, leg. Klimesch J.; in coll. MTM Budapest és a Bécsi Természettudományi Múzeumban).

Jegyzet – Notes: Az elmúlt 85 évből nem tudunk újabb magyarországi megfigyelésről.

9. *Cochylimorpha straminea* (Haworth, 1811)

Bionómia – Bionomics: bivoltin; V–VII, VIII–X. A hernyók *Atremisia*-, *Centaurea*-, *Chrysanthemum*- és *Scabiosa* fajokon élnek; a virágfejek alatti szárban. Elfogyasztják a magvakat és fiatal hajtásokat is. A második nemzedék egészen kis hernyóként telel át majd tavasszal az új hajtások száraiból táplálkozik. Habitat: főleg síksági és dombvidéki xerotherm erdőszéleken, cserjésekben, sziklagyepekben, sztyeplejtőkön, réteken, legelőkön, kaszálókon, útszéleken, mezsgyéken vagy parlagi területeken él.

Area: a Nyugat-Palearktikumban sokfelé elterjedt, helyenként gyakori.

Magyarországi elterjedése – - Distribution in Hungary: hazánkban általánosan elterjedt, az egyik leggyakoribb, euryök *Cochylimorpha fajunk.* A lelőhelyek térképi elhelyezkedése alapján jól látható igen jelentős földrajzi területekről eddig semmilyen adatunk nincs (vö.: 9. ábra).

Jegyzet: Buschmann Ferenc (pers. comm.) szerint a Jászság homoki élőhelyeinek *C. straminea* egyedei világosabbak, és a szárnyközépi barna sávot ritkán kísérik sötét pikkelyek, emiatt könnyen összetéveszthetők a *C. perfusana* (Guenée, 1845) fajjal.

10. *Cochylimorpha alternana* (Curtis, 1831)

Bionómia – Bionomics: bivoltin; IV–VI., VII–IX. A hernyók a még zárt *Centaurea scabiosa* virágfejében élnek, a virágokkal, és a még éretlen termésekkel táplálkoznak. A második generáció korai szakaszban lévő lárvái telelnek át. Habitat: száraz gyepek, legelők, homokbuckások, dolomit- és mészkő sziklagyepekben, lejtősztyep mozaikokban.

Area: Iránytól Közép-Ázsián át egészen Skandináviáig, a Brit-szegetekig, délen Észak-Afrikáig és Közel-Keletig elterjedt. Razowski (2009) szerint egy európai faunaelem, de ez nem valószínű, inkább egy többközpontú nyugat-palearktikus faunaelem Fazekas 1994).

Magyarországi elterjedése – - Distribution in Hungary: szórványosan az ország számos földrajzi régiójában gyűjtötték (pl. Mecsek, Mezőföld, Dunántúli-középhegység, Szigetköz, Duna–Tisza köze); Agárd, Ágasegyháza, Albertirsa, Bánhida, Budafok, Budaörs, Dinnyés, Fót, Hosszúhetény, Isaszeg, Kárász, Komló, Magyaregregy, Nagymaros, Pécsvárad, Tarhos, Verőce.

Jegyzet – Notes: Tápnövénye a *Centaurea scabiosa* egész Európában elterjedt, kivéve mediterrán az északi tájakat. Kelet felé eléri a kelet-szibériai Bajkál-tavat, sőt meghonosították Kelet-Ázsiában, Észak-Amerikában, Ausztráliában és Új-Zélandon is, ezért a *Cochylimorpha alternana* megjelenése más földrészeken is várható.

Értélelés – Interpretation

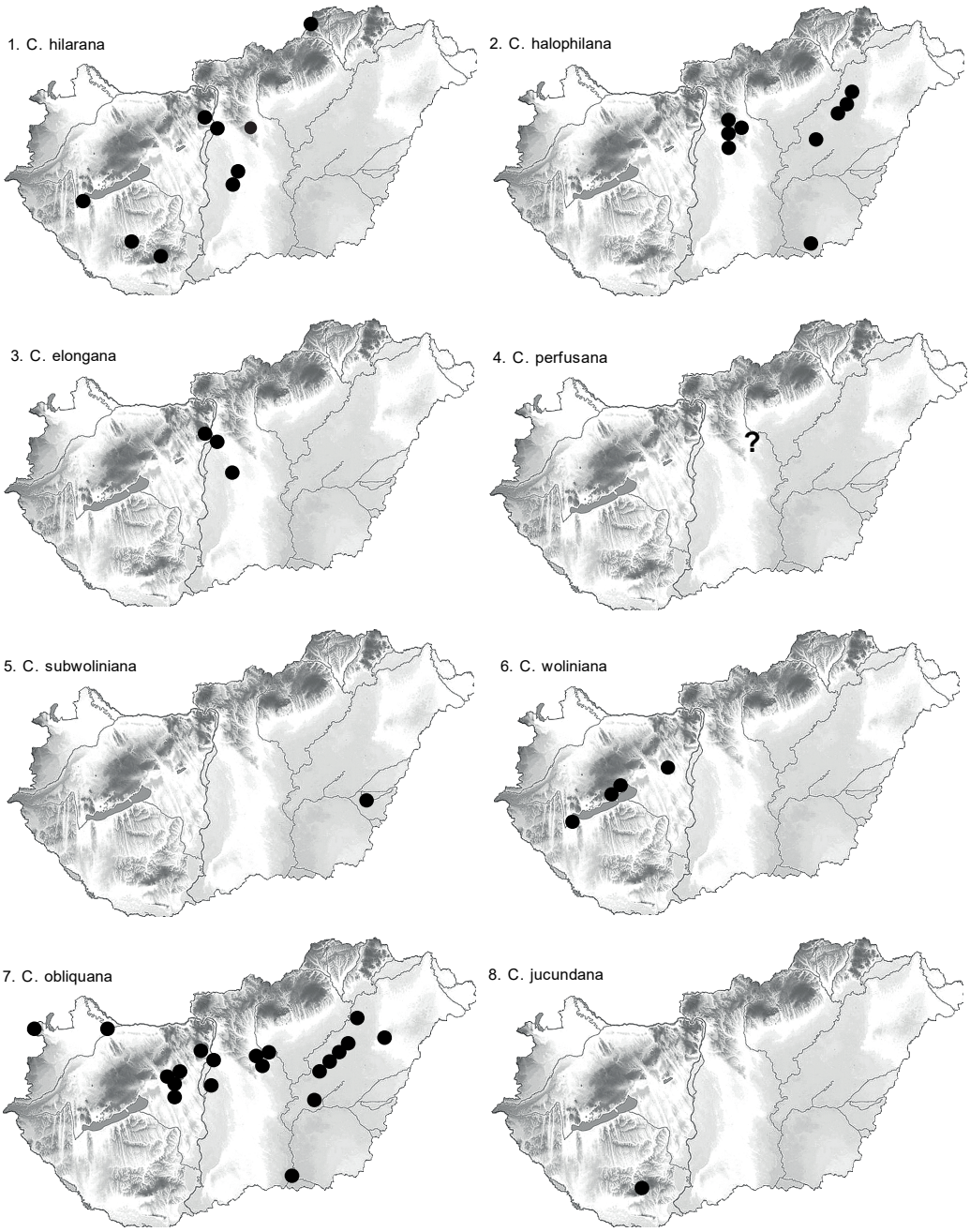
Az eddigi vizsgálatok és gyűjteményi revíziók alapján 9 faj előfordulása bizonyított Magyarországon:

Cochylimorpha hilarana (Herrich-Schäffer, [1815])
Cochylimorpha halophilana (Christoph, 1872)
Cochylimorpha elongana (Fischer von Röslerstamm, 1839)
Cochylimorpha subwoliniana (Danilevsky, 1962)
Cochylimorpha woliniana (Schleich, 1868)
Cochylimorpha obliquana (Eversmann, 1844)
Cochylimorpha jucundana (Treitschke, 1835)
Cochylimorpha straminea (Haworth, 1811)
Cochylimorpha alternana (Curtis, 1831)

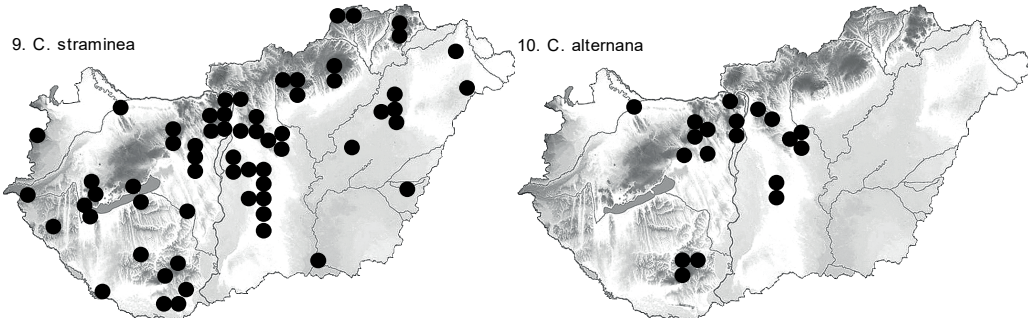
A *Cochylimorpha perfusana* (Guenée, 1845) fajt téves identifikáció miatt törölni kell a magyar faunából (vö. Buschmann 2004, Gozmány 1968, 1971, Pastorális & Buschmann 2018).

Köszönet. Köszönöm Buschmann Ferencnek (H-Jászberény) a kézirathoz fűzött értékes észrevételeit. Köszönöm Alec Harmernek (UK-Lymington) az angol nyelvi korrektúrát.

Acknowledgements. I thank Ferenc Buschmann (H-Jászberény) and Gábor Pastorális (SK-Komárno) for their valuable comments on the manuscript. Thanks to Alec Harmer (UK-Lymington) for proofreading the English version.

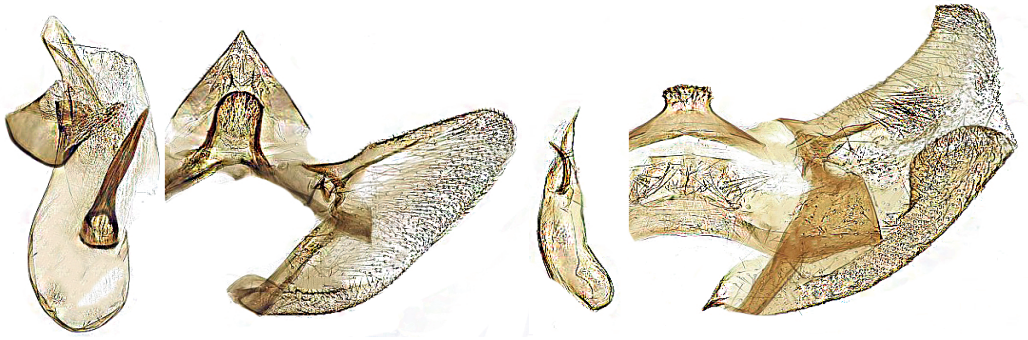


1–8, ábra. A magyarországi *Cochylimorpha* fajok földrajzi elterjedésének térképe
Figures 1–8. Map of the geographical distribution of *Cochylimorpha* species in Hungary



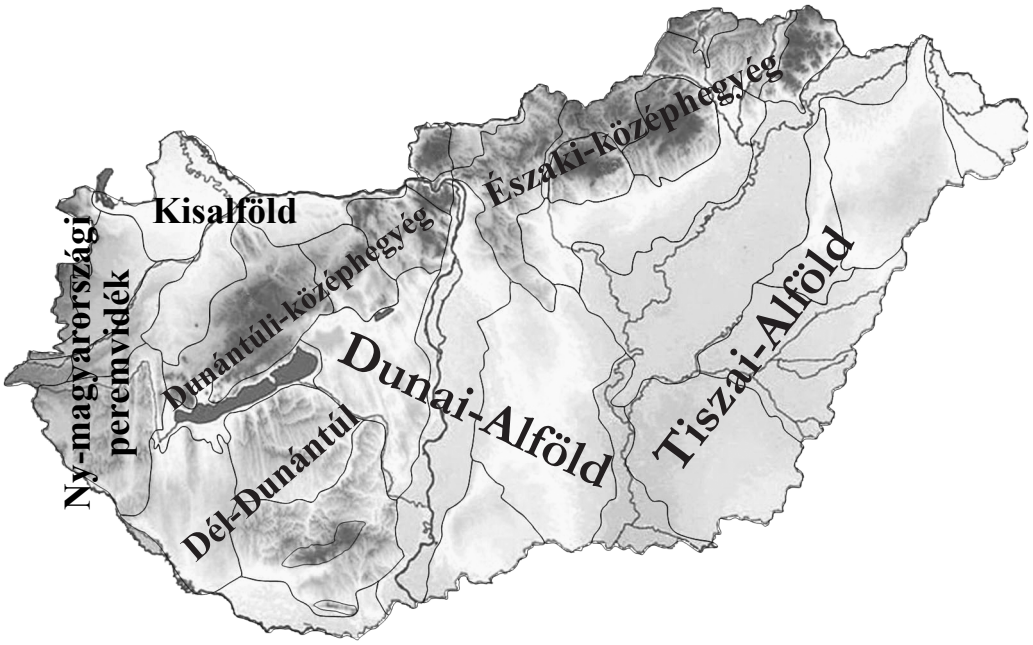
9–10, ábra. A magyarországi *Cochylimorpha* fajok földrajzi elterjedésének térképe
Figures 9—10. Map of the geographical distribution of *Cochylimorpha* species in Hungary

11a 12a



11b 12b

11–12. ábra. *Cochylimorpha perfusana* (Ausztria); **11a** szárnyak, **11b** ♂ genitália; *C. straminea* **12a** szárnyak, **12b** ♂ genitália.
Figures 11–12. *Cochylimorpha perfusana* (Austria); **11a** wings, **11b** ♂ genitalia; *C. straminea* **12a** wings, **12b** ♂ genitalia.



13. ábra. Magyarország domborzati térképe tájfelosztással Fazekas (2017, 2020, 2022) szerint. Részletes leírás az irodalomban.
Figure 13. Topographic map of Hungary with landscape division according to Fazekas (2017, 2020, 2022). Detailed description in the literature.

Irodalom – References

Az irodalmi hivatkozások listája nem átfogó, de alkalmas arra, hogy az olvasó tovább kutasson a különböző, a *Cochylimorpha* fajok taxonómiájában, bionómiájában és földrajzi elterjedésében.
The list of references is by no means comprehensive but been provided should the reader wish to enquire further into the various of *Cochylimorpha* species bionomic, taxonomic and distribution.

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https://doi.org/10.24386/LepidHung.2022.18.1.127 HU ISSN 2732-3854 (print) | HU ISSN 2732-3498 (online)

Lepidopterologica Hungarica 18(1): 127–141. | https://epa.oszk.hu/04100/04144

Received 02.05.2022 | Accepted 06.06.2022 | Published: 16.06.2022 (online) | 26.06.2022 (print)
ZooBank: LSID urn:lsid:zoobank.org:pub:A6E590E0-3AC6-453B-815D-6806D982A38B
Zenodo: https://zenodo.org/md5:c96a9c7bd09761e4818132f6a1aebfb9

The genus *Bryomima* Staudinger, 1900, with the description of four new taxa from Asia (Lepidoptera, Noctuidae)

Péter Gyulai

Citation. Gyulai P. 2022: The genus *Bryomima* Staudinger, 1900, with the description of four new taxa from Asia (Lepidoptera, Noctuidae). – Lepidopterologica Hungarica 18(1): 127–141.

Abstract. Description of two new species and two new subspecies of *Bryomima* Staudinger, 1900, with 24 colour illustrations and 15 genitalia figures.

Keywords. Asia, taxonomy, Noctuidae, new descriptions.

Author's address. Péter Gyulai | 3530 Miskolc, Mélyvölgy 13/A | Hungary
E-mail: adriennegyulai@gmail.com

Introduction

The Palaearctic taxa of the genus *Bryomima* Staudinger, 1900 are distributed from southern Turkey through Azerbaijan, Iraq, Iran and Afghanistan to Pakistan. The genus is most diverse in Iran.

List of the Palaearctic taxa

Bryomima carducha Staudinger, 1900 (type locality: N. Mesopotamia, Turkey, Mardin)
Bryomima carducha persicola **ssp. n.** (type locality: Iran, prov. Boyerahmad-va-Kohgiluyeh, SE- Zagros, 35 km SE of Yasuj)
Bryomima dilutior Schwingenschuss, 1937 (type locality: N Iran, Elburz)
Bryomima dilutior meridionalis **ssp. n.** (type locality: Iran, Fars, 7 km N of Sivand)
Bryomima rosea Brandt, 1941; (type locality: Iran, Kouh i Taftan)
Bryomima defreina Hacker, 1986 (type locality: Turkey, Hakkari)
Bryomima aviscaput **sp. n.** (type locality: Pakistan, Waziristan)
Bryomima vartianorum Gaal-Haszler, Lödl, Ronkay, Ronkay & Varga, 2012 (type locality: Iran, East of Kazeroun)
Bryomima avajensis **sp. n.** (type locality: Iran, Hamadan, Avaj Pass)
Bryomima luteosordida Osthelder, 1933 (type locality: Turkey, Marash)
Bryomima hakkariensis de Freina & Hacker, 1985 (type locality: Turkey. Hakkari, Tanin Tanin-Pass)
Bryomima eudiopsis (Boursin, 1960) (type locality: Afghanistan, Nuristan, Bashgl Valley)
Bryomima nuristana Varga & Ronkay, 1991 (type locality: Afghanistan, Pr. Kunar, Nuristan)
Bryomima striata Ronkay, Ronkay, Gyulai & Hacker, 2010 (type locality: Pakistan, Kash mir).

Separation of these taxa needs careful study due to the very strong resemblance in the external features and configuration of the genitalia. In the vesica the configuration of the shape of the

by the coverage; the position of the long cornuti may be spread out or flattened, depending on the position of the vesica tube at coverage. Hitherto, the female genitalia of most of the taxa has not been studied or published, probably because of the small differences in the structure among them.

The author dissected a large series of *Bryomima* taxa, however, due to the individual variability in both of the male and female external and genitalia features, there are still questions open to doubt in the taxonomy of *Bryomima*, as follows:

Both *Bryomima dilutior* Schwingenschuss, 1937 and *B. rosea* Brandt, 1941 were originally described as subspecies of *B. carducha* Staudinger, 1900. Later, Gaal- Haszler, Lödl, Ronkay, Ronkay & Varga (2012) validated both to species level. Since both taxa occur sympatrically in some localities in Iran, the author of the recent publication confirms this assessment. The Iranian populations of *B. carducha* are described here as a new subspecies. However, among the mostly whitish ground-coloured individuals of the Iranian *B. carducha* populations, pinkish, and pale orange-tinged individuals (in the same place and at night) also occur. From these forms, the somewhat similar, but much more local and rarer *B. rosea* can be distinguished externally by the much narrower, more uniformly coloured, and narrower middle area of the forewings, and lacking the large, dark, diffuse irregular round spot, which is typical in *B. carducha*.

The taxonomic rank of the populations of the polymorphic *B. luteosordida* Osthelder, 1933 and *B. hakkariensis* de Freina & Hacker, 1985 is also under discussion as to whether they are two distinct species having light and dark forms of both, or that all the forms belong to the same species.

The validity of *B. nuristana* Varga & Ronkay, 1991 is debatable; it can be only another population of *B. eudiopsis* (Boursin, 1960) since both taxa are described from the province of Nuristan and the two have not been compared in the original description of *B. nuristana*.

Abbreviations for personal and institutional collections used herein: HNHM= Hungarian Natural History Museum (Budapest, Hungary); MFN = Museum für Naturkunde Berlin, Germany; NHMW = Naturhistorisches Museum, Wien, Austria NRS = Naturhistoriska Riksmuseet, Stockholm, Sveden; HT = holotype; PT = paratype; BB = collection of B. Benedek (Érd, Hungary); PGM = collection of Péter Gyulai (Miskolc, Hungary); GYP = genitalia slide Péter Gyulai; RL = genitalia slide of László Ronkay; m = male; f = female.

Description of new taxa

***Bryomima carducha persicola* ssp. n.** (Figs 5–8, 26, 36)

Holotype: male (Fig. 5), Iran, prov. Boyerahmad-va-Kohgiluyeh, SE- Zagros, 35 km SE of Yasuj, 2600m, 6-7. VI. 2005, leg. P. Gyulai & A. Garai, slide no. GYP 5672 (coll. PGM).

Paratypes: 1 m, 1 f, with the same data (PGM); 2 f, Iran, Yasug, Pr. Buyer Ahmad, Zagros Mts., 2400 m, 2005 VI. 28-30., leg. Hácz, Juhász, Petrányi (BB); 1 m, prov. Boyerahmadva-Kohgiluyeh, SE- Zagros, Yasuj, 2500m, 7-8. VII. 2006, leg.T. Hácz (PGM); 1 f, Iran, Prov. Kohgiluyeh-Boyer Ahmad, 20 km S of Yasuj, 15-19. VII. 2013, leg. O. G. Legezin (BB); 1 m, Iran, Prov. Buyer Ahmad, Zagros Mts., Yasuj, 2700 m, VII. 2006, leg. T. Hácz (BB); 1 m, prov. Boyerahmad-va-Kohgiluyeh, SE- Zagros, 15 km N of Vazag, 2350 m, 12. VI. 2007, leg.T. Hácz (PGM), 16 m, 3 f, Iran, prov. Fars, Zagros Mts., Sepidan, 1325 m, 51°58’161’’ E, 30°16’934’’N, 26.-27. IV. 2008, leg. T. Hácz, K. Székely, K. Víg (PGM); 4 m, Iran, Prov. Fars, Zagros Mts., Sepidan, 2400 m, 2. V. 2011, collector unknown (BB); 1 m, Iran, prov. Fars, Zagros Mts., Dasht-e-Arjan, 2500 m, 9. VI. 1999, leg. J. Klír (PGM); 1 m, same data (coll. M. Dvorak); 4 m, Iran, prov. Fars, Zagros Mts., Dasht-e-Arjan, 2500 m, 8-10. VI. 1999, leg. V. Major (PGM); 3 m, 1 f, Iran, prov. Fars, Zagros Mts., Ardakan, 2500-3000 m, 18. VI. 2010, leg. B. Benedek & T. Hácz (PGM); 1 m, same data (BB); 1 f, same data (coll. H. Seibald); 1 m, Iran, prov. Fars, Zagros Mts., Fereidun Shar, 27. VI. 2005, leg. T. Hácz, I. Juhász & G. Petrányi (PGM); 2 f, Iran, prov. Fars, Zagros Mts., Fereidun Shar, 3000 m, 10-12. VII. 2006, leg. T. Hácz (coll. H.

m, 15-17. VI. 2010, leg. B. Benedek & T. Hácz (PGM); 20 m, 5 f, same data (BB); 1 m, Iran, Prov. Esfahan, 12 km N of Qasr-e-Cham, near Sahreza, 51°44'13"E, 31°50'14"N, 2200 m, 1. V. 2001, leg. Gy. Fábián & K. Víg (BB); 1 m, Iran, Esfahan prov. Semirom, Abmalakh distr., 1850 m, 22–24.VI.2017, leg. E. Rutjan (O. Pekarsky); 2 m, Iran, prov. Hamadan, distr., Malayer, near Nahavand, 1700–1800 m, 12.V.2008, leg. E. Rutjan (O. Pekarsky).
slide nos. GYP 1854m, 5646m, 5648m, 5652m, 5654m, 5655m, 5661f.

Diagnosis. *Bryomima carducha persicola* **ssp. n.** (Figs 5–8) is the S. Iranian subspecies of the nominotypical *B. carducha* Staudinger, 1900, which was described from Mardin, S. Turkey (Figs 1–4). The new subspecies can be distinguished from the nominotypical subspecies by the elongated pointed forewing apex and more contrasting wings. The dark black hue is less extensive in the middle area of the forewings of the new subspecies than in the nominotypical subspecies, but darker and mostly narrower, ribbon-like. Furthermore, in certain individuals of the new subspecies, the base colour of the anterior wing may be pale pinkish or pale orange or pale yellowish tinged, while in the nominotypical subspecies the author has not seen such variations yet. In the male genitalia of *B. carducha persicola* **ssp. n.** (Fig. 26) the sub-basal diverticulum is larger; the basal-subbasal area of the cornuti is more extended and the cornuti are mostly longer than in the nominotypical subspecies (Fig. 25). In the female genitalia, the differences are more conspicuous; the new subspecies (Fig. 36) have funnel-like antrum, and broader, terminally sudden narrowing ductus bursae.

Description (Figs 5–8). Forewing length 12-13 mm, wingspan 23-26 mm. Vesture of the head, thorax, abdomen greyish, however whitish with slight greyish suffusion on the under side and legs; palpi white. Forewings whitish, although certain individuals, may be pale pinkish, pale orange, or pale yellowish tinged; accurated, densely scattered with greyish scales, most noticeably in the median area, forming a diffuse blackish stripe, which the most broadened in the middle, to form a large irregular patch. Transverse lines obscured or not visible; only the strongly arcuate, lanceolate postmedian line is more defined. Hindwings brown, lightest in the basal area, but more darkly suffused in the broad marginal area; discal spot and median line absent.

Male genitalia (Fig. 26). Uncus moderately long, apically pointed; juxta broadly shield-shaped with wide dorsal medial depression and two symmetrical, apically pointed extensions; vinculum V-shaped; valvae elongate, both the dorsal and ventral costa medially slightly expanded, cucullus section terminally bird's-head shaped with an acute subapical process; harpe regressed. Aedeagus tubular, distally somewhat curved. Vesica basally and subbasally with one spacious, elongate, flattened frontal diverticulum, with a dense area of scattered short cornuti; distally tubular, slightly curved ventrad; the medial section bears a prominent, dense bundle of strong spines, continuing with an area of densely scattered shorter spines subterminally-terminally.

Female genitalia. (Fig. 36). Papillae anales setose, broad; apophyses posteriores and anteriores thin, long, both about the same length. Ostium oval, antrum funnel-like with a strongly sclerotized broad plate in the wall; ductus bursae asymmetrically tubular, terminally narrowing suddenly with strongly sclerotised asymmetric U-shaped, longitudinally wrinkled bar in its wall, continuing into the prominent, terminally rounded, somewhat wrinkled appendix bursae. Corpus bursae large, saccate, without signum.

Biology and distribution. The populations of the new subspecies occur in the mountains of the S. Zagros, in the provinces Esfahan, Fars and Boyerahmad-va-Kohgiluyeh of Iran, where locally it is not rare. The single specimen, found near the Iraqi border, seems the same as the nominotypical subspecies in S. Turkey and Iraq.

Etymology. *Bryomima carducha persicola* **ssp. n.** is named from the Iranian distribution.

***Bryomima dilutior meridionalis* ssp. n.** (Figs 11–13, 28, 38)

Holotype: male (Fig. 11), Iran, prov. Fars, Zagros Mts., 7 km N of Sivand, 12-13. V. 2002, leg. P. Gyulai & A. Garai, slide no. GYP 1853 (coll. PGM).

Paratypes: 4 m, 4 f, with the same data (PGM); 5 m, Iran, prov. Fars, 5 km S of Saadat

Shar, 53°12'38'' E, 30°05'21''N, 1900 m, 2. V. 2001, leg. Gy. Fábián & K. Víg (PGM); 1 male, same data (BB); 1 m, same data (coll. H. Seibald); 1 m, Iran, prov. Fars, 5 km S of Dehbid, 2040 m, 2. V. 2000, leg. Szabó & Hentschel (PGM); 1 m, Iran, prov. Fars, Zagros Mts., Persepolis, 1200 m, 25-26. V. 1999, leg. T. Hácz & G. Kőszegi (coll. PGM).
slide nos. GYP 1857m, 5659f, 5671m, 5672m.

Diagnosis. *Bryomima dilutior meridionalis* **ssp. n.** (Figs 11–13) is the southern subspecies of the nominotypical *B. dilutior* Schwingenschuss, 1937, which is distributed in the Alborz range of northern Iran. (Figs 9–10). The new subspecies can be distinguished from the nominotypical subspecies by the more elongated forewing apex; darker, almost concolourous ground colour of forewings, particularly in the marginal area and the obscure crosslines in the wing pattern. In the male genitalia (Fig. 28), the best distinguishing features from the nominotypical subspecies (Fig. 27) are the medially less extended valvae (less convex in both the dorsal and ventral costa), the smaller, narrower terminal part of the valvae with the acute subapical process and the smaller subbasal diverticulum. In the female genitalia (Fig. 38), the new subspecies has weaker ductus bursae, with more sclerotised longitudinal wrinkles in the wall, than in the nominotypical subspecies (Fig. 37).

Description (Figs 11–13). Forewing length 12-13 mm, wingspan 23-25 mm. Vesture of head, thorax, abdomen, legs and forewings brownish-greyish with scattered pale yellowish or ochreous scales, which the most dense in the thorax and the basal area of the forewings. The median area the darkest. Orbicular- and reniform stigmata small, pale ochre, diffuse. Claviform stigmata and the transverse lines obscure or not visible. Cilia pale ochreous. Hindwings brown with pale ochreous scattered scales, mostly in the basal – subbasal areas, lightest in the basal area, but evenly more brown suffused in the broad marginal area; discal spot absent or dot-like, median line brown, oblique, diffuse, both of them hardly visible; cilia pale ochreous.

Male genitalia (Fig. 28). Uncus long, narrow, apically pointed; juxta broadly shield-shaped with wide dorsal medial depression and two symmetrical, apically pointed extensions; vinculum **V**-shaped; valvae elongate, both the dorsal and ventral costa medially slightly expanded, cucullus section terminally bird's-head shaped with an acute subapical process; harpe regressed. Aedeagus tubular distally curved ventrad. Vesica basally-subbasally spacious, with a semiglobular, but somewhat flattened frontal, a much smaller, flattened subbasal diverticulum, and with a large dense area of scattered short cornuti; distally tubular, slightly curved ventrad; in the medial section bears a giant, prominent, elongate area of dense strong spines, of which the longest in the median section; ventral surface with a short area of scattered short cornuti subterminally-terminally.

Female genitalia. (Fig. 38). Papillae anales setose, broad; apophyses posteriores and anteriores thin, long, about the same length. Ostium oval, antrum funnel-like with strongly sclerotized broad plate in the wall; ductus bursae tubular, with strongly sclerotised assymetric U-shaped, longitudinally wrinkled bar in its wall, continuing into the prominent, wrinkled appendix bursae. Corpus bursae large, saccate, without signum.

Biology and distribution. The populations of the new subspecies occur in the mountains of the province Fars, where locally not rare. The nominotypical subspecies is distributed in the Alborz range and in the NW Zagros in the province Kordestan.

Etymology. *Bryomima dilutior meridionalis* **ssp. n.** is named from the southern distribution.

***Bryomima aviscaput* sp. n**. (Figs 16, 31)

Holotype: male (Fig. 16), Pakistan, NWFP S. Waziristan agency, near Tanai vill., 28. VII.-12. VIII. 2005, 1500-2500 m, leg. V. Gurko, GYP 5644 (coll. PGM).

Diagnosis. *B. aviscaput* **sp. n.** (Fig. 16) belongs to *B. carducha* lineage and differs from all the close relative taxa by the pale ochre ground colour of forewings with dense pale brown scales, the very arcuate postmedian crossline, the strongly tapering middle area near the claviform stigma and the conspicuous, oblique, almost straight median line in the hindwings. It strictly differs from *B. luteosordida – B. hakkariensis* (Fig. 23) species pair in its smaller size, much less weaker body, wing colouration and pattern. Last but not least, it is dissimilar to the taxa of the *B. eudiopsis* species group. In the male genitalia (Fig. 31), the best distinguishing features from all the taxa of the genus are the smaller, bird's- head shape of the terminal part of the valvae with the acute subapical process and the large, globular frontal diverticulum in the vesica with a unique configuration of the small cornuti. Furthermore, the new species almost lacks the small subbasal diverticulum, and bears a giant, prominent, assymmetric, elongate extension of the vesica, densely and evenly covered with strong spines. Additionally, *B. aviscaput* **sp. n.** subterminally-terminally bears short area of scattered tiny granules instead of the small cornuti; only in this feature does it show a relationship to *B. striata* Ronkay, Ronkay, Gyulai & Hacker, 2010 and *B. avajensis* **sp. n.**.

Description (Fig. 16). Forewing length 12 mm, wingspan 23 mm. Eyes globular, black; antennae light ochre, filiform, without cilia. Palpi tiny, covered with pale ochreous scales, the tip with some black scales. Vesture of head, thorax, abdomen and legs pale ochreous, only the tarsi of the legs broadly brown interrupted with pale yellowish sections. Forewings elongate triangular, apex pointed, subapically with a slight, short blackish line. Ground colour of the forewings and cilia is pale ochreous, densely scattered with fine light brown scales; the medial area the darkest. Orbicular and reniform stigmata small, light yellowish, diffuse, lighter than the ground colour, with some brown scales in the middle; claviform stigmata obscure. Basal, antemedian and median transverse lines fine, pale brown; basal line oblique, antemedian line semicircular-wavy, postmedian line strongly arched, with fine lace-like serrations; subterminal line with a row of slight, diffuse pale brown wedge-like spots. Hindwings pale ochreous, lightest in the basal area, but more and more brown suffused in the broad marginal area; discal spot absent, median line brown, oblique, almost straight; cilia pale ochreous. The underside of wings pale ochreous, most conspicuous is the almost evenly broad, brown marginal area of the hindwings.

Male genitalia (Fig. 31). Uncus long, narrow, apically pointed, slightly hooked; juxta broadly shield-shaped with wide dorsal medial depression and two symmetrical, apically pointed extensions; vinculum V-shaped; valvae elongate, both the dorsal and ventral costa medially expanded, cucullus section terminally bird's-head shaped with an acute subapical process; harpe regressed. Aedeagus tubular hardly curved. Vesica basally-subbasally spacious, distally tubular, slightly curved ventrad; the large, globular frontal diverticulum with a unique configuration of the scattered small cornuti, the subbasal diverticulum tiny; the giant, prominent, asymmetric, elongate extension in the medial section of the vesica densely and evenly covered with strong spines; ventral surface subterminally-terminally with a short area of scattered tiny granules.

Female genitalia. Unknown.

Biology and distribution. The population of *B. aviscaput* **sp. n.** seems to be extremely isolated in Waziristan.

Etymology. *B. aviscaput* **sp. n**. is named from the resemblence of the terminal part of the valvae with the acute subapical process to a bird's-head.

***Bryomima avajensis* sp. n**. (Figs 24, 34)

Holotype: male (Fig. 24), Iran, Prov. Hamadan, 5 km SW of Avadj pass, to Razan, 2500 m, 1-2. VI. 2005, leg. P. Gyulai & A. Garai, GYP 1769; (coll. PGM).

Diagnosis. *Bryomima avajensis* **sp. n.** (Fig. 24) externally resembles mostly *B. hakkariensis* (Fig. 23), from which it is much smaller, the body is less robust and the ground colour of the wings rather greyish. It differs from all the further relative taxa in the brownish-grey ground colour of the wings and that it does not show any similar features to the taxa of *B. eudiopsis* species group. In the male genitalia (Fig. 34), the best distinguishing feature from most of the taxa of the genus is the distally convex dorsal costa of the valvae. Additionally, from the *B. luteosordida* and *B. hakkariensis* species pair, it has smaller genitalia with much smaller, bird'-head shaped terminal part of the valvae with a much shorter, acute subapical process; larger, lobe-like diverticulum in the basal part of the vesica and the uninterrupted cornuti area in the new species. From the taxa of the *carducha* line, it can be separated by the convex distal dorsal costa of the valvae, larger, lobe-like diverticulum in the basal part of the vesica and the giant, prominent, asymmetric, elongate extension of the vesica, densely and evenly covered with strong spines, which do not shorten towards the terminal section.

Description (Fig. 24). Forewing length 12 mm, wingspan 23 mm. The single specimen is not a fresh one, slightly worn, but the wing pattern visible. Eyes globular, black; antennae black, filiform, without cilia. Palpi tiny, covered with black and white scales, the tip also. Vesture of head, thorax, abdomen and legs blackish and whitish or blackish with white tip. Ground colour of the forewings and cilia brownish grey, the medial area the darkest. Orbicular and reniform stigmata small, whitish, with a black dot in the middle of the orbicular spot and a greyish curved sign in the reniform stigma; claviform stigma obscure. Transverse lines fine, brownish-grey; antemedian line arched, postmedian line strongly arcuated, with fine lace-like serrations, with a slight outer lighter shading. Hindwings brownish-grey, lightest in the basal and median area, but a more evenly suffused brown in the broad marginal area; discal spot absent, Underside of wings concolourous light brownish grey, somewhat worn, almost patternless, with only the obscure ghost of the crosslines visible on the forewings.

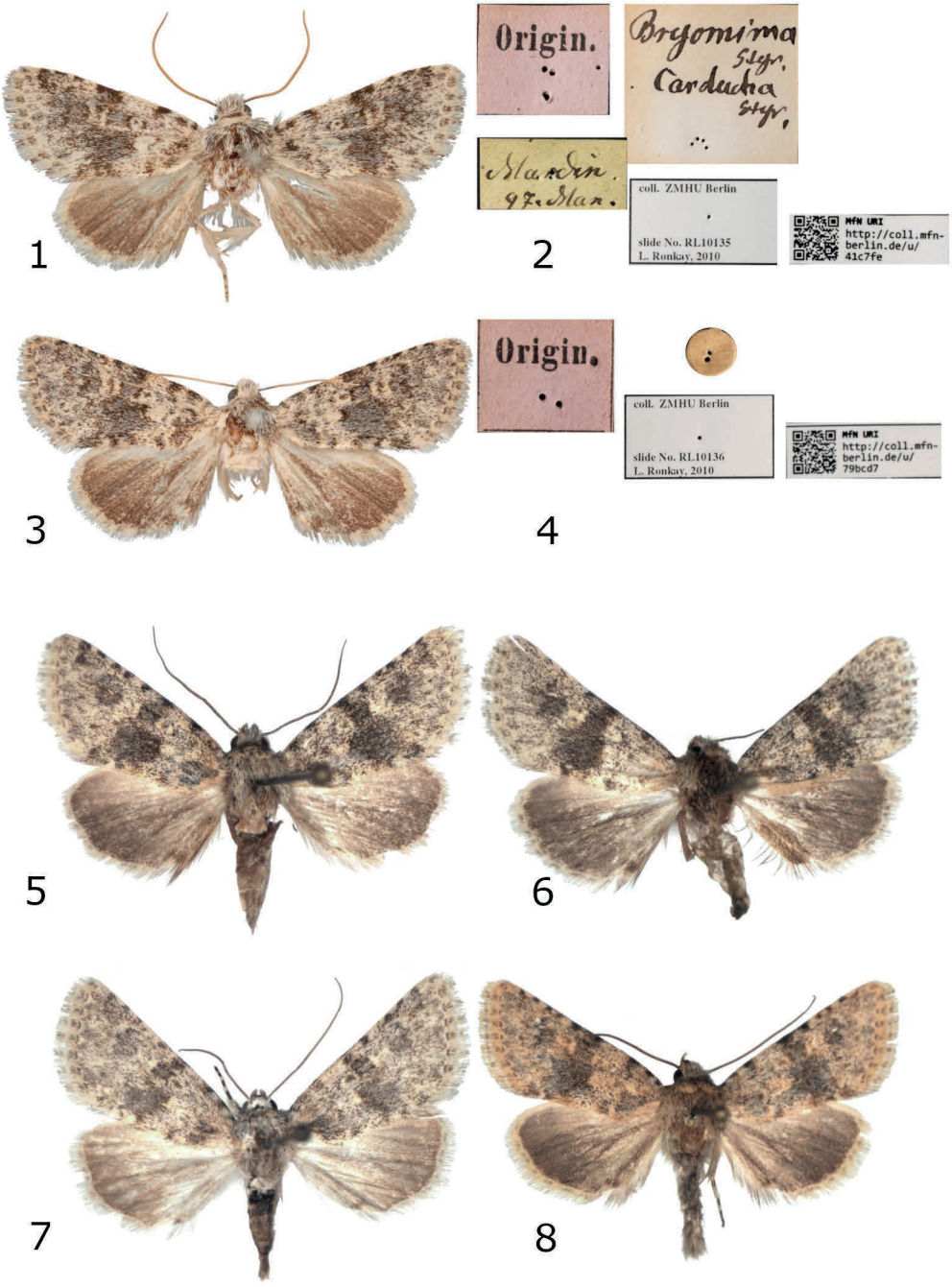
Male genitalia (Fig. 34). Uncus medium long, thin, apically pointed; juxta broadly shield-shaped with wide dorsal medial depression and two symmetrical, apically pointed extensions; vinculum V-shaped, valvae elongate, the dorsal costa distally convex, the ventral one only medially expanded, cucullus section terminally bird's-head shaped with an acute long subapical process; harpe regressed. Aedeagus tubular, strongly curved ventrad. Vesica spacious, basally with a large, lobe-like diverticulum, with a dense field of numerous scattered, short and medium long cornuti; medially a small diverticulum without cornuti. The distal section broadly tubular, slightly curved ventrad; the medial section bears a giant, prominent, assymmetric, elongate dorsal extension, densely and evenly covered with an area of strong spines, continuing to narrow steadily until the terminal section; ventral surface in the ventral subterminal-terminal section with a weak area of dense but small granules.

Female genitalia. Unknown.

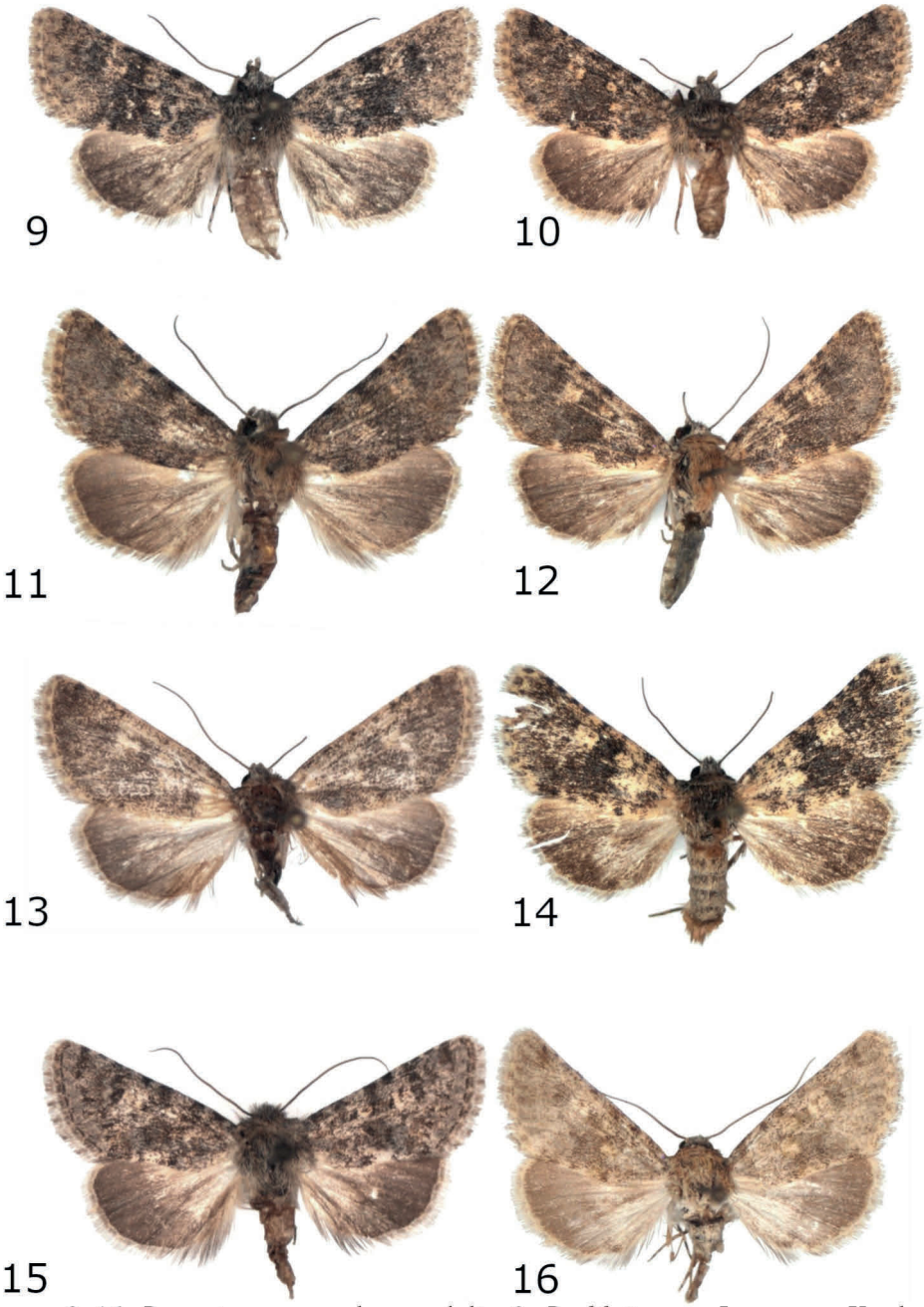
Biology and distribution. The population of *B. avajensis* **sp. n.** seems to be extremely isolated in the Iranian province Hamadan.

Etymology. *B. avajensis* **sp. n**. is named from the Avaj pass, from where it was collected.

Acknowledgements. The author is grateful to his wife Adrienne Gyulai-Garai (Miskolc, Hungary) for greatly helping with the computer work and during our expeditions in Asia; to Asghar Shirvani (Kerman, Iran) for *Bryomima* spp. photos from the province Kerman; to Sabine Gaal (Naturhistorisches Museum, Wien, Austria) for the photo of *B. carducha* and *B. rosea*; to Théo Léger and Viola Richter (Museum für Naturkunde Berlin, Germany) for the type photo documentation of *Bryomima carducha*; to Tobias Malm (Naturhistoriska Riksmuseet, Stockholm, Sveden) *B. rosea* type photo documentation; to Zsolt Bálint and Balázs Tóth (Hungarian Natural History Museum, Budapest, Hungary) for photo documentation of *B. carducha* and *B. rosea*; and last but not least, to Imre Fazekas (Pannon Institute, Pécs, Hungary) for the publication of the manuscript, to Alec Harmer (Great Britain) for linguistic corrections and for the reviewers.



Figures 1–8. *Bryomima* spp. and ssp. adults. 1-2. *B. carducha*, m, Cotype, Turkey, Mardin, coll. MFN Berlin, RL 10135; 3-4. *B. carducha*, f, Cotype, Turkey, Mardin, coll. MFN Berlin, RL 10136; 5. *B. carducha persicola* **ssp. n.**, HT, m, Iran, prov. Boyerahmad-va-Kohgiluyeh, GYP 5672; 6. *B. carducha persicola* **ssp. n.**, PT, f, Iran, prov. Fars, GYP 5661; 7. *B. carducha persicola* **ssp. n.**, PT, m, Iran, prov. Fars; 8. *B. carducha persicola* **ssp. n.**, PT, m, Iran, prov. Fars.



Figures 9–16. *Bryomima* spp. and ssp. adults. 9. *B. dilutior*, m, Iran, prov. Kordestan, Askaran, GYP 5668; 10. *B. dilutior*, f, Iran, prov. Kordestan, Askaran, GYP 5670; 11. *B. dilutior meridionalis* **ssp. n.**, HT, m, Iran, prov. Fars, Sivand, GYP 1853; 12. *B. dilutior meridionalis* **ssp. n.**, PT, f, Iran, prov. Fars, Sivand, GYP 5659; 13. *B. ?* sp. n., m, Iran, prov. Boyerahmad, Dena, GYP 5648; 14. *B. defreina*, m, Turkey, prov. Van; 15. *Bryomima vartianorum* PT, m, Iran, prov. Hormozgan, Gouzam, GYP 1855; 16. *B. aviscaput* **sp. n**., HT, m, Pakistan, S. Waziristan, Tanai, GYP 5644.

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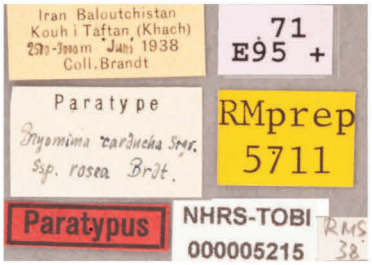

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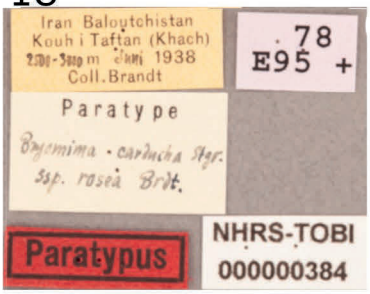

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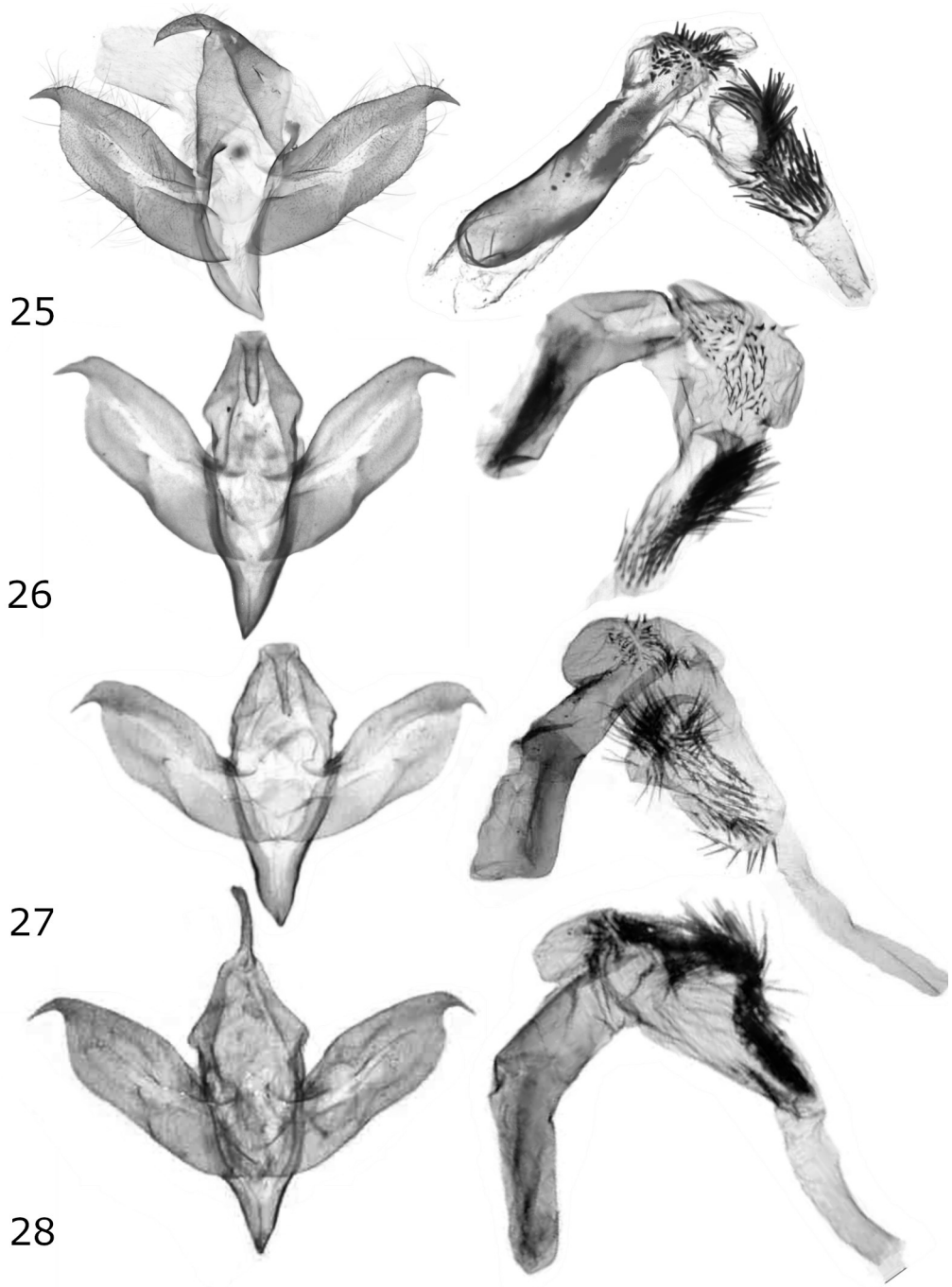
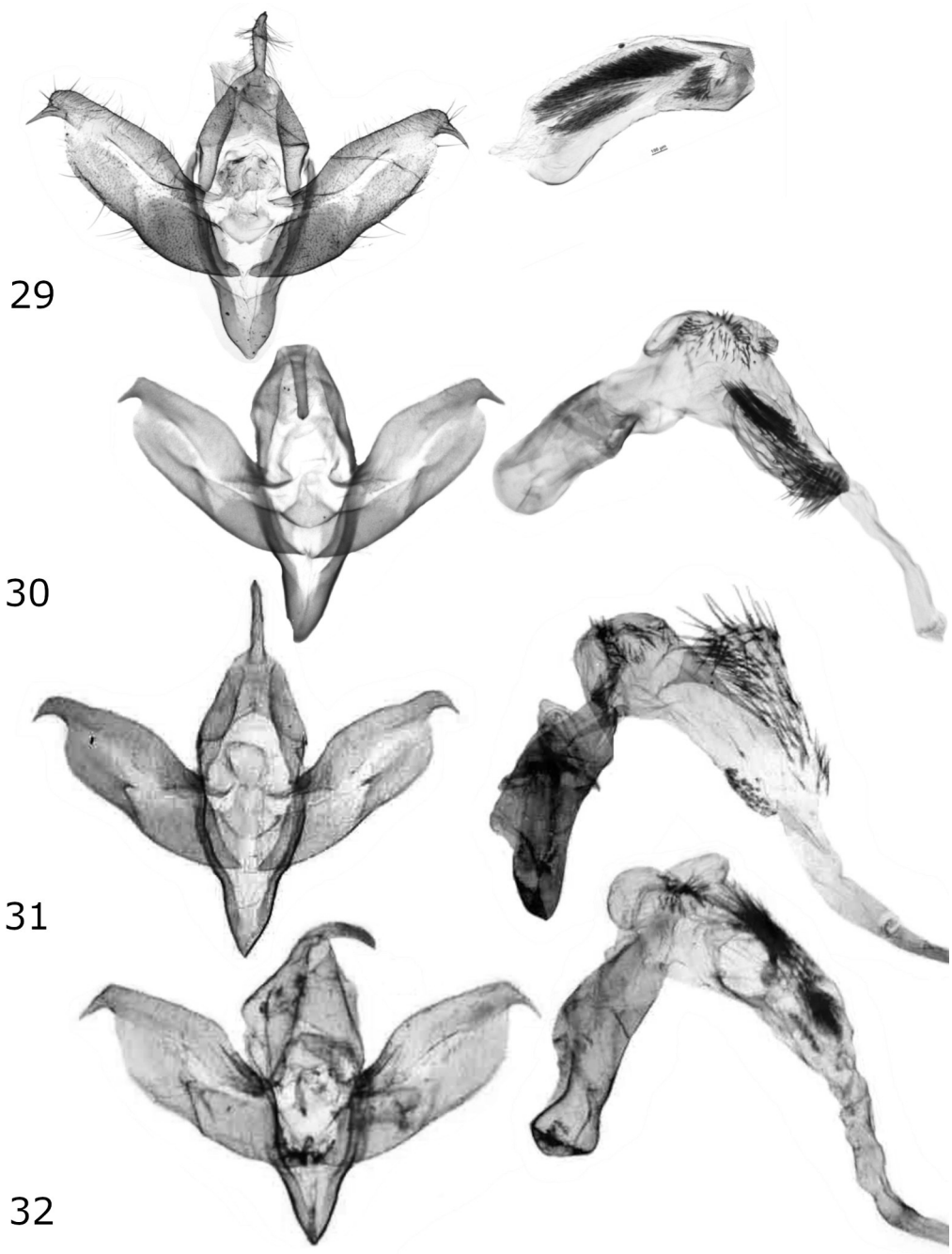
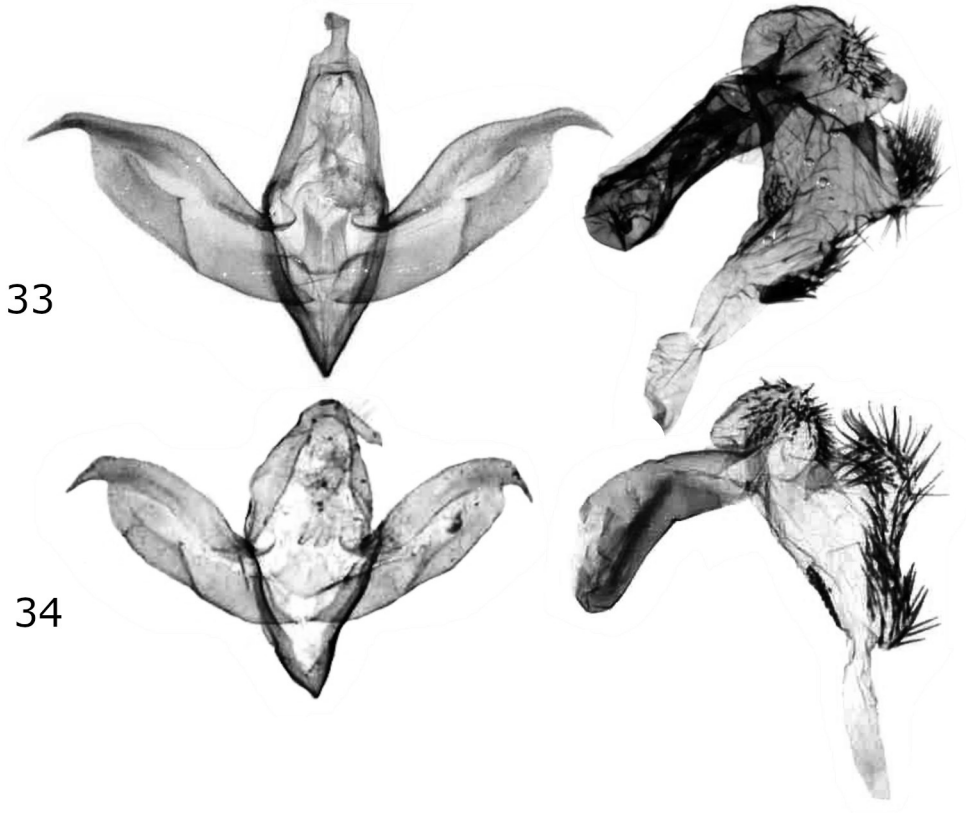
Figures 17–24. *Bryomima* spp. and ssp. adults. 17–18. *B. rosea*, PT, m, Iran, Baloutschistan, Kouh-i-Taftan, RM 5711; 19–20. *B. rosea*, PT, f, Iran, Baloutschistan, Kouh-i-Taftan; 21. *B.rosea*, m, Iran, Prov. Hamadan, GYP 5702; 22. *B. rosea*, f, Iran, Prov. Hamadan, GYP 5660; 23. *B. hakkariensis*, m, Iran, prov. Mazandaran, Mazandaran pass; 24. *B. avajensis* **sp. n.**, HT, m, Iran, Prov. Hamadan, 5 km SW of Avadj pass, GYP 1769



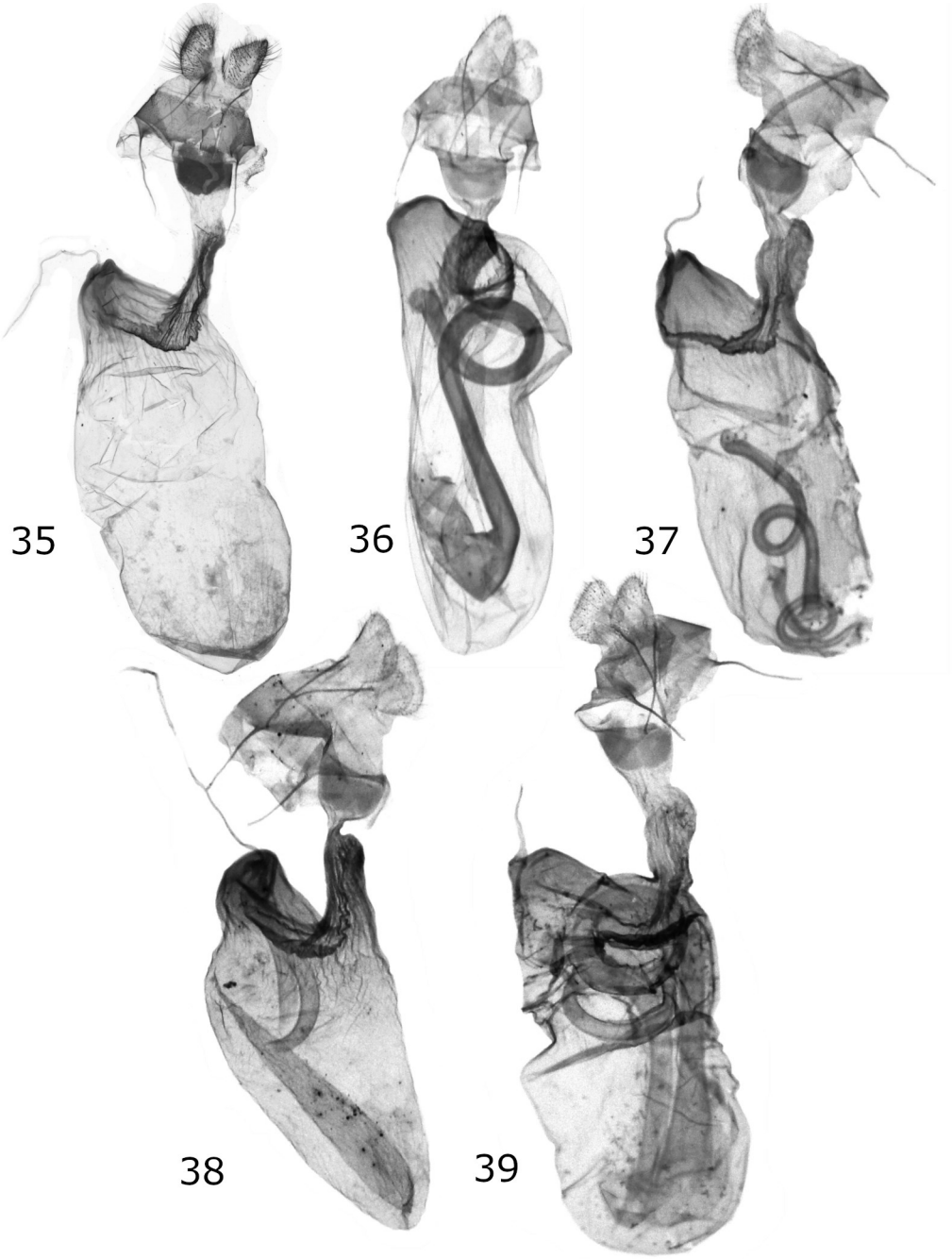
Figures 25–28. *Bryomima* spp. and ssp. male genitalia. 25. *B. carducha*, Cotype, Turkey, Mardin, coll. MFN Berlin, RL 10135; 26. *B. carducha persicola* **ssp. n.**, HT, Iran, prov. Boyerahmad-va-Kohgiluyeh, GYP 5672; 27. *B. dilutior*, Iran, prov. Kordestan, Askaran, GYP 5668; 28. *B. dilutior meridionalis* **ssp. n.**, HT, m, Iran, prov. Fars, Sivand, GYP 1853.



Figures 29–32. *Bryomima* spp. and ssp. male genitalia. 29. *B. rosea*, PT, Iran, Baloutschistan, Kouh-i-Taftan, RM 5711; 30. *B. rosea*, Iran, Hamadan, Avaj, GYP 5702; 31. *B. aviscaput* **sp. n.**, HT, Pakistan, Waziristan, Tanai, GYP 5644; 32. *B. vartianorum*, PT, Iran, prov. Hormozgan, Gouzam, GYP 1855.



Figures 33–34. *Bryomima* spp. male genitalia. 33. *B. hakkariensis*, Iran, prov. Mazandaran, Mazandaran pass; 34. *B. avajensis* **sp. n.**, HT, Iran, Prov. Hamadan, 5 km SW of Avadj pass, GYP 1769



Figures 35–39. Bryomima spp. and ssp. female genitalia. 35. *B. carducha*, Cotype, Turkey, Mardin, coll. MFN Berlin, RL 10136; 36. *B. carducha persicola* **ssp. n.**, PT, Iran, Fars, Sepidan, GYP 5661; 37. *B. dilutior*, Iran, Kordestan, GYP 5670; 38. *B.dilutior meridionalis* **ssp. n.**, PT, Iran, Fars, Sivand, GYP 5659; 39. *B. rosea*, Iran, prov. Hamadan, GYP 5660.

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DOI: https://doi.org/10.24386/LepHung.2022.18.1.143 HU ISSN 2732-3854 (print)| HU ISSN 2732-3498 (online)

Lepidopterologica Hungarica 18(1): 143–152. | https://epa.oszk.hu/04100/04144

Received 03.01.2022 | Accepted 14.05.2022 | Published: 18.05.2022 (online) | 26.06.2022 (print)
LSID urn: lsid: zoobank.org:pub:C0D00DD2-88B0-478E-95FF-B126F3640C86

Description of the new genus *Burmahabitans* and three Apameini species, *Photedes macroductus* sp. n, *Sesamia waziristana* sp. n. and *Burmahabitans chinsilvicola* sp. n. (Lepidoptera, Noctuidae)

Péter Gyulai

Citation. Gyulai P. 2022: Description of the new genus *Burmahabitans* and three Apameini species, *Photedes macroductus* sp. n., *Sesamia waziristana* sp. n. and *Burmahabitans chinsilvicola* sp. n. (Lepidoptera, Noctuidae). – Lepidopterologica Hungarica 18(1): 143–152.

Abstract. A diagnosis and description of the new genus *Burmahabitans* is given, and three species of Apameini, *Photedes macroductus* sp. n., *Sesamia waziristana* sp. n. and *Burmahabitan schinsilvicola* sp. n. are presented and illustrated with 10 colour images and 10 genitalia figures.

Keywords. Apameini, Noctuidae, Asia, descriptions.

Author's address. Péter Gyulai | H-3530 Miskolc, Mélyvölgy 13/A | Hungary
E-mail: adriennegyulai@gmail.com

Introduction

The article "New Apameini species from Asia (Lepidoptera, Noctuidae)" by the author P. Gyulai, was published in the International Journal of Zoology and Animal Biology (MEDWIN PUBLISHERS ISSN: 2639-216X, DOI: 10.23880/izab-16000248) on 2. November 2020. However, the article was published only online, and author could not find a hard copy anywhere. The publisher only refers to an E-Book, which means they have only electronic books. So far only 6 grades have been published. The choice of topic is very heterogeneous, there are no new species descriptions in it. Furthermore, both the colour and the genitalia figures are very small. The "References" section does not follow the alphabetical order of the original manuscript and the useful scientific articles. Finally, the individual references have been renumbered in the order in which they appear in the text.

To clarify things related to ZooBank registration, the author turned to the ZooBank administration for advice after writing down the history and concerns about the things outlined above in relation to the 2020 article. Following their advice on the new title of the article ("There is no requirement either way in the Code for this – you can call it a description or a redescription" and "Best to explicitly indicate "sp. n."), in this publication the names of the new taxa are exactly the same as the previous ones, but they have been re-described as sp. n. Since there are no nomenclatural acts (new names, lectotypifications, neotype designations, first reviser actions, etc.), the ZooBank administrator suggested to include a sentence in the paper that says.

This work has been registered in ZooBank as urn:lsid:zoobank.org:pub:3CFDD9D0-5B00 -440E-893E-34F0F10BE43A."

The most recent comprehensive studies and revisions of the tribe *Apameini* were provided by Zilli *et al.* (2005 and 2009), with a detailed characterization of the species and their genitalia, with colour images and genitalia figures. Following researches in Asia during the last twenty years, the occurrence of further species was suspected, and this has been confirmed by genitalia studies.

Arenostola Hampson, 1908, *Longalatedes* Beck, 1992 and *Photedes* Lederer, 1857, which probably form a genus-group, *teste* Zilli, Ronkay & Fibiger, 2005, are closely related genera of *Apameini*. The species placed in these genera, some of which have many synonyms, are rather small, with similar external features and some shared features in both male and female genitalia. Hence, the exact taxonomic position of some of the species is uncertain and other authors have assigned them to different genera. The male of the species described below is still unknown, and here it is placed provisionally in *Photedes*, based on some of the features of the female genitalia.

Sesamia Guenée, 1852 is a thermophilic and diversified genus found worldwide, apart from the arctic and cool areas. Most of the species are inhabitants of tropical and subtropical regions, some are well-known stem-boring agricultural pests. The taxonomic position of the genus is a subject of discussion, and it has been associated to different tribes of *Noctuidae* by sundry authors and the Internet. Here, the views of Fibiger and Goldstein (2005) are accepted, wherein a new subtribe, *Sesamiina*, was erected within the tribe *Apameini* to include *Sesamia* and some closely related genera, mostly African and south-eastern Asian.

Abbreviations for personal and institutional collections used herein include: HNHM = Hungarian Natural History Museum (Budapest, Hungary); PGM = collection of Péter Gyulai (Miskolc, Hungary); GYP = genitalia slide of P. Gyulai; MF = genitalia slide of Michael Fibiger; VZ = genitalia slide of Zoltán Varga.

Description of the taxa

Photedes macroductus sp. n. (Figs 1, 11)

Holotype. Female (Figs 1, 11), Iran, Prov. Esfahan, Zagros Mts., Fereidun Shar, 3000 m, 15-17.VI.2010, leg. B. Benedek & T. Hácz, slide no. GYP 3276 (coll. PGM, later to be deposited in HNHM).

Diagnosis. *Photedes macroductus* sp. n. (Fig. 1) resembles *Ph. improba* (Staudinger, 1900), to which it is closely related (Fig. 2). In comparison, it is more robust, with shorter and slightly broader, pale ochre forewings with fine reddish suffusion, with slight brown suffusion on the main veins and much darker brown hindwings; the forewings of *Ph. improba* are pale yellowish, without brown suffusion on the main veins and much lighter hindwings. In the female genitalia, the most striking difference is in the shape and sclerotization of the ductus bursae; it is asymmetrically enlarged, robust, sinuously ribbed and strongly sclerotized, and only the anterior third section tight, hardly sclerotized and longitudinally ribbed-wrinkled in *Ph. macroductus* (Fig. 11); whereas in *Ph. improba* (Fig. 12), the anterior section is large, bulbous, with tubular distal section, longitudinally slightly ribbed-sclerotized.

Ph. macroductus is significantly smaller than the two externally also similar, Eurasiatic species of *Arenostola.* Forewing length 12 mm, wingspan 24 mm, but 14–19 mm and 30–35 mm respectively in *A. phragmitidis* Hübner, (1803) (Fig. 3) and *A. unicolor* Warren, 1914 (Fig. 4). Another useful feature for superficial separation is the colour of the hindwing, which is much darker in *Ph. macroductus*, brown with pale beige fringes, and much lighter, pale ochre to pale beige in the *Arenostola* species. Underside of forewings darker in *Ph. macroductus* and veins well defined by brown suffusion, while in *Arenostola* species it is the same colour as the upper side, sometimes with a very slight pale ochre suffusion on the veins. In the female genitalia, the main differences are in the shape and sclerotization of ductus bursae and appendix bursae: *Ph. macroductus* (Fig. 12) differs from those of the two similar *Arenostola* species (Figs 13, 14), in asymmetrically enlarged, sinuously ribbed ductus bursae and membranous appendix bursae;

in the two congeners, the ductus bursae is almost evenly broad, longitudinally ribbed sclerotized, appendix bursae strongly sclerotized and ribbed, with a broad sclerotized rod between the inner side of the papillae anales.

Description (Fig. 1). Forewing length 12 mm, wingspan 24 mm. Eyes globular, black; antennae light ochre, filiform; palpi covered with beige scales, third segment only whitish ciliated, apex pointed. Head, thorax, abdomen vesture and legs beige. Forewings triangular, apex pointed; ground colour including fringe pale ochre with fine reddish suffusion; stigmata and transverse lines absent, the main veins somewhat defined by fine brown suffusion. Hindwings brown with pale beige fringes. Underside of the forewings similar to the upperside, but middle area slightly brown suffused and veins clearly defined by slight brown suffusion.

Female genitalia (Fig. 11). Characterized by the long, conical ovipositor, the presence of a long, scythe-like sclerotized rod in the inner side of the papillae anales and a small, dark claw-like shape inside them; apophyses anteriores and posteriores long, the latter longer. Ostium bursae displaced, antrum shallow*;* ductus bursae asymmetrically enlarged, robust, sinuously ribbed-wrinkled and strongly sclerotized, anterior third section tight, hardly sclerotized, and longitudinally slightly ribbed-wrinkled; appendix bursae and corpus bursae membranous.

Male. Unknown.

Bionomics and distribution. *Ph. macroductus* is known only from the type locality in western Iran, and the close relative *Ph. improba* is a local central Asian species. The somewhat similar Anatolian-Central Asian *A. unicolor* occurs only in the northern part of Iran.

Etymology. *Ph. macroductus* is named from the robust ductus bursae.

Sesamia waziristana sp. n. (Figs 5, 17)

Holotype. Male (Figs 5, 17), Pakistan, NWFP S. Waziristan agency, near Tanai vill., 28.VII–12.VIII.2005, 1500–2500 m, leg. V. Gurko, slide no. GYP 5246m (coll. PGM, later to be deposited in HNHM).

Diagnosis. *Sesamia waziristana* sp. n. (Fig. 5), is one of the smallest species of the genus. The most similar and closest relative of *S. waziristana* is *S. rungsi* Boursin, 1957 (Fig. 6), in Afghanistan. The only known specimen of this species is practically the same size as those of *S. rungsi*; forewing length 10 mm as opposed to 10–11mm. The best feature for separation is the ground colour of the wings; which are much lighter in *S. waziristana*, pale beige in the forewings, but slightly darker, light brown in the hindwings; in *S. rungsi* they are unicolorous brown. In the male genitalia, the main differences are in the valva and the configuration of the cornuti the aedeagus. *S. waziristana* (Fig. 17) has much more elongate distal section of valvae, slightly longer uncus, much lower juxta with larger dorsal-medial prominence, narrower costal extension of valvae, with tip more bifurcate than in *S. rungsi* (Fig. 18). In *S. waziristana*, aedeagus with two large flap-like appendages with numerous small cornuti; in *S. rungsi* there are two large and two smaller flap-like appendages with numerous small cornuti, like a semi-belt on the aedeagus.

It is worth mentioning that another Central Asian species, *Sesamia christophi* Hacker, 1998, from Turkmenistan, Kyrgyzstan, and Tajikistan (Figs 7,8) is also rather similar, but confusion is impossible, since this is conspicuously larger (forewing length 13–14 mm) than *S. waziristana* and wings are brown with slight red-brown suffusion on the forewings. The male genitalia (Fig. 19) are also strikingly different from those of *S. waziristana* (Fig.17), in the much longer distal section and longer, but not bifurcate costal extension of valvae, the lack of the flap-like cornuted appendages of the aedeagus and the presence of a single large cornutus in the basal part of the vesica.

The locality of *S. waziristana* is rather far from those of the two related species, and sympatric occurrence is very unlikely.

Description (Fig. 5). Forewing length 10 mm, wingspan 19 mm. Eyes globular, black; antennae light brown, with a white longitudinal line, slightly ciliated; palpi long, covered with pale ochre scales. Frons, collar, thorax vesture, under side of body and legs also covered with pale ochre or beige scales. Forewing triangular, apex rounded, ground colour pale beige; orbicular and claviform

stigmata absent, reniform stigma obscure; transverse lines absent, but postmedial line indicated by some fine brown dots; fringe pale ochre. Hindwing slightly darker, light brown without discal spot and medial line, fringe pale ochre.

Male genitalia (Fig. 17). characterized by the hooked uncus, broad tegumen, large, subtriangular juxta with dorsal-medial triangle prominence, U-shaped vinculum, distally tapering, terminally rounded valvae without corona but with a conspicuous, large, strongly sclerotized costal extension, tip bifurcate. Aedeagus short but strong, dorsally broaden toward the vesica, bearing two large flap-like appendages with numerous small cornuti; vesica short, ample, with a broader and a thinner basal-subbasal slightly sclerotized area.

Female. Unknown.

Bionomics and distribution. *S. waziristana* is known from the type locality and occurs only in western Pakistan.

Etymology. *S. waziristana* is named from the type locality.

Burmahabitans gen. n.

Type species: *Burmahabitans chinsilvicola* sp. n., by present designation.

Diagnosis. This monotypic genus (Figs 9, 10) is a distinct evolutional line of *Apameini*. The main external diagnostic features, compared to the related genera *Arenostola* Hampson, 1908, *Longalatedes* Beck, 1992, *Photedes* Lederer, 1857 and *Sesamia* Guenée, 1852 (Figs 1–8) are as follows: vesture of body light rusty; forewings more elongate, with acute apex, ground colour light rusty with a conspicuous, wide, oblique, diffuse rufous fascia which extends from the subapex toward the dorsum. *B. chinsilvicola* has a slight resemblance to *Acrapex roseotincta* Hampson, 1910, (Fig. 7: 18) known from Sri Lanka, but the ground colour of forewing, the direction of the oblique fascia and the presence of some other elements of wing pattern do not match; the male and female genitalia are both conspicuously different. The male genitalia (Fig. 20), show more affinities to *Arenostola*, *Longalatedes* and *Photedes* (the genitalia of almost all the species were figured by Zilli *et al*., 2005); however, the cucullus section is not separated in this genus, as it is in the first two genera, or separated by a narrow neck of the distal section of valvae as in *Photedes*; the penicular lobes are less extended, and the presence of an elongate sclerotized costal streak of valvae is a good feature for separation from the other genera. A sclerotized costa of valvae and its extension is characteristic of *Sesamia* Guenée, 1852 (Figs 17, 19), but in *Burmahabitans*, it is slight and not extended to a bifurcate tip or a prominent, long, head-like extension as in *Sesamia*; in *Burmahabitans*, the juxta is uniquely large, broadly cup-shaped, ventrally with two small, triangular, sclerotized marks and dorsally with two symmetrical, heavily sclerotized wing-like appendages. The aedeagus is straight, longer than in *Sesamia*, but with shorter caecum, carina without spines, and lacking a strongly sclerotized belt of cornuti. The gear-like, strongly sclerotized appendage in the subbasal section of the vesica is also unique; and a diverticulum, present in *Arenostola*, *Longalatedes* and *Photedes* and in some species of *Sesamia*, is absent. In the female genitalia (Fig. 15), the rod-like bars between the ovipositor lobes are broad but are very narrow or absent in *Sesamia* (Fig. 16), and fused with sclerotized trapezoidal plates in *Arenostola*. The antrum is higher than in all *Longalatedes* and *Photedes*, medially slightly depressed, as opposed to that in *Sesamia,* but the ostium bursae is not displaced to the right as in *Arenostola* Hampson, 1908. The antrum plate is conjoined to the strongly sclerotized, triangular distal section of ductus bursae, which is similar to those of some of the African *Sesamia*, but very different from those of the other relatives; the ample, globular appendix bursae is not a feature of *Sesamia*, but is present in the other three related genera.

Description. Monotypic. For description, see below under *Burmahabitans chinsilvicola* (Figs 9, 10, 15, 20).

Burmahabitans chinsilvicola sp. n. (Figs 9, 10, 15, 20)

Holotype. Male (Fig. 9), Myanmar West, Chin state, ca. 4,5 km W Thaing Gnin village, N 23°11.877', E 93°47.964', 2090 m, 6.XI.2015, leg. Loeffler & Naumann, slide no. GYP 4584, (coll. PGM, later to be deposited in HNHM).

Paratype. Female, same data as holotype, slide no. GYP 4720 (coll. PGM).

Description (Figs 9, 10). *B. chinsilvicola* is a rather small species, forewing length 11–14 mm, wingspan 22–27 mm, the female slightly larger. Body slender, forewings elongate with acute apex. Eyes globular, black; antennae light ochre with white line in the upper side, finely setose-ciliate in male, filiform in female; palpi covered with pale ochre scales, third segment very tiny, brownish, pointed. Frons, collar, thorax and abdomen vesture and legs pale ochre. Ground colour of forewings and cilia light rusty-pale ochre, with an oblique, slightly blurred rufous fascia, which extends from subapex toward the dorsum, faintly tinged with ochreous along distal side; other features of wing pattern lacking, apart from a few brown dots in the male. Hindwings and cilia whitish. Underside of wings whitish, slightly tinged with pale ochreous, with slight brown suffusion in median area of forewings.

Male genitalia (Fig. 20) characterized by the long, thin, terminally evenly tapered uncus; tegumen broad; juxta large, broadly cup-shaped, ventrally with two small, triangular, sclerotized marks, dorsally with two symmetrical, heavily sclerotized, wing-like appendages with a deep, broad depression between them; vinculum V-shaped; valvae almost evenly broad with sclerotized, terminally subtriangular costa, sacculus elongate, harpe small, globular and slightly bifurcate at tip; cucullus densely covered with fine hairs but without corona. Aedeagus rather long, almost straight, tube-like; vesica ample, distally long, tube-like, with gear-like, strongly sclerotized appendage in the middle and a strongly sclerotized strong cornutus sub-terminally, on a long base.

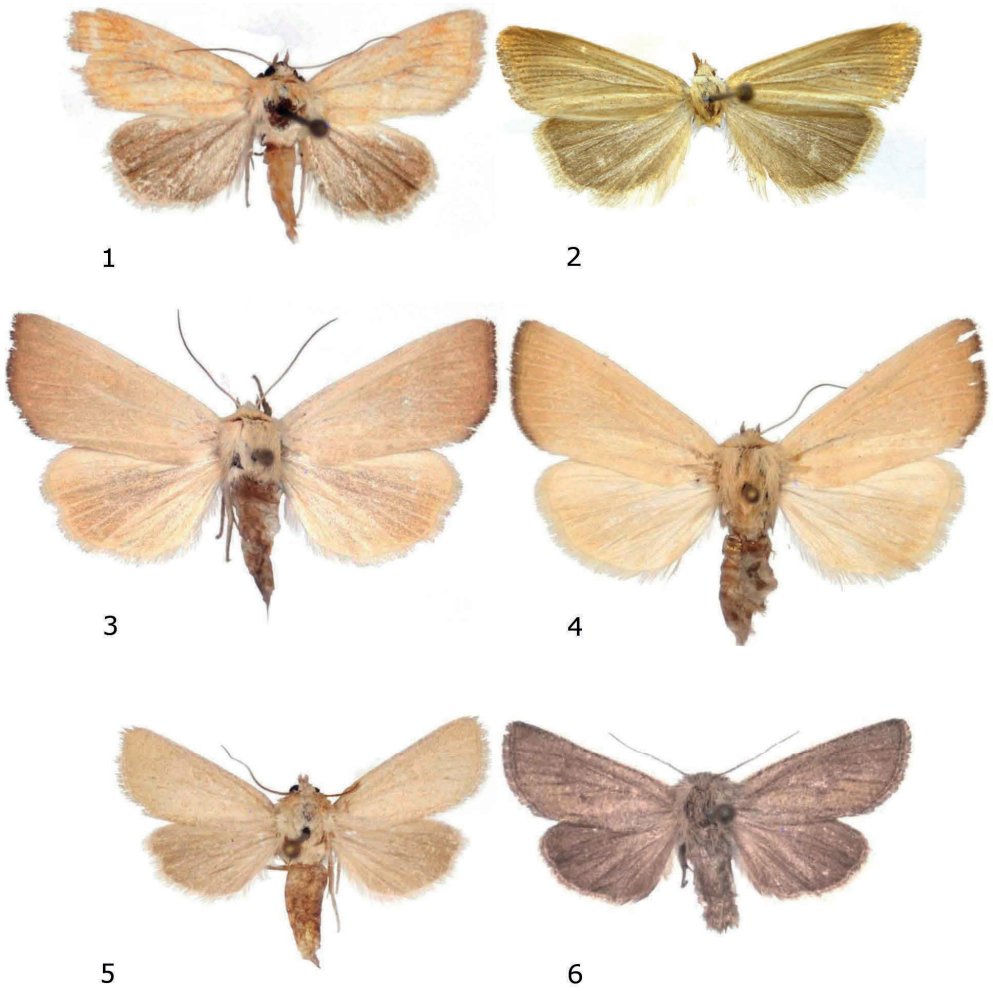
Female genitalia (Fig. 15). Ovipositor lobes strongly sclerotized, conical, long, with a darker claw-like construction inside and two rod-like parallel bars between them; apophyses anteriores and posteriores long, the latter the longer. Antrum broad, sclerotized; ostium bursae medially slightly depressed; antrum plate conjoined with the unevenly sclerotized, triangular distal section of ductus bursae; appendix bursae ample, globular, grainy; corpus bursae saccate, membranous.

Bionomics and distribution. This species is known from the type locality in Chin state, Myanmar (Burma).

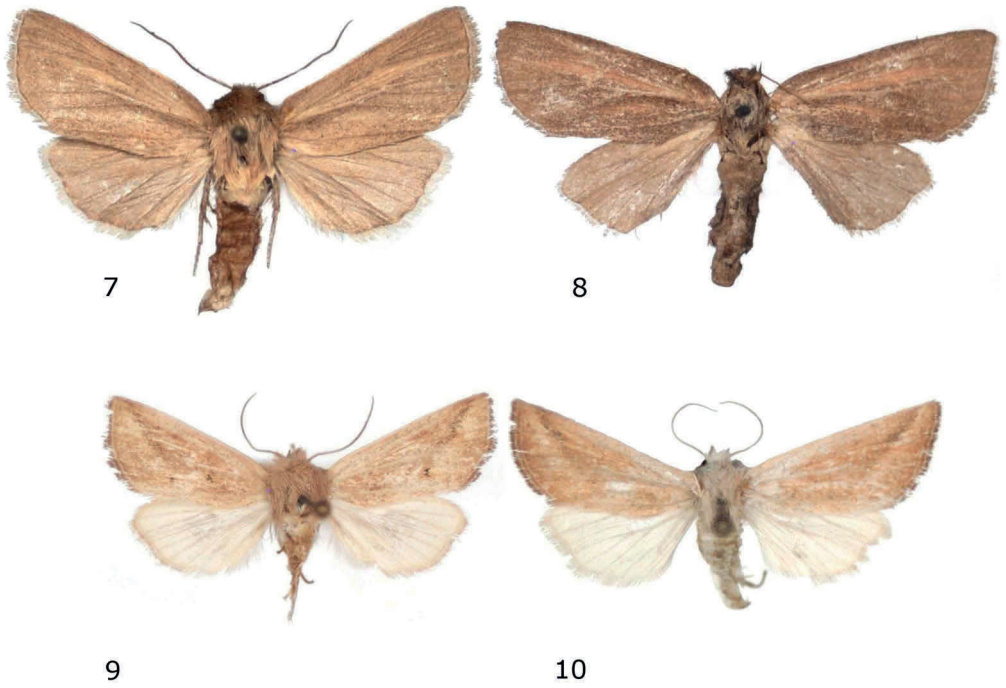
Etymology. *B. chinsilvicola* is named after the locality, in Burma, in Chin State Forest.

Acknowledgements

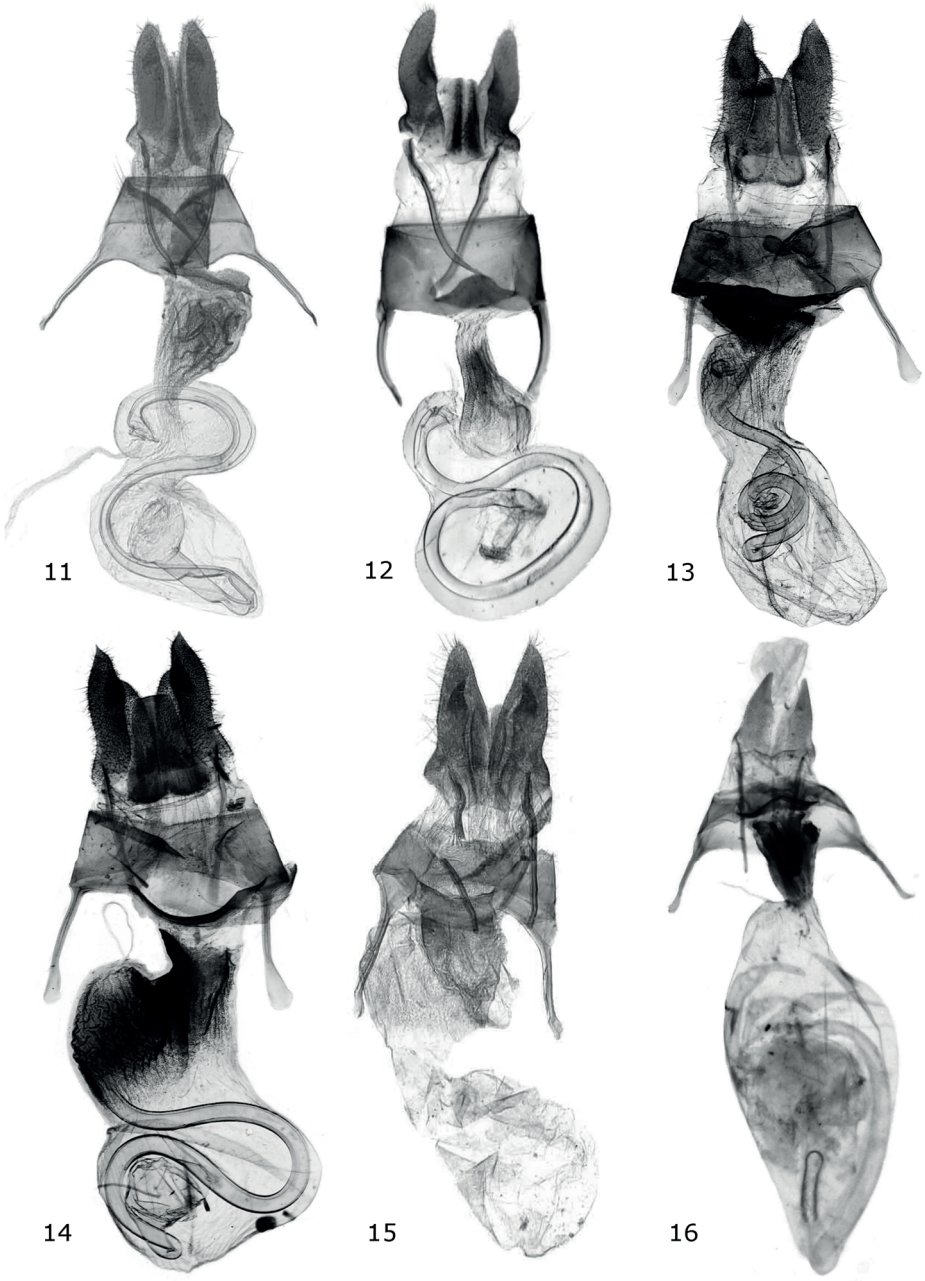
The author is grateful to Imre Fazekas (Pannon Institute, Pécs, Hungary) for the publication of the manuscript with the redescriptions; to Prof. Zoltán Varga (Zoological Institute of Debrecen University, Hungary) and László Ronkay (HNHM, Hungary) for consultation and scanning of some of the genitalia slides; to V. S. Kononenko (Laboratory of Entomology, Vladivostok, Russia) and Anton Volynkin (Altai State University, Barnaul and Tomsk State University, Institute of Biology, Tomsk, Russia) for *Photedes improba* genitalia slide photo; to Zsolt Bálint and Balázs Tóth (HNHM, Hungary) for the colour image of *Photedes improba*; to Balázs Benedek (Törökbálint, Hungary) for help getting type material; to Adrienne Gyulai–Garai (Miskolc, Hungary) for much help in the computer work; to Péter Kozma (Debrecen, Hungary) for scanning some of the genitalia slides; to Barry Goater (Hampshire, UK) for linguistic adjustments; and to the reviewers.



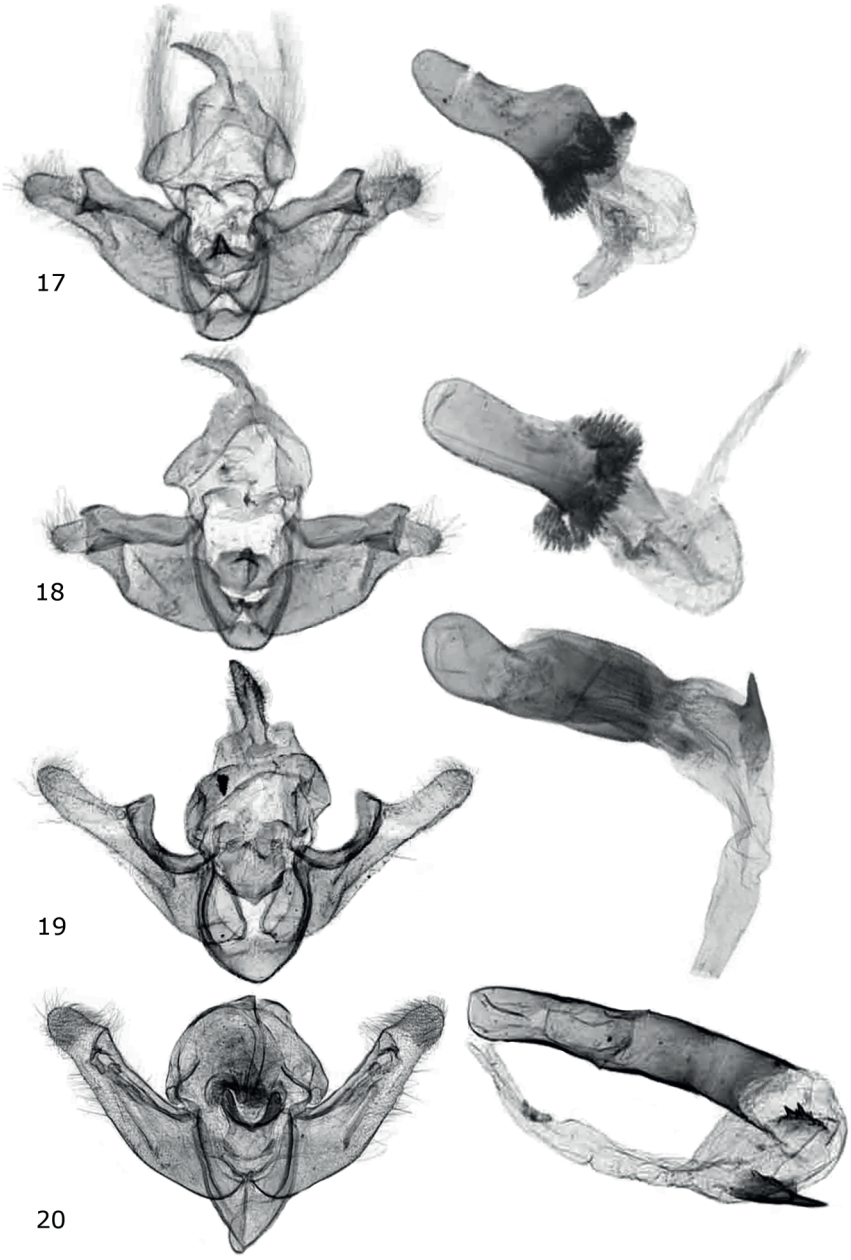
Figures 1–6. Adults. **1.** *Photedes macroductus* sp, n, Holotype, Iran, Prov. Esfahan, Zagros Mts., leg. B. Benedek & T. Hácz, female, GYP 3276 (PGM/HNHM); **2.** *Photedes improba* (Staudinger, 1900), Mongolia, Suchebaatar aimak, exp. Z. Kaszab, female, MF 5649 (HNHM); **3.** *Arenostola phragmitidis* Hübner, (1804), Hungary, Fertőboz, female, GYP 5315 (PGM); **4.** *Arenostola unicolor* Warren, 1914, Iran, Kordestan, female, GYP 5313 (PGM); **5.** *Sesamia waziristana* sp. n Holotype, Pakistan, NWFP S. Waziristan, leg. Gurko, male, GYP 5246 (PGM/ HNHM); **6.** *Sesamia rungsi* Boursin, 1957, Afghanistan, Sarobi, leg. Reshöft, male, GYP 5255 (PGM).



Figures 7–10. 7. *Sesamia christophi* Hacker, 1998, Kirgisia, Fergansky basin, leg. Lukhtanov, male, GYP3274 (PGM); **8.** *Sesamia christophi* Hacker, 1998, Tajikistan, Parchar, leg. Tshetkin, female, GYP5333 (PGM); **9.** *Burmahabitans chinsilvicola* sp. n., Holotype, Myanmar, Chin Forest, leg. Loeffler & Naumann, male, GYP 4584 (PGM/HNHM); **10.** *Burmahabitans chinsilvicola* sp. n., Paratype, Myanmar, Chin Forest, leg. Loeffler & Naumann, female, GYP 4720 (PGM).



Figures 11–16. Female genitalia. **11.** *Photedes macroductus* sp. n., Holotype, Iran, Prov. Esfahan, Zagros Mts., leg. B. Benedek & T. Hácz, GYP 3276 (PGM/HNHM); **12.** *Photedes improba* (Staudinger, 1900), Mongolia, Suchebaatar aimak, exp. Z. Kaszab, slide MF 5649 (HNHM); **13.** *Arenostola phragmitidis* Hübner, (1804), Hungary, Fertőboz, GYP 5315 (PGM); **14.** *Arenostola unicolor* Warren, 1914, Iran, Kordestan, GYP 5313 (PGM); **15.** *Burmahabitans chinsilvicola* sp. n, Paratype, Myanmar, Chin forest, GYP 4720 (PGM); **16.** *Sesamia christophi* Hacker, 1998, Tajikistan, Parchar, GYP5333 (PGM/).



Figures 17–20. Male genitalia. **17.** *Sesamia waziristana* sp. n. Holotype, Pakistan, NWFP S. Waziristan GYP 5246 (PGM/HNHM); **18.** *Sesamia rungsi* Boursin, 1957, Afghanistan, Sarobi, GYP 5255 (PGM); **19.** *Sesamia christophi* Hacker, 1998, Kirgisia, Fergansky basin, GYP3274 (PGM); **20.** *Burmahabitans chinsilvicola* sp. n., Holotype, Myanmar, Chin forest, GYP 4584 (PGM).

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