NAT. CROAT. | VOL. 29 | No 1 | 37-54 | ZAGREB | October 30, 2020

original scientific paper / izvorni znanstveni rad
DOI 10.20302/NC.2020.29.5

THE MOTH FAUNA (LEPIDOPTERA: HETEROCERA) OF MEDVEDNICA NATURE PARK, CROATIA

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Koren, T.: The moth fauna (Lepidoptera: Heterocera) of Medvednica Nature Park, Croatia. Nat. Croat., Vol. 29, No. 1, 37-54, Zagreb, 2020.

The paper gives the first overview of the moth fauna of Medvednica Nature Park, one that is based on the literature data and recent surveys carried out in the period from 2015 to 2019. The literature overview confirms the presence of 69 moth species recorded within the borders of the Nature Park. The survey recorded a total of 437 moth species in the area, 388 of them for the first time. In all, 455 species are now confirmed for Medvednica Nature Park. One Tortricidae species, *Phtheochroa annae*, is new for the fauna of Croatia. The area of Medvednica Nature Park can be now considered as one of the best explored Nature parks in Croatia, with the first checklist of its moth fauna. In most of the visited sites across Medvednica, habitat conditions are still favorable for the short-term survival of most species, but the overgrowing of meadows and forest edges, as well as intensive mowing of meadows, may dramatically worsen this situation during the next decades. Further moth surveys in this protected area would therefore be advisable.

Key words: Zagreb, diversity, distribution, conservation, protected area

Koren, T.: Fauna noćnih leptira (Lepidoptera: Heterocera) Parka prirode Medvednica. Nat. Croat., Vol. 29, No. 1, 37-54, Zagreb, 2020.

Prilog prikazuje prve rezultate istraživanja noćnih leptira Parka prirode Medvednica, temeljene na literaturnim podacima i recentnim istraživanjima provedenim između 2015. i 2019. godine. Pregledom literature potvrđena je prisutnost 69 vrsta zabilježenih unutar granica Parka prirode. U našim istraživanjima zabilježili smo 437 vrsta noćnih leptira, od kojih 388 prvi put na tom području. Ukupan broj vrsta noćnih leptira Parka prirode Medvednica sada sadrži 455 vrsta. Jedna vrsta iz porodice Tortricidae, *Phtheochroa annae*, nova je za faunu Hrvatske. Nakon ovog istraživanja noćnih leptira područje Parka prirode Medvednica može se smatrati jednim od najbolje istraženih zaštićenih područja u Hrvatskoj. Na većini posjećenih područja diljem Medvednice stanišni uvjeti povoljni su za kratkoročni opstanak većine vrsta, ali zarastanje livada i rubova šume, kao i intenzivna košnja vršnih livada, mogli bi u idućim desetljećima dramatično pogoršati ovu situaciju. Radi toga preporučujemo nastavak istraživanja noćnih leptira ovog vrijednog područja i u budućnosti.

Ključne riječi: Zagreb, raznolikost, rasprostranjenost, zaštita, zaštićeno područje

INTRODUCTION

Moths are one of the most prevalent terrestrial insects. They are also one of the most numerous groups of insects with more than 160,000 described species, but the total number of extant species is estimated to be around half a million (Kristensen *et al*., 2006). Moths perform essential ecosystem services such as pollination, decomposition, and nutrient cycling and provide prey for birds and other vertebrates (Schmidt & Ro-

land, 2009; Hahn & Brühl, 2016). In this respect, the knowledge about moth diversity and abundance is especially beneficial for protected or Natura 2000 areas.

In Croatia, protected areas of different kinds cover 7.95 % of the territory. Among them, there are 11 Nature Parks. Of these, published results about the moth fauna exist only for Kopački Rit Nature Park where 201 species of mostly Macrolepidoptera have been recorded (Vignjević *et al*., 2010). For other nature parks, only historical records exist, but without any checklists or overviews.

Medvednica Nature Park, in the vicinity of Zagreb has never been in the focus of systematic moth surveys. The first records of the moths of Medvednica are found in the work of Ljudevit Vukotinović, in which he presents the records of 42 species for Mt. Medvednica (gora Zagrebačka) (Vukotinović, 1879). Although valuable, his work today must be considered with caution, with the knowledge of Lepidopteran literature from that time. Just as with the list of butterflies he provided; his list of moths contains a large number of species that are certainly not present in the area of Medvednica. For example, the species *Scopula ternata* (*Acidalia fumata*) has not yet been recorded in the fauna of Croatia, and the species *Autophila cataphanes* and *Apopestes spectrum* are now present only in the Mediterranean coastal area of Croatia, far away from Medvednica Nature Park. For this reason, we did not take his work into account when compiling the list of moths of Medvednica Nature Park.

Further records from Medvednica are given by Grund (1916), who mentions only five species collected within the boundaries of the Nature Park. The most significant contribution to the moths of Medvednica was published by Mladinov (1958) in her review of the moth fauna of Zagreb, with 91 records of 54 different moth species that fall within the boundaries of Medvednica Nature Park. In a recent review of the collection of Vanda Kochansky - Devidé, there are four species of moths collected in the Medvednica area (Koren *et al*., 2018). In one of the papers of Lorkovic (1977) dedicated to moths, he mentions the species *Xanthorhoe biriviata* from the Pustodol area of Sljeme. Mladinov (1976) reports the findings of *Tetheella fluctuosa* and *Thyris fenestrella* from Mt. Medvednica. In an overview of the Noctuoidea species stored in the Lepidoptera collection of the Faculty of Forestry, Kučinić & Hrašovec (1999) report nine species collected on Mt. Medvednica. After that, only a single species is reported from the area, Matošević *et al*. (2009) mention the findings of *Argyresthia fundella*.

In this contribution we provide the results of a more systematic survey of the moth fauna of Medvednica Nature Park, with the complete data from the literature. Some guidelines for the long-term protection of the moth fauna are also discussed.

MATERIALS AND METHODS

Study area

The Medvednica mountain range is located on the northern edge of Zagreb, the capital of Croatia. It is approximately 42 kilometers long, extending in a southwest-northeast direction. Because Medvednica is located on the very edge of the capital, the anthropogenic influence on almost the entire area is very significant and visible. Medvednica is a favorite destination for hikers and nature lovers. This is especially reflected in the large number of roads, forest roads, and also lawns and meadows created by deforestation and subsequent mowing. Today, almost all of the mountain range belon-

gs to the Medvednica Nature Park (Medvednica NP), a protected area of 17,938 ha. The highest peak of the massif is Sljeme, 1,035 m a.s.l. The dominant habitat types within the park are forest, which covers 81% of the area, and the characteristics of forest communities vary with altitude and terrain exposure. In the lowlands, forests of oak and common hornbeam (*Epimedio-Carpinetum betuli*) are dominant. Most of the territory of Medvednica is covered with beech forests or mixed beech - fir forests. Less common are grassland (meadows, pastures), clearings, vineyards and orchards. In the area of the Medvednica Nature Park, at least 1205 plant taxa have been recorded (Dobrović *et al*., 2006). Unlike the flora, the fauna of Medvednica is largely unexplored, especially the invertebrate fauna.

Moth survey

Day flying moths were observed or caught with an entomological net during the day. Nightly active moths were attracted using standard Lepidoptera equipment. On most localities, up to six UV light tents were used. On average, four hours were spent on each locality on each date, depending on the season and climate conditions. In total, 16 localities were visited during this survey (Tab. 1, Fig. 1).

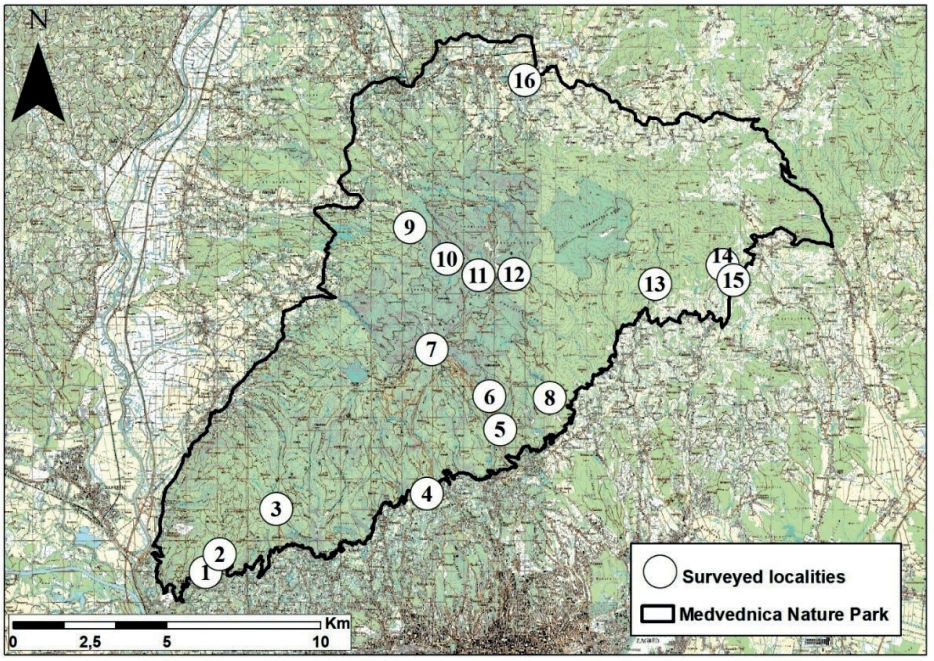

Fig. 1. Borders of Medvednica Nature park with surveyed localities. Numbers of localities correspond to the ones given in Tab. 1.

Where possible, species were identified in the field using standard identification keys. Only in cases where the identification was questionable were moths collected and identified in the lab using standard identification keys (e.g. Fibiger, 1997; Hausmann & Viidalepp, 2012; Macek *et al*., 2008, 2012; Nowacki, 1998; Slamka, 2006, 2008, 2013). Collected

specimens are stored in the private Koren Collection in Zagreb. The correct identification of many species was done by dissection of internal genital structures. Isolated genitals were afterwards stored in micro vials in glycerin, on the same pin as specimen. The nomenclature follows the online database Fauna Europaea (de Jong *et al*., 2014).

Tab. 1. Surveyed localities on Medvednica Nature Park.

	Locality	Dates of visit	WGS84 N	WGS84 E	Altitude
1.	Medvednica NP, Podsused, forest, banks of the stream	10.6.2019	45,833774	15,852638	353
2.	Medvednica NP, Bizek, overgrown quarry	22.3.2016, 18.4.2019, 3.9.2019	45,839028	15,858751	353
3.	Medvednica NP, Ponikve, moist meadows and forest edge	9.6.2019	45,852029	15,882501	371
4.	Medvednica NP, Medvedgrad, surroundings of the city	25.8.2019, 26.10.2019	45,856045	15,945654	717
5.	Medvednica NP, Adolfovac, near Bliznec stream, forest edge	5.9.2019	45,874489	15,976490	256
6.	Medvednica NP, Adolfovac, northern road, forest edge	5.9.2019	45,884115	15,972212	660
7.	Medvednica NP, Tomislavov dom, forest edge	15.8.2019	45,898068	15,948272	717
8.	Medvednica NP, Markuševec, overgrown quarry	1.9.2019	45,883459	15,997450	660
9.	Medvednica NP, Kraljev vrh, forest edge	14.6.2019, 10.8.2019, 11.8.2019, 5.9.2019, 4.10.2019	45,933783	15,939735	308
10.	Medvednica NP, Kraljev Vrh, overgrown quarry, forest edge	11.4.2016	45,924341	15,955074	308
11.	Medvednica NP, Sljeme, Rezani k., forest edge	4.9.2019	45,919504	15,968202	519
12.	Medvednica NP, Sljeme, Krčevina, forest edge	5.9.2019	45,919712	15,983323	519
13.	Medvednica NP, Jambrešić, Vidovec, forest edge	15.6.2019, 16.6.2019	45,916357	16,042220	307
14.	Medvednica, Vejalnica, forest edge, dry meadows	13.4.2016, 16.5.2016, 10.6.2016, 8.9.2016, 4.10.2017	45,921551	16,070460	458
15.	Medvednica NP, Vejalnica, southern part, forest edge, dry meadows	26.6.2015, 15.7.2019, 27.8.2019, 21.10.2019	45,917064	16,075008	458
16.	Medvednica NP, Stubički Golubovec, Golubovečki Ribnjaci, forest and wet meadows	26.4.2016, 22.7.2019	45,976283	15,988628	218

RESULTS

During this survey, we recorded a total of 437 species (Tab. 2), 388 of which are new to Medvednica Nature Park. The literature review revealed the presence of 69 species of moths in the Medvednica Nature Park area (Tab. 2). Together with the literature data, 455 moth species have been recorded in the area.

The highest proportion of recorded species belongs to the typical forest edge species that can be recorded on such marginal forest as well as disturbed habitats in high numbers (e.g. *Camptogramma bilineata*, *Campaea margaritaria*). Also, generalists like *Autographa gamma* and *Chiasmia clathrata* were very common in most localities in the nature park. Wet grassland species are only marginally present in some small areas of Medvednica Nature Park (e.g. *Idaea biselata*, *Deltote bankiana*). Several dry grassland moths have also been found, and of those *Gortyna flavago* and *Luperina dumerilii* can be regarded as local in northern Croatia. While *L. dumerilii* is very common in coastal areas of the country it has only occasionally been recorded in northern Croatia (Lorković, 1977).

One of the rarer Geometrid species encountered during this survey is *Stegania dilectaria*. This species is distributed in northern, middle and eastern Croatia (Mihoci, 2012). The last published specimens originating from Croatia were recorded around Varaždin in 1950 (Mihoci & Bregović, 2008).

The occurrence of *Thera vetustata* has only recently been confirmed in Croatia (Mihoci, 2012). One specimen of the usually mountain species was recorded on Medvednica. However, the record is not unusual as the species is widely distributed in the montane parts of Croatia (author, pers. obs.).

One Tortricidae species, *Phtheochroa annae* Huemer, 1990, was recorded in Croatia for the first time during this survey (Fig. 2). So far, only a single female specimen has been recorded, on Vejalnica Meadows. The correct species identification was confirmed by the analysis of the genital structures (Fig. 3) (see Hüemer, 1990). This Tortricidae species has been described relatively recently when a revision of the species *Phtheochroa rugosana* (Hübner, 1799) was done, resulting in the description of five new species based on the difference in male and female genital structures (Hüemer, 1990). *Phtheochroa annae* inhabits Central and South-eastern Europe and has been recorded in Austria, Hungary, Romania and Greece (Hüemer, 1990).

Fig. 2. *Phtheochroa annae*, from Vejalnica on Mt. Medvednica (Photo: T. Koren).

Fig. 3. Genitals of *Phtheochroa annae*, from Vejalnica on Mt. Medvednica (Photo: T. Koren).

Tab. 2. List of moth species recorded during this survey. The locality numbers correspond to the ones given in Tab. 1. Species for which the identification is based on dissection of the genital structures are marked with an * symbol.

	Family	Species	Locality	Literature records
1.	Argyresthiidae	*Argyresthia fundella* (Fischer von Röslerstamm, 1835)		●
2.	Incurvariidae	*Incurvaria masculella* (Denis & Schiffermüller, 1775)	14	
3.	Saturniidae	*Aglia tau* (Linnaeus, 1758)	2, 10, 14	●
4.		*Antheraea yamamai* (Guérin-Méneville, 1861)	8, 9, 15	
5.		*Saturnia pavoniella* (Scopoli, 1763)	14	
6.	Sphingidae	*Agrius convolvuli* (Linnaeus, 1758)	8, 15	
7.		*Deilephila elpenor* (Linnaeus, 1758)	14	
8.		*Deilephila porcellus* (Linnaeus, 1758)	14	
9.		*Laothoe populi* (Linnaeus, 1758)	3	
10.		*Macroglossum stellatarum* (Linnaeus, 1758)	7	
11.		*Mimas tiliae* (Linnaeus, 1758)	9, 13	●
12.		*Smerinthus ocellata* (Linnaeus, 1758)	3	
13.		*Sphinx ligustri* Linnaeus, 1758	14, 15	
14.		*Sphinx pinastri* Linnaeus, 1758	16	
15.	Thyrididae	*Thyris fenestrella* (Scopoli, 1763)		●
16.	Drepanidae	*Cilixglaucata* (Scopoli, 1763)	14, 15	
17.		*Cymatophorina diluta* (Denis & Schiffermüller, 1775)	14, 15	
18.		*Drepana curvatula* (Borkhausen, 1790)	3, 9, 10	
19.		*Drepana falcataria* (Linnaeus, 1758)	3, 9	
20.		*Falcaria lacertinaria* (Linnaeus, 1758)	14	
21.		*Habrosyne pyritoides* (Hufnagel, 1766)	1, 9, 13, 15	
22.		*Polyploca ridens* (Fabricius, 1787)	2, 14	
23.		*Tethea or* (Denis & Schiffermüller, 1775)	3, 15, 16	
24.		*Tetheella fluctuosa* (Hübner, 1803)		●
25.		*Thyatira batis* (Linnaeus, 1758)	1, 9, 13, 14, 16	
26.		*Watsonalla binaria* (Hufnagel, 1767)	8, 9, 14, 15	
27.		*Watsonalla cultraria* (Fabricius, 1775)	14, 15	●
28.	Geometridae	*Abraxas sylvata* (Scopoli, 1763)		●
29.		*Acasis viretata* (Hübner, 1799)	2, 10, 14, 15, 16	
30.		*Aethalura punctulata* (Denis & Schiffermüller, 1775)	16	
31.		*Alcis repandata* (Linnaeus, 1758)	13	●
32.		*Alsophila aescularia* (Denis & Schiffermüller, 1775)	10	
33.		*Angerona prunaria* (Linnaeus, 1758)	1, 3, 8, 9, 13, 14, 15, 16	
34.		*Aplocera praeformata* (Hübner, 1826)	14	
35.		*Artiora evonymaria* (Denis & Schiffermüller, 1775)	2, 8	
36.		*Ascotis selenaria* (Denis & Schiffermüller, 1775)	14, 15, 16	
37.		*Asthena albulata* (Hufnagel, 1767)	3	
38.		*Asthena anseraria* (Herrich-Schäffer, 1855)	9, 13	
39.		*Biston betularia* (Linnaeus, 1758)	9, 15	
40.		*Cabera exanthemata* (Scopoli, 1763)	8, 9, 14, 16	●
41.		*Cabera pusaria* (Linnaeus, 1758)	3, 9	●
42.		*Campaea margaritaria* (Linnaeus, 1761)	1, 2, 3, 5, 6, 8, 9, 11, 12, 13, 14, 15	●
43.		*Camptogramma bilineata* (Linnaeus, 1758)	2, 8, 9, 13, 14, 15	
44.		*Cataclysme riguata* (Hübner, 1813)	14, 15	

	Family	Species	Locality	Literature records
45.		*Catarhoe cuculata* (Hufnagel, 1767)	2, 14, 15, 16	●
46.		*Catarhoe rubidata* (Denis & Schiffermüller, 1775)	9	
47.		*Cepphis advenaria* (Hübner, 1790)	13	
48.		*Chiasmia clathrata* (Linnaeus, 1758)	3, 7, 14, 15, 16	●
49.		*Chlorissa cloraria* (Hübner, 1813)	14	
50.		*Chloroclysta siterata* (Hufnagel, 1767)	10, 14, 15, 16	
51.		*Chloroclystis v-ata* (Haworth, 1809)	14, 15, 16	
52.		*Cidaria fulvata* (Forster, 1771)	14	●
53.		*Cleora cinctaria* (Denis & Schiffermüller, 1775)	14	
54.		*Colostygia olivata* (Denis & Schiffermüller, 1775)	5, 6, 8	●
55.		*Colostygia pectinataria* (Knoch, 1781)	3, 9, 13, 14, 15	
56.		*Colotois pennaria* (Linnaeus, 1761)	15	
57.		*Comibaena bajularia* (Denis & Schiffermüller, 1775)	13	
58.		*Cosmorhoe ocellata* (Linnaeus, 1758)	3, 9, 12, 13, 14, 15	
59.		*Crocallis elinguaria* (Linnaeus, 1758)	5, 6, 9, 14	
60.		*Cyclophora albiocellaria* (Hübner, 1789)	15	
61.		*Cyclophora annularia* (Fabricius, 1775)	2, 3, 8, 13, 14, 16	
62.		*Cyclophora linearia* (Hübner, 1799)	8, 9, 13, 14	●
63.		*Cyclophora porata* (Linnaeus, 1767)	3	
64.		*Cyclophora punctaria* (Linnaeus, 1758)	13, 15, 16	
65.		*Cyclophora ruficiliaria* (Herrich-Schäffer, 1855)	14	
66.		*Earophila badiata* (Denis & Schiffermüller, 1775)	10	
67.		*Ecliptopera silaceata* (Denis & Schiffermüller, 1775)	9	●
68.		*Ectropis crepuscularia* (Denis & Schiffermüller, 1775)	2, 10, 14, 15	
69.		*Ematurga atomaria* (Linnaeus, 1758)	2, 7, 14, 15	●
70.		*Ennomos quercinaria* (Hufnagel, 1767)		●
71.		*Ennomos fuscantaria* (Haworth, 1809)	8	
72.		*Epione repandaria* (Hufnagel, 1767)	9	
73.		*Epirrhoe alternata* (Muller, 1764)	3, 9, 14, 15	
74.		*Epirrhoe tristata* (Linnaeus, 1758)		●
75.		*Epirrhoe galiata* (Denis & Schiffermüller, 1775)	13, 14, 15	
76.		*Erannis defoliaria* (Clerck, 1759)	15	
77.		*Euchoeca nebulata* (Scopoli, 1763)	1, 3, 9, 13	
78.		*Eupithecia centaureata* (Denis & Schiffermüller, 1775)	14, 15	
79.		*Eupithecia ericeata* (Rambur, 1833)	14	
80.		*Eupithecia icterata* (de Villers, 1789)	5, 8	
81.		*Eupithecia insigniata* (Hübner, 1790)	14	
82.		*Eupithecia linariata* (Denis & Schiffermüller, 1775)	15	
83.		*Fagivorina arenaria* (Hufnagel, 1767)	14, 15	●
84.		*Gandaritis pyraliata* (Denis & Schiffermüller, 1775)	14	
85.		*Gnophos furvata* (Denis & Schiffermüller, 1775)	15	●
86.		*Gymnoscelis rufifasciata* (Haworth, 1809)	9, 14	
87.		*Heliomata glarearia* (Denis & Schiffermüller, 1775)	14, 15	
88.		*Hemistola chrysoprasaria* (Esper, 1795)	15	
89.		*Holoterpna pruinosata* (Staudinger, 1897)	15	
90.		*Horisme radicaria* (de La Harpe, 1855)	14	
91.		*Horisme tersata* (Denis & Schiffermüller, 1775)	15	
92.		*Horisme vitalbata* (Denis & Schiffermüller, 1775)	14	
93.		*Hydrelia flammeolaria* (Hufnagel, 1767)	9, 14	

	Family	Species	Locality	Literature records
94.		*Hydria cervinalis* (Scopoli, 1763)	14	
95.		*Hydriomena furcata* (Thunberg, 1784)		●
96.		*Hydriomena impluviata* (Denis & Schiffermüller, 1775)	3, 9, 13	
97.		*Hypomecis punctinalis* (Scopoli, 1763)	1, 3, 9, 14	
98.		*Hypomecis roboraria* (Denis & Schiffermüller, 1775)	3, 9, 13, 14	
99.		*Idaea aversata* (Linnaeus, 1758)	3, 9, 13, 14, 15, 16	
100.		*Idaea biselata* (Hufnagel, 1767)	15, 16	●
101.		*Idaea degeneraria* (Hübner, 1799)	2, 15	
102.		*Idaea dimidiata* (Hufnagel, 1767)	9, 13	
103.		*Idaea moniliata* (Denis & Schiffermüller, 1775)	15	
104.		*Idaea muricata* (Hufnagel, 1767)	14, 15	
105.		*Idaea nitidata* (Herrich-Schäffer, 1861)	15	
106.		*Idaea straminata* (Borkhausen, 1794)	15	
107.		*Idaea trigeminata* (Haworth, 1809)	9, 13	
108.		*Lampropteryx suffumata* (Denis & Schiffermüller, 1775)	14	
109.		*Ligdia adustata* (Denis & Schiffermüller, 1775)	1, 2, 3, 9, 10, 13, 14, 15, 16	
110.		*Lobophora halterata* (Hufnagel, 1767)	2, 14	
111.		*Lomaspilis marginata* (Linnaeus, 1758)	3, 8, 9, 13, 14, 15, 16	●
112.		*Lomographa bimaculata* (Fabricius, 1775)	14	
113.		*Lomographa temerata* (Denis & Schiffermüller, 1775)	9, 14, 15, 16	
114.		*Macaria alternata* (Denis & Schiffermüller, 1775)	3, 9, 13, 14, 15, 16	
115.		*Macaria liturata* (Clerck, 1759)	9, 14	
116.		*Melanthia procellata* (Denis & Schiffermüller, 1775)	1, 13, 15	●
117.		*Mesoleuca albicillata* (Linnaeus, 1758)	2, 8, 9, 13, 16	●
118.		*Mesotype parallelolineata* (Retzius, 1783)	14	
119.		*Minoa murinata* (Scopoli, 1763)	15	
120.		*Opisthograptis luteolata* (Linnaeus, 1758)	2, 14	
121.		*Ourapteryx sambucaria* (Linnaeus, 1758)	13, 14, 15	
122.		*Paradarisa consonaria* (Hübner, 1799)	2	
123.		*Parectropis similaria* (Hufnagel, 1767)	13, 14	
124.		*Pasiphila debiliata* (Hübner, 1817)	13	
125.		*Peribatodes rhomboidaria* (Denis & Schiffermüller, 1775)	1, 2, 3, 5, 6, 8, 9, 11, 12, 13, 14, 15, 16	
126.		*Perizoma affinitata* (Stephens, 1831)		●
127.		*Perizoma alchemillata* (Linnaeus, 1758)	9, 15, 16	●
128.		*Perizoma flavofasciata* (Thunberg, 1792)	13, 16	
129.		*Perizoma lugdunaria* (Herrich-Schäffer, 1855)	9	
130.		*Phileremevetulata* (Denis & Schiffermüller, 1775)	14	
131.		*Plagodis dolabraria* (Linnaeus, 1767)	9, 14, 15	
132.		*Plagodis pulveraria* (Linnaeus, 1758)	14	●
133.		*Pseudopanthera macularia* (Linnaeus, 1758)	14	
134.		*Pseudoterpna pruinata* (Hufnagel, 1767)	8, 14, 15	
135.		*Pungeleria capreolaria* (Denis & Schiffermüller, 1775)	9, 11, 13, 14	
136.		*Rhodostrophia vibicaria* (Clerck, 1759)	13, 14	
137.		*Scopula immorata* (Linnaeus, 1758)	15	●
138.		*Scopula incanata* (Linnaeus, 1758)	15	
139.		*Scopula nigropunctata* (Hufnagel, 1767)	5, 9, 15	

	Family	Species	Locality	Literature records
140.		*Scopula ornata* (Scopoli, 1763)	2, 14, 15	
141.		*Scopula rubiginata* (Hufnagel, 1767)	15, 16	
142.		*Scopula virgulata* (Denis & Schiffermüller, 1775)	15	
143.		*Scotopteryx luridata* (Hufnagel, 1767)	2, 14, 15	
144.		*Selenia dentaria* (Fabricius, 1775)	10, 14, 16	
145.		*Selenia lunularia* (Hübner, 1788)	14	●
146.		*Selenia tetralunaria* (Hufnagel, 1767)	9, 10, 14, 15	
147.		*Spargania luctuata* (Denis & Schiffermüller, 1775)		●
148.		*Stegania cararia* (Hübner, 1790)	2, 15	
149.		*Stegania dilectaria* (Hübner, 1790)	2	
150.		*Thera variata* (Denis & Schiffermüller, 1775)	9, 14, 15	●
151.		*Thera vetustata* (Denis & Schiffermüller, 1775)	9	
152.		*Timandra comae* Schmidt, 1931	6, 15	
153.		*Trichopteryx carpinata* (Borkhausen, 1794)	2, 1	
154.		*Triphosa dubitata* (Linnaeus, 1758)	10, 14	
155.		*Xanthorhoe biriviata* (Borkhausen, 1794)	16	●
156.		*Xanthorhoe ferrugata* (Clerck, 1759)	3, 14, 16	
157.		*Xanthorhoe montanata* (Denis & Schiffermüller, 1775)		●
158.		*Xanthorhoe quadrifasiata* (Clerck, 1759)	16	
159.	Oecophoridae	*Alabonia staintoniella* (Zeller, 1850)	13	
160.	Chiambachidae	*Diurnea fagella* (Denis & Schiffermüller, 1775)	2, 1	
161.	Elachistidae	*Agonopterix arenella* (Denis & Schiffermüller, 1775)	14	
162.		*Agonopterix ciliella* (Stainton, 1849)	14	
163.		*Agonopterix nervosa* (Haworth, 1811)	14	
164.		*Agonopterix propinquella* (Treitschke, 1835)	8	
165.		*Hypercallia citrinalis* (Scopoli, 1763)	14	
166.		*Semioscopis steinkellneriana* (Denis & Schiffermüller, 1775)	14	
167.	Hepialidae	*Triodia sylvina* (Linnaeus, 1761)	2, 6, 8, 15	
168.	Lasiocampidae	*Dendrolimus pini* (Linnaeus, 1758)	9	
169.		*Gastropacha quercifolia* (Linnaeus, 1758)	14	
170.		*Lasiocampa quercus* (Linnaeus, 1758)	9	●
171.		*Macrothylacia rubi* (Linnaeus, 1758)	16	
172.		*Malacosoma castrensis* (Linnaeus, 1758)	14	
173.		*Odonestis pruni* (Linnaeus, 1758)	14	
174.		*Phyllodesma tremulifolia* (Hübner, 1810)	16	
175.		*Poecilocampa populi* (Linnaeus, 1758)	14	
176.	Erebidae	*Amata phegea* (Linnaeus, 1758)	16	●
177.		*Arctia caja* (Linnaeus, 1758)		●
178.		*Arctia villica* (Linnaeus, 1758)	9, 13, 14	●
179.		*Arctornis l-nigrum* (Muller, 1764)	15	●
180.		*Atolmis rubricollis* (Linnaeus, 1758)	9	
181.		*Calliteara pudibunda* (Linnaeus, 1758)	3, 8	●
182.		*Callimorpha dominula* (Linnaeus, 1758)	14	●
183.		*Calyptra thalictri* (Borkhausen, 1790)	9	
184.		*Catocala elocata* (Esper, 1787)		●
185.		*Catocala fulminea* (Scopoli, 1763)	15	
186.		*Catocala nupta* (Linnaeus, 1767)	15	●
187.		*Catocala promissa* (Denis & Schiffermüller, 1775)	15	

	Family	Species	Locality	Literature records
188.		*Catocala sponsa* (Linnaeus, 1767)	15	
189.		*Cybosia mesomella* (Linnaeus, 1758)	9, 13	●
190.		*Dysauxes ancilla* (Linnaeus, 1767)	15, 16	●
191.		*Dysgonia algira* (Linnaeus, 1767)	2, 5, 15	
192.		*Eilema caniola* (Hübner, 1808)	9, 15	
193.		*Eilema complana* (Linnaeus, 1758)	13, 14	
194.		*Eilema depressa* (Esper, 1787)	8, 9, 13, 15	
195.		*Eilema lurideola* (Zincken, 1817)	14	
196.		*Eilema sororcula* (Hufnagel, 1766)	2, 9, 10, 13, 14, 16	
197.		*Euclidia glyphica* (Linnaeus, 1758)	4, 15	
198.		*Euclidia mi* (Clerck, 1759)	15	
199.		*Euplagia quadripunctaria* (Poda, 1761)	4, 7, 8, 9, 15, 16	●
200.		*Euproctis similis* (Fuessly, 1775)	9	
201.		*Herminia grisealis* (Denis & Schiffermüller, 1775)	2, 8, 9, 13, 15, 16	
202.		*Herminia tarsicrinalis* (Knoch, 1782)	1, 3, 8, 9, 13, 14, 15, 16	
203.		*Herminia tarsipennalis* (Treitschke, 1835)	8, 15	
204.		*Herminia tenuialis* (Rebel, 1899)	16	
205.		*Hypena proboscidalis* (Linnaeus, 1758)	2, 3, 7, 8, 12, 13	●
206.		*Hypena rostralis* (Linnaeus, 1758)	2	
207.		*Idia calvaria* (Denis & Schiffermüller, 1775)	3	
208.		*Laspeyria flexula* (Denis & Schiffermüller, 1775)	9, 13, 14, 15	
209.		*Lithosia quadra* (Linnaeus, 1758)	2, 8, 9, 13, 14, 15	
210.		*Lygephila craccae* (Denis & Schiffermüller, 1775)	14, 15	
211.		*Lygephila pastinum* (Treitschke, 1826)	16	
212.		*Lymantria dispar* (Linnaeus, 1758)	9, 15, 16	
213.		*Lymantria monacha* (Linnaeus, 1758)	15, 16	●
214.		*Metachrostis velox* (Hübner, 1813)	15	
215.		*Miltochrista miniata* (Forster, 1771)	8, 9, 13	●
216.		*Paracolax tristalis* (Fabricius, 1794)	9, 14, 15	
217.		*Pechipogo strigilata* (Linnaeus, 1758)	9, 13, 16	
218.		*Phragmatobia fuliginosa* (Linnaeus, 1758)	8, 14, 15, 16	
219.		*Phytometra viridaria* (Clerck, 1759)	14, 15	
220.		*Polypogon gryphalis* (Herrich-Schäffer, 1851)	15	
221.		*Polypogon tentacularia* (Linnaeus, 1758)	13	
222.		*Rivula sericealis* (Scopoli, 1763)	2, 3, 4, 8, 11, 15, 16	
223.		*Scoliopteryx libatrix* (Linnaeus, 1758)		●
224.		*Schrankia costaestrigalis* (Stephens, 1834)	5, 8	
225.		*Spilosoma lubricipeda* (Linnaeus, 1758)	3, 9	
226.		*Spilosoma lutea* (Hufnagel, 1766)	1	
227.		*Trisateles emortualis* (Denis & Schiffermüller, 1775)	9, 13, 15	●
228.		*Zanclognatha lunalis* (Scopoli, 1763)		●
229.	Noctuidae	*Abrostola triplasia* (Linnaeus, 1758)	2	
230.		*Acontia candefacta* (Hubner, 1831)	15	
231.		*Acontia trabealis* (Scopoli, 1763)	3, 14, 15	
232.		*Acronicta aceris* (Linnaeus, 1758)	14, 15	
233.		*Acronicta alni* (Linnaeus, 1767)	14	
234.		*Acronicta cuspis* (Hübner, 1813)*	15	
235.		*Acronicta euphorbiae* (Denis & Schiffermüller, 1775)	14	

	Family	Species	Locality	Literature records
236.		*Acronicta psi* (Linnaeus, 1758)*	15	
237.		*Acronicta rumicis* (Linnaeus, 1758)	2, 8, 14, 15	
238.		*Aedia leucomelas* (Linnaeus, 1758)	3, 8, 15, 16	
239.		*Agrochola helvola* (Linnaeus, 1758)	15	
240.		*Agrochola litura* (Linnaeus, 1758)	14	
241.		*Agrochola macilenta* (Hübner, 1809)	15	
242.		*Agrotis exclamationis* (Linnaeus, 1758)	3, 13, 14	
243.		*Agrotis ipsilon* (Hufnagel, 1766)	13, 14	
244.		*Agrotis segetum* (Denis & Schiffermüller, 1775)	12, 13, 16	
245.		*Allophyes oxyacanthae* (Linnaeus, 1758)	9, 14, 15	
246.		*Ammoconia caecimacula* (Denis & Schiffermüller, 1775)	15	
247.		*Amphipyra livida* (Denis & Schiffermüller, 1775)	15	
248.		*Amphipyra pyramidea* (Linnaeus, 1758)*	2, 14, 15	
249.		*Amphipyra tragopoginis* (Clerck, 1759)		•
250.		*Anorthoa munda* (Denis & Schiffermüller, 1775)	2	
251.		*Apamea monoglypha* (Hufnagel, 1766)	3	•
252.		*Apamea scolopacina* (Esper, 1788)	15	
253.		*Athetis lepigone* (Möschler, 1860, 1860)	5, 8, 9, 15	
254.		*Atypha pulmonaris* (Esper, 1790)	9, 13, 15	
255.		*Autographa gamma* (Linnaeus, 1758)	2, 4, 8, 14, 15, 16	
256.		*Autographa jota* (Linnaeus, 1758)		•
257.		*Autographa pulchrina* (Haworth, 1809)		•
258.		*Axylia putris* (Linnaeus, 1761)	14	
259.		*Callopistria juventina* (Stoll, 1782)	9	
260.		*Cerastis rubricosa* (Denis & Schiffermüller, 1775)	2, 14	
261.		*Colocasia coryli* (Linnaeus, 1758)	1, 2, 3, 9, 10, 14, 16	
262.		*Conistra erythrocephala* (Denis & Schiffermüller, 1775)	14	
263.		*Conistra rubiginea* (Denis & Schiffermüller, 1775)	2, 10, 14	
264.		*Conistra rubiginosa* (Scopoli, 1763)	14	
265.		*Conistra vaccinii* (Linnaeus, 1761)	2, 9, 14	
266.		*Cosmia trapezina* (Linnaeus, 1758)	8, 15, 16	
267.		*Craniophora ligustri* (Denis & Schiffermüller, 1775)	2, 8, 9, 14, 15	
268.		*Cryphia algae* (Fabricius, 1775)*	14, 15, 16	
269.		*Cryphia receptricula* (Hübner, 1803)*	14	
270.		*Deltote bankiana* (Fabricius, 1775)	13	
271.		*Deltote pygarga* (Hufnagel, 1766)	13, 14, 15	
272.		*Diachrysia chrysitis* (Linnaeus, 1758)	2	
273.		*Diloba caeruleocephala* (Linnaeus, 1758)	14, 15	
274.		*Dypterygia scabriuscula* (Linnaeus, 1758)	13	
275.		*Egira conspicillaris* (Linnaeus, 1758)	14	
276.		*Elaphria venustula* (Hübner, 1790)	16	
277.		*Epilecta linogrisea* (Denis & Schiffermüller, 1775)	8, 15	
278.		*Eugnorisma depuncta* (Linnaeus, 1761)	5, 6, 8, 9, 12, 15	
279.		*Euplexia lucipara* (Linnaeus, 1758)	9, 16	
280.		*Gortyna flavago* (Denis & Schiffermüller, 1775)	14	
281.		*Griposia aprilina* (Linnaeus, 1758)	15	
282.		*Helicoverpa armigera* (Hübner, 1808)	5, 8, 14, 15	
283.		*Hoplodrina ambigua* (Denis & Schiffermüller, 1775)	15	
284.		*Lacanobia oleracea* (Linnaeus, 1758)	8, 13	

	Family	Species	Locality	Literature records
285.		*Lamprosticta culta* (Denis & Schiffermüller, 1775)	15	
286.		*Leucania comma* (Linnaeus, 1761)		•
287.		*Lithophane ornitopus* (Hufnagel, 1766)	2	
288.		*Lithophane socia* (Hufnagel, 1766)	2	
289.		*Luperina dumerilii* (Duponchel, 1826)	2	
290.		*Mesoligia furuncula* (Denis & Schiffermüller, 1775)	15	
291.		*Mniotype satura* (Denis & Schiffermüller, 1775)	14	
292.		*Moma alpium* (Osbeck, 1778)	15, 16	
293.		*Mormo maura* (Linnaeus, 1758)	8	•
294.		*Mythimna albipuncta* (Denis & Schiffermüller, 1775)	8, 14, 15	
295.		*Mythimna congrua* (Hübner, 1817)	8	
296.		*Mythimna ferrago* (Fabricius, 1787)	5, 14, 15, 16	
297.		*Mythimna l-album* (Linnaeus, 1767)	9, 15	
298.		*Mythimna turca* (Linnaeus, 1761)	3	
299.		*Noctua comes* Hübner, 1813	2, 5, 8, 11, 12, 14, 15	
300.		*Noctua fimbriata* (Schreber, 1759)*	2, 8, 13, 15	
301.		*Noctua interposita* (Hübner, 1790)	15	
302.		*Noctua janthina* Denis & Schiffermüller, 1775	2, 8, 15	
303.		*Noctua pronuba* (Linnaeus, 1758)	2, 3, 5, 8, 9, 12, 13, 14, 15	•
304.		*Ochropleura plecta* (Linnaeus, 1761)	3, 14	
305.		*Oligia latruncula* (Denis & Schiffermüller, 1775)*	8, 13	
306.		*Oligia strigilis* (Linnaeus, 1758)*	13, 14	
307.		*Orthosia cerasi* (Fabricius, 1775)	2, 14	
308.		*Orthosia cruda* (Denis & Schiffermüller, 1775)	2	
309.		*Orthosia gothica* (Linnaeus, 1758)	2, 14	
310.		*Orthosia gracilis* (Denis & Schiffermüller, 1775)	14	
311.		*Orthosia incerta* (Hufnagel, 1766)	2, 14	
312.		*Orthosia populeti* (Fabricius, 1775)	2	
313.		*Phlogophora meticulosa* (Linnaeus, 1758)	15	
314.		*Polia bombycina* (Hufnagel, 1766)	13	
315.		*Polyphaenis sericata* (Esper, 1787)	15	
316.		*Pyrrhia umbra* (Hufnagel, 1766)	9, 14	
317.		*Sideridis rivularis* (Fabricius, 1775)	15	
318.		*Thalpophila matura* (Hufnagel, 1766)	14	
319.		*Tholera cespitis* (Denis & Schiffermüller, 1775)	15	
320.		*Tiliacea aurago* (Denis & Schiffermüller, 1775)	14, 15	
321.		*Tiliacea citrago* (Linnaeus, 1758)	14	
322.		*Tiliacea sulphurago* (Denis & Schiffermüller, 1775)	14	
323.		*Trachea atriplicis* (Linnaeus, 1758)	9	
324.		*Valeria oleagina* (Denis & Schiffermüller, 1775)	2	
325.		*Xanthia icteritia* (Hufnagel, 1766)	15	
326.		*Xestia castanea* (Esper, 1798)	14	
327.		*Xestia c-nigrum* (Linnaeus, 1758)	2, 3, 14, 15	
328.		*Xestia ditrapezium* (Denis & Schiffermüller, 1775)	13	
329.		*Xestia stigmatica* (Hübner, 1813)	8, 15	
330.		*Xestia triangulum* (Hufnagel, 1766)	15	
331.		*Xestia xanthographa* (Denis & Schiffermüller, 1775)	2, 6, 8, 14, 15	

	Family	Species	Locality	Literature records
332.	Nolidae	*Bena bicolorana* (Fuessly, 1775)	15	
333.		*Earias vernana* (Fabricius, 1787)	15	
334.		*Meganola albula* (Denis & Schiffermüller, 1775)	8, 9, 15	
335.		*Meganola strigula* (Denis & Schiffermüller, 1775)	14, 15	
336.		*Meganola togatulalis* (Hübner, 1796)	14	
337.		*Nola cicatricalis* (Treitschke, 1835)	14	
338.		*Nola cristatula* (Hübner, 1793)	10	
339.		*Pseudoips prasinana* (Linnaeus, 1758)	8, 9, 10, 14, 15, 16	
340.	Notodontidae	*Clostera anachoreta* (Denis & Schiffermüller, 1775)	14	
341.		*Clostera curtula* (Linnaeus, 1758)	14, 16	●
342.		*Clostera pigra* (Hufnagel, 1766)	14	
343.		*Drymonia melagona* (Borkhausen, 1790)	9, 13, 15, 16	●
344.		*Drymonia ruficornis* (Hufnagel, 1766)	14	
345.		*Drymonia velitaris* (Hufnagel, 1766)	14	
346.		*Furcula furcula* (Clerck, 1759)	14	
347.		*Gluphisia crenata* (Esper, 1785)	14, 16	
348.		*Harpyia milhauseri* (Fabricius, 1775)	14	
349.		*Notodonta dromedarius* (Linnaeus, 1767)	8, 15	
350.		*Notodonta tritophus* (Denis & Schiffermüller, 1775)	13	●
351.		*Notodonta ziczac* (Linnaeus, 1758)	3	
352.		*Peridea anceps* (Goeze, 1781)	14	
353.		*Phalera bucephaloides* (Ochsenheimer, 1810)	15	
354.		*Pheosia tremula* (Clerck, 1759)	2	
355.		*Ptilodon capucina* (Linnaeus, 1758)	3, 9, 13	
356.		*Ptilodon cucullina* (Denis & Schiffermüller, 1775)	8, 9, 13, 14, 15, 16	●
357.		*Ptilophora plumigera* (Denis & Schiffermüller, 1775)	14	
358.		*Spatalia argentina* (Denis & Schiffermüller, 1775)	3, 14, 15, 16	
359.		*Stauropus fagi* (Linnaeus, 1758)	9, 13, 14, 15, 16	
360.	Crambidae	*Agrotera nemoralis* (Scopoli, 1763)	3, 9, 13, 14	
361.		*Anania coronata* (Hufnagel, 1767)	13	
362.		*Anania crocealis* (Hübner, 1796)	14, 15	
363.		*Anania fuscalis* (Denis & Schiffermüller, 1775)	15	
364.		*Anania hortulata* (Linnaeus, 1758)	13, 16	
365.		*Anania lancealis* (Denis & Schiffermüller, 1775)	13	
366.		*Anania stachydalis* (Germar, 1821)	8, 9, 13, 14, 15	
367.		*Anania terrealis* (Treitschke, 1829)	5, 14, 15	
368.		*Anania verbascalis* (Denis & Schiffermüller, 1775)	8, 9, 14, 15	
369.		*Catoptria falsella* (Denis & Schiffermüller, 1775)	15	
370.		*Catoptria osthelderi* (Lattin, 1950)*	15	
371.		*Catoptria pinella* (Linnaeus, 1758)*	15	
372.		*Chrysocrambus linetella* (Fabricius, 1781)	16	
373.		*Chrysoteuchia culmella* (Linnaeus, 1758)	15	
374.		*Crambus lathoniellus* (Zincken, 1817)	16	
375.		*Crambus pascuella* (Linnaeus, 1758)	13	
376.		*Crambus perlella* (Scopoli, 1763)	15	
377.		*Cydalima perspectalis* (Walker, 1859)	8, 14, 15	
378.		*Cynaeda dentalis* (Denis & Schiffermüller, 1775)	2, 15	
379.		*Diasemiopsis ramburialis* (Duponchel, 1834)	8	
380.		*Dolicharthria punctalis* (Denis & Schiffermüller, 1775)	2, 15	

	Family	Species	Locality	Literature records
381.		*Ecpyrrhorrhoe rubiginalis* (Hübner, 1796)	8	
382.		*Evergestis forficalis* (Linnaeus, 1758)	13	
383.		*Evergestis limbata* (Linnaeus, 1767)	13	
384.		*Evergestis pallidata* (Hufnagel, 1767)	1, 8, 9, 13	
385.		*Metasia ophialis* (Treitschke, 1829)	2, 15, 16	
386.		*Nascia cilialis* (Hübner, 1796)	16	
387.		*Nomophila noctuella* (Denis & Schiffermüller, 1775)	2, 8	
388.		*Ostrinia nubilalis* (Hübner, 1796)	9, 13, 16	
389.		*Palpita vitrealis* (Rossi, 1794)	14	
390.		*Pediasia contaminella* (Hübner, 1796)	2, 8, 15	
391.		*Pleuroptya ruralis* (Scopoli, 1763)	2, 5, 6, 8, 9, 14	
392.		*Pyrausta aurata* (Scopoli, 1763)	8, 15	
393.		*Pyrausta cingulata* (Linnaeus, 1758)	15	
394.		*Pyrausta purpuralis* (Linnaeus, 1758)	14, 15	
395.		*Sitochroa palealis* (Denis & Schiffermüller, 1775)	9	
396.		*Sitochroa verticalis* (Linnaeus, 1758)	14	
397.		*Udea ferrugalis* (Hübner, 1796)	14, 15, 16	
398.		*Udea olivalis* (Denis & Schiffermüller, 1775)	15	
399.		*Xanthocrambus lucellus* (Herrich-Schäffer, 1848)	15	
400.	Pyralidae	*Aphomia sociella* (Linnaeus, 1758)	14	
401.		*Dioryctria abietella* (Denis & Schiffermüller, 1775)	14	
402.		*Endotricha flammealis* (Denis & Schiffermüller, 1775)	8, 15, 16	
403.		*Homoeosoma sinuella* (Fabricius, 1794)	14	
404.		*Hypochalcia propinquella* (Guenée, 1845)	14	
405.		*Hypsopygia costalis* (Fabricius, 1775)	8, 9, 14, 15	
406.		*Hypsopygia glaucinalis* (Linnaeus, 1758)	6, 8	
407.		*Hypsopygia rubidalis* (Denis & Schiffermüller, 1775)	16	
408.		*Myelois circumvoluta* (Fourcroy, 1785)	16	
409.		*Oncocera semirubella* (Scopoli, 1763)	8, 14, 15	
410.		*Pyralis farinalis* (Linnaeus, 1758)	14, 15	
411.		*Pyralis regalis* Denis & Schiffermüller, 1775	15	
412.	Pterophoridae	*Cnaemidophorus rhododactyla* (Denis & Schiffermüller, 1775)	14, 15, 16	
413.		*Emmelina monodactyla* (Linnaeus, 1758)	14	
414.		*Platyptilia farfarellus* Zeller, 1867*	16	
415.	Psychidae	*Bijugis bombycella* (Denis & Schiffermüller, 1775)	14, 16	
416.	Tortricidae	*Acleris cristana* (Denis & Schiffermüller, 1775)	8	
417.		*Acleris laterana* (Fabricius, 1794)	12	
418.		*Acleris variegana* (Denis & Schiffermüller, 1775)	14, 15	
419.		*Agapeta zoegana* (Linnaeus, 1767)	15	
420.		*Aleimma loeflingiana* (Linnaeus, 1758)	2, 14	
421.		*Ancylis badiana* (Denis & Schiffermüller, 1775)	8	
422.		*Ancylis mitterbacheriana* (Denis & Schiffermüller, 1775)	16	
423.		*Archips podana* (Scopoli, 1763)	8, 13, 14, 15	
424.		*Archips xylosteana* (Linnaeus, 1758)	14	
425.		*Clepsis rurinana* (Linnaeus, 1758)	16	
426.		*Cochylis hybridella* (Hübner, 1813)	14	
427.		*Cydia pomonella* (Linnaeus, 1758)	8, 14, 15	
428.		*Endothenia marginana* (Haworth, 1811)	14	

	Family	Species	Locality	Literature records
429.		*Endothenia quadrimaculana* (Haworth, 1811)	3, 8, 14	
430.		*Epinotia festivana* (Hübner, 1799)	14	
431.		*Eucosma cana* (Haworth, 1811)	15	
432.		*Grapholita fissana* (Frölich, 1828)	14	
433.		*Gravitarmata margarotana* (Heinemann, 1863)	14	
434.		*Gypsonoma sociana* (Haworth, 1811)	14, 15	
435.		*Hedya nubiferana* (Haworth, 1811)	14	
436.		*Hedya salicella* (Linnaeus, 1758)	16	
437.		*Metendothenia atropunctana* (Zetterstedt, 1839)	14	
438.		*Notocelia incarnatana* (Hübner, 1800)	15	
439.		*Notocelia uddmanniana* (Linnaeus, 1758)	8	
440.		*Pammene trauniana* (Denis & Schiffermüller, 1775)	1	
441.		*Pandemis corylana* (Fabricius, 1794)	1	
442.		*Paramesia gnomana* (Clerck, 1759)	14	
443.		*Philedone gerningana* (Denis & Schiffermüller, 1775)	15	
444.		*Phtheochroa annae* Huemer, 1990	14	
445.		*Pseudeulia asinana* (Hübner, 1799)	14	
446.		*Rhyacionia buoliana* (Denis & Schiffermüller, 1775)	15	
447.		*Spilonota ocellana* (Denis & Schiffermüller, 1775)	14	
448.		*Tortrix viridana* Linnaeus, 1758	14	
449.	Limacodidae	*Apoda limacodes* (Hufnagel, 1766)	9, 15, 16	•
450.		*Heterogenea asella* (Denis & Schiffermüller, 1775)	9, 16	
451.	Plutellidae	*Plutella xylostella* (Linnaeus, 1758)	14	
452.	Yponomeutidae	*Yponomeuta padella* (Linnaeus, 1758)	15	
453.		*Yponomeuta plumbella* (Denis & Schiffermüller, 1775)	15	
454.	Zygaenidae	*Zygaena carniolica* (Scopoli, 1763)	14	•
455.		*Zygaena transalpina* (Esper, 1780)		•

*Species for which the genitals were checked to confirm the correct identification.

DISCUSSION

With 437 species recorded during this survey, the area of Medvednica Natur Park can now be regarded as one of the better surveyed areas of Croatia with respect to the moth fauna (e.g. Kranjčev, 1985; Habeler, 2008; Vignjević *et al*., 2010; Koren & Ladavac, 2013). Also, it is the only nature park in Croatia of the 11 existing ones, aside from Kopački Rit, only a part of the moth fauna of which was studied (Vignjević *et al*., 2010), to have a checklist of moths. This is certainly not the final number of species, but probably only 40-50% of the estimated moth fauna species of Medvednica Nature Park. Future surveys, as well the study of Microlepidoptera families will certainly increase the confirmed number of species in the area. The data from this survey can be used for the better management of the habitats as well for promotion and awareness-raising of the local communities and visitors of the Nature Park.

Checklists for most moth families in Croatia and Red Lists are still missing, therefore is difficult to put our results in a meaningful perspective regarding the species' rarity or threat status. Thus, the species' status can only be subjectively evaluated which may lead to the wrong conclusions. In today's drastic changes in land use, it is important to preserve habitat richness for moths in the Nature Park. Although the Nature Park is mostly forested, meadows and pastures as well as the plant-rich forest edge are very important for the long-term survival of moths. The remaining meadows are nowadays found mainly in the marginal parts of the Park (eg Vejalnica, Bizek, Golubovec ponds). It is at these sites that the butterfly fauna is very diverse and rich. However, it should be noted that abandonment of meadows has been observed, especially in the area of Vejalnica. Most meadows nowadays are no longer mowed or grazed, which results in the disappearance of many plant and animal species from the area. Some grassland species reported in the literature, like *Z. transalpina,* were not confirmed during our survey. As members of the family Zagaenidae are known to be sensitive to the changes in use of meadows, this may indicate a negative change in grassland diversity. However targeted surveys of day-flying Zygaenidae of the Nature park is needed in order to assess the status of this family in the area.

During this survey, habitat succession was observed in almost all grassland habitats. For this reason, habitat remediation actions are required, like removing shrubby vegetation from the meadows and starting regular mowing. The central, forested part of Medvednica belongs to less favourable habitats for moths, as there is mainly dense forest. The meadows that still exist in that part are intensely mowed, and as such not suitable for the survival of either caterpillar plants or adult moths. To preserve fauna diversity in the area, meadows should be recovered and extensively maintained, to preserve host plants for larvae and flowers as nectar source for the adults.

Also important is the connectivity of the fragmented grassland habitats across Medvednica NP. In a survey in the deciduous forests of eastern North America, increased forest fragmentation was found to change moth community composition as a result of both species impoverishment and replacement (Schmidt & Roland, 2009). In order to accomplish that, forest edges should be maintained open in order to provide corridors to vagrant moths and other animal species.

ACKNOWLEDGMENTS

I would like to thank the Public Institution Medvednica Nature Park for recognizing the value of this project and financially supporting it. I am grateful to Peter Hüemer for the confirmation of the correct identification of *P. annae*. My heartfelt thanks also go to my colleagues at the Hyla Association for their selfless assistance during field trips. I am also in debt to two anonymous reviewers for critical reviews and useful comments on the manuscript.

Received February 16, 2020

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SAŽETAK

Fauna noćnih leptira (Lepidoptera: Heterocera) Parka prirode Medvednica

T. Koren

Na području Hrvatske nalazi se 11 Parkova prirode raspoređenih u sve tri biogeografske regije. Fauna noćnih leptira većina Parkova prirode nije bila sustavno istraživana, s iznimkom Kopačkoga Rita gdje su do sada izvršena preliminarna istraživanja noćnih leptira. Noćni su leptiri važan dio ekosustava, a s preko 160,000 opisanih vrsta važni su oprašivači mnogih biljnih vrsta. Znanje o raznolikosti noćnih leptira nekoga područja može olakšati upravljanje tim područjem te usmjeriti konzervacijske akcije. Park prirode Medvednica nalazi se u neposrednoj blizini Grada Zagreba, no fauna noćnih leptira toga područja nikada nije bila sustavno istraživana. Pregledom literature potvrđena je prisutnost tek 69 vrsta zabilježenih unutar granica Parka prirode. Recentnim istraživanjem provedenim između 2015. i 2019. godine na području Parka prirode Medvednica zabilježeno je 437 vrsta noćnih leptira, od kojih je njih 388 prvi put zabilježeno na tom području. Sveukupno je od sada na području Parka prirode Medvednica zabilježeno 455 vrsta noćnih leptira. Jedna vrsta porodice Tortricidae, *Phtheochroa annae*, po prvi puta je zabilježena u fauni Hrvatske. Ipak, popis noćnih leptira nije potpun te sadrži tek oko 40-50% potencijalne faune tog područja; no nakon ovog istraživanja područje Parka prirode Medvednica može se smatrati jednim od najbolje istraženih područja u Hrvatskoj. Na većini posjećenih područja diljem Medvednice stanišni uvjeti povoljni su za kratkoročni opstanak većine vrsta, ali zarastanje livada i rubova šume, kao i intenzivna košnja vršnih livada, mogli bi u u bliskoj budućnosti dramatično pogoršati održavanje velike biološke raznolikosti područja. Osim toga je važno održati i poboljšati komunikaciju leptira između izoliranih livadnih staništa diljem Medvednice održavanjem i stvaranjem šumskih rubova bogatih podrastom.