



RESEARCH ARTICLE

# New data on the distribution of the threatened Marsh Fritillary – *Euphydryas aurinia* (Lepidoptera: Nymphalidae) – in Romania

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## Abstract

*Euphydryas aurinia*, a highly endangered species listed on the Annex II of the Habitats Directive as well as on the Annex II of the Bern Convention, has a wide distribution in the Palearctic realm. Although it is an intensively studied species, its distribution is still not enough known. In Romania, in the last century it has been reported almost exclusively from the regions inside and westwards to the Carpathian Mountains. Records from Oltenia and Wallachia are filling a gap in the known distribution of this butterfly in the southern part of Romania, while 13 new records consolidate the known range of this species in southern and eastern Transylvania. In order to assess the progress encountered, a critical reviewed checklist with the records of the Marsh Fritillary presented in a regional distribution map complete this paper.

## Keywords

protected species, faunistic note, new record, distribution.

## Introduction

The Marsh Fritillary, *Euphydryas aurinia* (Rottemburg, 1775), is a butterfly largely distributed in the Palaearctic region, from western Europe (westwards from Ireland, Great Britain – records also from Scotland – and Portugal) and Northwest Africa (Morocco and Algeria) to Anatolia, southern Urals, the Caucasus and northern Iran, and furthermore eastwards to the Altai through Mongolia, southern and eastern Siberia, northern China and Korea. In the western Palaearctic region, this species is found only locally in Great Britain, Denmark, Sweden and Finland as well as in Italy and Greece, where it is absent in most areas. However, it is entirely absent from Iceland, Norway, Channel Islands, the Isle of Man and the Mediterranean islands, but occurs locally in the mountains of Morocco and Algeria (Leraut 2016). Although it can be locally common in certain parts of its distribution realm, it has clearly and strongly declined all over Europe (for example, it has greatly declined in Île-de-France – Leraut 2016). It has been reported as threatened in 39 European countries and is already extinct in one European country, being credited with an overall decrease trend of 20–50% in Europe, despite data-quality poor or trend unknown in more than 50% of the range (van Swaay and Warren 1999). Also, in spite of being regarded as least concern in most of Europe (van Swaay et al. 2010; Maes et al. 2019), this butterfly is listed on the Annexes II of the Habitats Directive of the European Union, no more than 16 LIFE projects targeted towards either this species or its habitats have been developed (van Swaay et al. 2010) and a total number of 1381 Natura2000 sites have been designated up to now for the conservation of this species.

Currently, a number of 22 Natura2000 sites are designated in Romania for the conservation of the Marsh Fritillary. According to the data from 2013–2018 available for reporting under the Article 17 of the Habitats Directive, in Romania, the areas where the Marsh Fritillary has been found have a total range of 4100 km<sup>2</sup> in the continental bioregion (1.89 % of the surface occupied by this bioregion in Romania) and 2100 km<sup>2</sup> in the alpine bioregion (1.65% of surface of this bioregion in Romania): For the both bioregions, the conservation status is favourable (see Article 17 web tool).

However, in Romania, the Marsh Fritillary is listed as vulnerable at the national scale (Rákósy 2021; Rákósy et al. 2021). Despite having been considered by some authors (Székely 2008) as common but very local, its populations appear to be limited to locally restricted areas. Until the last decade, it was known only from Transylvania, Banat and Crişana (Székely 2008; Mihăilescu et al. 2015; Rákósy and Goia 2021), with very old records (unconfirmed in the last century) from the others regions of Romania (Rákósy and Goia 2021). However, recognizing the insufficient knowledge of the distribution of this species in Romania, some pointed out that “for sure, the number of the populations is higher than the one currently known” (Rákósy 2013). This gap in the known distribution of the Marsh Fritillary in Romania is also noticed by Székely (2008).

Following early records from Săcărâmb (Franzenau 1852), Ciucurova (Mann 1866), Cislădie, Cislădioara, Sibiu (Sibiu County) and Előpatak / Vâlcele (Covasna

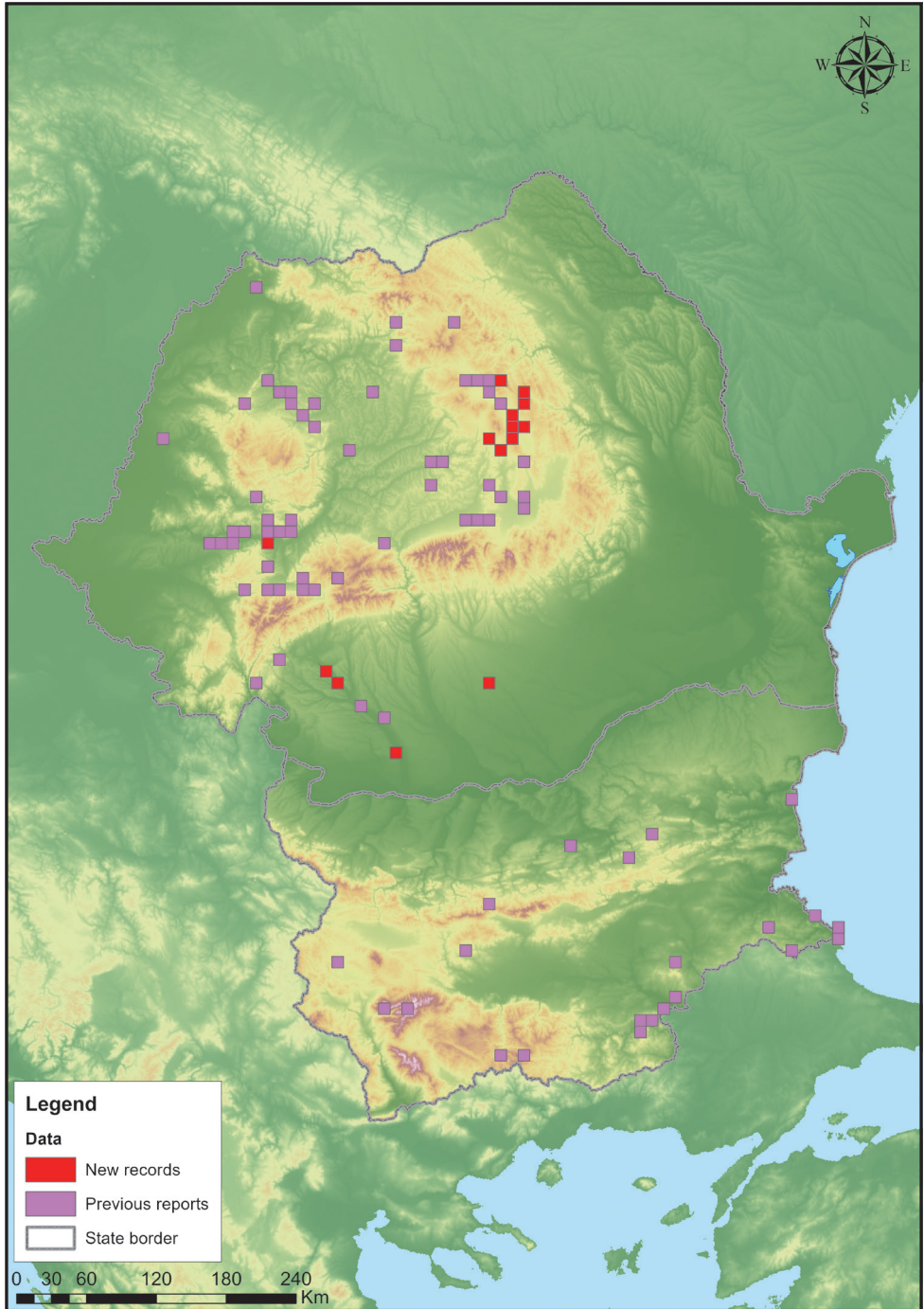
County – Czekelius 1895), the known distribution of the Marsh Fritillary in Romania gradually extended starting with the early XXth century. However, outside the Carpathians Mountains, there are only old and unconfirmed reports of the Marsh Fritillary. For instance, eastwards of the Eastern Carpathians, old records are known from Comănești, Bacău County (specimens captured by Nicolae Leon; Fleck 1900), Botoșani – specimens captured long before '990s by prof. Ioan Nemeș, cited by Székely (1992) who also stipulates that he did not find again this species – and Ursache forest, Botoșani County (Lungoci 1972). Nevertheless, none of these records could be certified following the revision of a specimen preserved in a collection, nor confirmed by new captures in the last half of century. To the south, doubtful records have been published by Chimișliu and Goga (2005) based on specimens in the Ioan Stănoiu collection captured at Baia de Aramă, Mehedinți County and Cozia Mountains (specimen captured on August 20, raising serious questions regarding the truth identity of this particular specimen, if not all the Marsh Fritillary specimens found in the Ioan Stănoiu collection and/or the accuracy of the collecting data from this collection catalogue).

## Material and methods

Recently, *E. aurinia* has been recorded from Filiași, Dolj County (Chimișliu 2011) and Ișalnița, Dolj County (Chimișliu 2012). These two reports have been certified following a revision of the Marsh Fritillary specimens found in the collections of the Olteniei Museum, Craiova. On this occasion, another female specimen collected by Cornelia Chimișliu on May 24, 1994 at Răcari, Dolj County was found, thereby increasing the number of recorded populations from Oltenia. A year later, another record for the Marsh Fritillary in westernmost part of Oltenia was reported at about 0,5 km north-east from Cireșu, Mehedinți County (Papé et al. 2013, fig. 37).

In Bulgaria, during the last decades, the Marsh Fritillary was reported northward as far as Hotnitsa, Veliko Tarnovo Province (specimen photographed by Ray Hamilton, May 13, 2011), Omurtag, Targovishte Province (specimen photographed by Gulsen Mutlu, May 29, 2011; Beshkov pers. com.) and Kamtchiya, Ribarskoto selishte, Varna Province (specimen photographed by B. Benedek, May 15, 2010; Beshkov pers. com.). Taking into account the known reports from Romania and Bulgaria (see Table 1), this leaves a fairly substantially large area without any report between the Transylvanian Alps and the Danube, and even further, south of the Danube (Fig. 1).

Following the growing efforts dedicated to increase the known distribution of the Marsh Fritillary in Romania, Tibor-Csaba Vizauer managed to discover an important number of populations of this butterfly in the Ciuc Mountains (see Table 1), thus confirming previous reports (Kovács and Kovács 1986; Sándor and Székely 2020), but significantly increasing the number of known populations in this region. Moreover, on this occasion several populations were identified at altitudes well over



**Figure 1.** The distribution of *Euphydryas aurinia* in Bulgaria and Romania, with the new records from Oltenia and Wallachia; the coordinates of the reporting points are presented in the table 1.

**Table 1.** The list with the Marsh Fritillary reports from Bulgaria and Romania; for Romania, the old records from the XIXth century, unconfirmed during the last century, were excluded.

Locality and station	Country and region	Latitude	Longitude	Reference
Strandzha Mountains, Tsarnogorovo place, near Malko Tarnovo, Strandzha Nature Park	Bulgaria, Burgas Region	41.951° N	27.569° E	leg. Stoyan Beshkov and Boyan Zlatkov, 12.05.2008; Zlatkov and Beshkov 2009; Beshkov 2009
Rezovo, Strandzha Nature Park	Bulgaria, Burgas Region	41.987° N	28.019° E	leg. Stoyan Beshkov and Boyan Zlatkov, 24.04.–27.05.2008; Beshkov, 2009
Silistar Plazh near Rezovo, Strandzha Nature Park	Bulgaria, Burgas Region	42.023° N	28.006° E	leg. Stoyan Beshkov and Boyan Zlatkov, 28.05.2008; Beshkov, 2009
to the south, next to the fence of the „Zlatnata Perla”, north from Varvara, Strandzha Nature Park	Bulgaria, Burgas Region	42.140° N	27.896° E	leg. Stoyan Beshkov and Boyan Zlatkov, 27.05.2008; Beshkov, 2009
to the north, next to the fence of the „Zlatnata Perla”, north from Varvara, Strandzha Nature Park	Bulgaria, Burgas Region	42.142° N	27.893° E	leg. Stoyan Beshkov and Boyan Zlatkov, 27.05.2008; Beshkov, 2009
Mladzhenko	Bulgaria, Burgas Region	42.152° N	27.378° E	leg. Stoyan Beshkov and Boyan Zlatkov, 29.05.2008; Beshkov, 2009
Momina Skala above Madzharovo	Bulgaria, Haskovo Region	41.633° N	25.844° E	leg. Stoyan Beshkov, Stanislav Abadjiev & Chris van Swaay, 21.05.2006
Arda chalet, near Dabovetz	Bulgaria, Haskovo Region	41.636° N	25.990° E	leg. Stoyan Beshkov, Stanislav Abadjiev and Chris van Swaay, 20.05.2006
Arda Valley, opposite Kovan Kayabetween Bryagovetz and Momina Skala chalet	Bulgaria, Haskovo Region	41.637° N	25.850° E	leg. Stoyan Beshkov, I. Stoytchev and I. Duparinov, 04.05.2000
4 km from the bridge on Arda River near Madzharovo on the road to Borislavtzi	Bulgaria, Haskovo Region	41.645° N	25.881° E	leg. Stoyan Beshkov and H. Beck, 22.05.2004
Yazovir Ivaylovgrad Dam, Arda chalet, near Dabovetz	Bulgaria, Haskovo Region	41.656° N	25.973° E	leg. Stoyan Beshkov and Nikolay D. Kodzhabashev, 27.04.1990
„Kromleli” near Dolni Glavanak	Bulgaria, Haskovo Region	41.685° N	25.808° E	leg. Stoyan Beshkov, Stanislav Abadjiev and Chris van Swaay, 17.05.2006
Sheynovetz, above Mezek	Bulgaria, Haskovo Region	41.718° N	26.065° E	leg. Stoyan Beshkov and M. Beshkova, 04.05.2013
near Mustrak	Bulgaria, Haskovo Region	41.855° N	26.297° E	leg. Stoyan Beshkov and Ana Nahirnić, 03.05.2019
between Topolovgrad and Sinapovo	Bulgaria, Haskovo Region	42.115° N	26.399° E	leg. Stoyan Beshkov and Ana Nahirnić, 04.05.2019
National Park Rilski Manastir, Tihia Rila, near the end of the road to Ribni Ezera	Bulgaria, Kyustendil Region	42.133° N	23.481° E	leg. Stoyan Beshkov, M. Marinov and N. Dilchev, 29.07.1997
Ravna, above Rilski Manastir to Ivan Vazov hut	Bulgaria, Kyustendil Region	42.140° N	23.322° E	leg. Stoyan Beshkov, Stanislav Abadjiev and T. Yanakiev, 22.07.1989
Mine Persenk, Tchepelare district	Bulgaria, Lovech Region	42.846° N	24.549° E	leg. Stanislav Abadjiev, 16.05.1986

Table 1. (continued)

Locality and station	Country and region	Latitude	Longitude	Reference
between Panagyurishte and Streltcha, Popintsi Natura 2000 site	Bulgaria, Pazardzhik Region	42.482° N	24.235° E	leg. Stoyan Beshkov and R. Bekchiev, 02.06.2017
Kovatchevtzi	Bulgaria, Pernik Region	42.553° N	22.823° E	leg. Nikolay D. Kodzhabashev, 2-7.VII.1996
Tchaidere near Osmanov Vir, surroundings of Trigrad	Bulgaria, Smolean Region	41.624° N	24.395° E	leg. Stoyan Beshkov, 2005-2015
Sveti Spas Capel above Stoykite	Bulgaria, Smolean Region	41.644° N	24.637° E	leg. Stoyan Beshkov, 14.06.2011
Omurtag	Bulgaria, Targovishite Region	43.117° N	26.426° E	photo Guisen Mutlu, 29.05.2011
Kamitchiya, Ribarskoto selishte	Bulgaria, Varna Region	43.125° N	27.925° E	photo B. Benedek, 15.05.2010
Krumchevizi near Maysko	Bulgaria, Veliko Tarnovo Region	42.934° N	26.119° E	leg. Stoyan Beshkov and M. Beshkova, 07.05.2012
Hotnitsa	Bulgaria, Veliko Tarnovo Region	43.163° N	25.558° E	photo Ray Hamilton, 13.05.2011
Căpâlnaş	Romania, Arad County	45.967° N	22.236° E	König 1975; Burnaz 1993c; Stănescu 1995
Tinca	Romania, Bihor County	46.774° N	21.930° E	Ilie and Marinescu 2019; this report could not be verified based on captured specimens and/or field photos
Sămihaiu de Cămpie	Romania, Bistrița-Năsăud County	46.892° N	24.335° E	Vicol 1986; Ruști 1987
Prundu Bărgăului	Romania, Bistrița-Năsăud County	47.219° N	24.741° E	Ruști 1987
Prundu Bărgăului, Chicera Valley	Romania, Bistrița-Năsăud County	47.219° N	24.741° E	Togănel 1995
Maieru	Romania, Bistrița-Năsăud County	47.400° N	24.744° E	Ilie & Hoza 2019; this report could not be verified based on captured specimens and/or field photos
Șinca Nouă, Strâmba Valley	Romania, Brașov County	45.698° N	25.247° E	Rákósy 2009
Prejmer Forest	Romania, Brașov County	45.742° N	25.742° E	Székeley et al. 2017
Vlădeni	Romania, Brașov County	45.762° N	25.360° E	Ciochia and Barbu 1980; Székeley 1996
Șinca Veche	Romania, Brașov County	45.762° N	25.172° E	Ciochia and Barbu 1980
Șercaia, Dumbrava Vadului	Romania, Brașov County	45.772° N	25.102° E	Székeley et al. 2000; Székeley 2004; Dinca and Vîla 2008; Székeley and Görbe 2019
Bogății Forest	Romania, Brașov County	45.905° N	25.480° E	Székeley et al. 2017; data corroborated with the management plan of Natura2000 site ROSCI0137 Pădurea Bogății (Vizauer, pers. com.)
Racoș	Romania, Brașov County	46.024° N	25.409° E	Székeley 1996; Dinca and Vîla 2008
Băutar	Romania, Caraș-Severin County	45.516° N	22.566° E	Burnaz 2011

Table 1. (continued)

Locality and station	Country and region	Latitude	Longitude	Reference
Cornișoru	Romania, Caraș-Severin County	45.520° N	22.562° E	Burmaz 2011
Sălicea	Romania, Cluj County	46.675° N	23.525° E	Rákossy 1988
Cluj-Napoca, Gărbăului Valley	Romania, Cluj County	46.720° N	23.535° E	photo Diana Buchilă, 1.06.2020
Cluj-Napoca, Baci Forest	Romania, Cluj County	46.785° N	23.536° E	Goia and Dincă 2006
Dealurile Clujului de Est Natura 2000 site (ROSC10295)	Romania, Cluj County	46.900° N	23.600° E	Craioveanu et al. 2016
Șardu, Valea Șardului	Romania, Cluj County	46.902° N	23.355° E	Junker et al. 2015
Satu Lung	Romania, Cluj County	46.911° N	23.593° E	Pecsenye et al. 2018
Ciocaș Hill	Romania, Covasna County	45.772° N	25.687° E	Székely et al. 2017
Vâlcele	Romania, Covasna County	45.852° N	25.681° E	Czekelius 1895; Székely et al. 2017
Bixad	Romania, Covasna County	46.105° N	25.859° E	Kovács and Kovács 1986
Ișalnița	Romania, Dolj County	44.392° N	23.741° E	Chimișliu 2012
Răcari	Romania, Dolj County	44.504° N	23.549° E	leg. Cornelia Chimișliu, 24.05.1994; specimen in the collections of the Olteniei Museum, Craiova
Filiași	Romania, Dolj County	44.554° N	23.520° E	Chimișliu 2011
Vârghișului Gorge	Romania, Harghita County	46.205° N	25.539° E	Kovács and Kovács 1986
Săncrăieni, Valea Mare	Romania, Harghita County	46.301° N	25.786° E	Kovács and Kovács 1986
Vlăhța	Romania, Harghita County	46.321° N	25.513° E	Sándor and Székely 2020, confirmed by obs. Tibor-Csaba Vizauer, 2022
Băile Jigodin	Romania, Harghita County	46.340° N	25.809° E	obs. Tibor-Csaba Vizauer, 2011, 2022
Cioboteni	Romania, Harghita County	46.382° N	25.830° E	obs. Tibor-Csaba Vizauer, 2011
Cioboteni, Șumuleu Valley	Romania, Harghita County	46.376° N	25.854° E	obs. Tibor-Csaba Vizauer, 2020
Potond	Romania, Harghita County	46.393° N	25.958° E	obs. Tibor-Csaba Vizauer, 2020
Delnița	Romania, Harghita County	46.412° N	25.829° E	obs. Tibor-Csaba Vizauer, 2011
Delnița, Băile Bărzava	Romania, Harghita County	46.426° N	25.840° E	obs. Tibor-Csaba Vizauer, 2020
Frumoasa, Ciucului Mountains	Romania, Harghita County	46.453° N	25.853° E	obs. Tibor-Csaba Vizauer, 2011
Comiat	Romania, Harghita County	46.521° N	25.947° E	obs. Tibor-Csaba Vizauer, 2020

Table 1. (continued)

Locality and station	Country and region	Latitude	Longitude	Reference
Ciucului Mountains, Ugra Valley (Ugrapataka)	Romania, Harghita County	46.527° N	26.002° E	catpillars and their webs obs. Tibor-Csaba Vizauer, 2019
Izvoru Mureşului	Romania, Harghita County	46.622° N	25.689° E	Sándor and Székely 2020
Lunca de Jos, Iavardi Valley (Jávárdi-patak)	Romania, Harghita County	46.625° N	25.924° E	obs. Tibor-Csaba Vizauer, 2011
Gheorgheni	Romania, Harghita County	46.720° N	25.590° E	Sándor and Székely 2020
Gheorgheni, Belchia Valley	Romania, Harghita County	46.736° N	25.584° E	Sándor and Székely 2020
Gheorgheni, Chiruţul Mijlociu Valley (Közép-Kürtőc)	Romania, Harghita County	46.746° N	25.592° E	obs. Tibor-Csaba Vizauer, 2022
Izvoru Cerbului (Szarvas forrás)	Romania, Harghita County	46.741° N	25.665° E	Sándor and Székely 2020
Lăzarea	Romania, Harghita County	46.755° N	25.546° E	Sándor and Székely 2020
Hăşmaş Mountains, near Suhardul Mic	Romania, Harghita County	46.798° N	25.791° E	obs. Tibor-Csaba Vizauer, 17.06.2016
Făgeţel	Romania, Harghita County	46.835° N	25.305° E	obs. Sorin Stanciu, 12.06.2018
Băniţa - Boli Hill	Romania, Hunedoara County	45.447° N	23.320° E	Burnaz 2002
Băniţei Gorge	Romania, Hunedoara County	45.449° N	23.311° E	Burnaz 2002
Crivadia Gorge	Romania, Hunedoara County	45.468° N	23.214° E	Burnaz 2002
“Nucşoara daffodil hayfields” nature reserve	Romania, Hunedoara County	45.499° N	22.941° E	Burnaz 2008b; Burnaz and Ruşti 2009
Zeicani	Romania, Hunedoara County	45.499° N	22.726° E	Burnaz & Balász 2011
Sălaşu de Sus, meadow	Romania, Hunedoara County	45.514° N	22.956° E	Burnaz 2007
Şureanu Mountains	Romania, Hunedoara County	45.542° N	23.514° E	Burnaz 1993c
Karst region Ponorici-Cioclovina	Romania, Hunedoara County	45.572° N	23.145° E	Burnaz 2002
Govájdite	Romania, Hunedoara County	45.739° N	22.795° E	Burnaz 2002
Archia, Bejan forest	Romania, Hunedoara County	45.847° N	22.886° E	obs. Tibor-Csaba Vizauer and Ágnes Kastal, 2020
Almaşu Sec, Bejan forest	Romania, Hunedoara County	45.857° N	22.863° E	foto Alexandru Rădac, 24.04.2019
Buceş-Vulcan Mountain	Romania, Hunedoara County	45.926° N	23.099° E	Burnaz 2002
Mureşului river valley, between Gurasada and Zam	Romania, Hunedoara County	45.945° N	22.495° E	Burnaz 2010
Lunca	Romania, Hunedoara County	45.973° N	22.869° E	Burnaz 1992; Burnaz 2005



Table 1. (continued)

Locality and station	Country and region	Latitude	Longitude	Reference
Săcămb	Romania, Hunedoara County	45.974° N	23.038° E	Burnaz 1997
Zam	Romania, Hunedoara County	46.000° N	22.450° E	Burnaz 2002
Mada Gorge	Romania, Hunedoara County	46.008° N	23.124° E	Burnaz 1992; Burnaz 1993b; Burnaz 1993c; Burnaz 2002
Ardeului Gorge	Romania, Hunedoara County	46.016° N	23.144° E	Burnaz 2002
Boiu de Sus	Romania, Hunedoara County	46.019° N	22.590° E	Burnaz 2002
Crăciunești Gorge	Romania, Hunedoara County	46.024° N	22.872° E	Burnaz 1992; Burnaz 1993c; Burnaz 2005
Godinești	Romania, Hunedoara County	46.024° N	22.533° E	Burnaz 1992; Burnaz 1993c; Burnaz 2002
Ribicioarei Gorge	Romania, Hunedoara County	46.236° N	22.770° E	Burnaz 2002
Șureanu Mountains, Valea Luncani	Romania, Hunedoara County	46.472° N	23.951° E	Burnaz 1993a
0.5 km north-east of Cireșu	Romania, Mehedinți County	44.829° N	22.544° E	Papé et al. 2013
Baia de Aramă	Romania, Mehedinți County	45.000° N	22.811° E	Chimișliu and Goga 2005
Sighișoara-Târnava Mare Natura 2000 site (ROSC10227)	Romania, Mureș County	46.109° N	24.820° E	Rákósy 2010
Saschiz	Romania, Mureș County	46.194° N	24.962° E	Schneider 1984
Sighișoara	Romania, Mureș County	46.217° N	24.791° E	Rákósy and Weber 1986
Mujideni	Romania, Satu Mare County	47.845° N	23.253° E	Ardelean 1998
Mujideni Forest	Romania, Satu Mare County	47.853° N	23.205° E	Szabó 2008
Stana	Romania, Sălaj County	46.833° N	23.117° E	Junker et al. 2015; however, the coordinates provided in this published paper (46° 50' N, 23° 07' E) correspond to a point located near Izvoru Crișului, Cluj county, about 5,5 km south from Stana
Bozolinic graveyard	Romania, Sălaj County	46.970° N	23.228° E	leg. Carol Bere and C. Radu, 07.06.1997
Meseșului Mountains, Poicu stream	Romania, Sălaj County	46.979° N	22.927° E	Bălint et al. 2016
Ugruțiu, Almaș-Agrij Depression	Romania, Sălaj County	47.019° N	23.363° E	Bălint et al. 2016; Katona et al. 2016
Dumbrava Sibiului	Romania, Sibiu County	45.742° N	24.091° E	Niculescu, 1965
Panaci	Romania, Suceava County	47.234° N	25.369° E	obs. Constantin Corduneanu, 23.06.2022
Groși	Romania, Timiș County	45.915° N	22.285° E	Stănescu 2005

1000 m, thus increasing the altitude up to which this species can be found in Romania compared to previous reports (Székely 2008).

During the first decade of May 2015, Prunar and Ardelean have targeted the specific habitat and found specimens of this butterfly at the edge of the Hotâroasa forest, Gorj County (May 3, 44.815° N, 23.248° E), Bratovoiești, Pădurea lui Barbu, Dolj County (May 8, 44.103° N, 23.891° E; Fig. 2) and Gârbovu, Dealu Mare Monastery, Gorj County (May 9, 44.719° N, 23.317° E; Fig. 3). All these reports were within the limits of the Natura2000 site ROSCI0045 Coridorul Jiului. The number of the spotted specimens was particularly high in the vicinity of the Dealu Mare Monastery, near the village Gârbovu, Gorj County. These findings have confirmed the presence of the Marsh Fritillary in Oltenia.

About 7 years later came the first record from Wallachia: following a rather unsteady and cold spring, during May 2022 weather has improved substantially and conditions were met for resuming the field searches. Taking advantage of these conditions, Alexandru Iftime chanced upon a suitable habitat for the Marsh Fritillary north from Goia, Argeș County, at the edge of the Voineasca forest. It was in the early afternoon of May 7, 2022, when he managed to spot and photograph of a Marsh Fritillary female (Fig. 4) flying along a woodland edge (44.535° N, 24.999° E). Unlike the populations identified in Oltenia during 2015, this one is not located on the territory of a protected area. Nevertheless, together with the above-mentioned



**Figure 2.** *Euphydryas aurinia* – Bratovoiești, Pădurea lui Barbu (Dolj County). May 8, 2015; photo Florin Prunar and Adorian Ardelean.



**Figure 3.** *Euphydryas aurinia* – Gârbovu, Dealu Mare Monastery (Gorj County). May 9, 2015; photo Florin Prunar and Adorian Ardelean.

records from Oltenia, Iftime's one extends the known distribution of the Marsh Fritillary further south in Romania, proving that stable populations of this butterfly are found also between the Transylvanian Alps and the Danube.

## Discussion

In most of Europe, the Marsh Fritillary is a grassland specialist that can be found in wet, unfertilized meadows. According to Rákósy (2013), all known populations on the territory of Romania are found in wet meadows that harbour the most important food plant of this butterfly across its European range: the devil's-bit (*Succisa pratensis*). However, next to this, other species of related genera (*Knautia* sp., *Scabiosa* sp. and also *Centaurea* sp., *Lonicera* sp., *Symphoricarpos* sp., *Gentiana* sp., *Teucrium* sp., *Plantago* sp., *Primula* sp., *Digitalis* sp., *Veronica* sp. and *Centranthus* sp.) have been reported also as foodplants of the Marsh Fritillary (e.g. Peñuelas et al. 2006; Švitra and Sielezniew 2010 etc).

Along with the Apollo butterfly *Parnassius apollo* (Linnaeus, 1758) and the large blue *Phengaris arion* (Linnaeus, 1758), the Marsh Fritillary is one of the most frequently occurring species within the European Prime Butterfly Areas (PBA), each of these 3 species being found in over 100 PBAs (van Swaay and Warren 2006).



**Figure 4.** *Euphydryas aurinia*, female – Goia, Voineasca forest (Argeş County). May 7, 2022; photo Alexandru Iftime.

Together with the large scarce blue *Phengaris teleius* (Bergsträsser, 1779) these three species also have the largest number of identified breeding areas, with at least 1000 estimated populations within the PBAs. However, very few species have undergone increase of the local populations on PBAs, the maximum being the one of the Marsh Fritillary with five sites (but for 37 sites, the overall reported abundance has decreased, for 71 sites it was found to be stable and for 60 sites, the overall reported abundance was considered unknown – van Swaay and Warren 2006). Given these, the Marsh Fritillary appears as a species with high protective potential at least all over its European range.

But through much of this distribution range, the Marsh Fritillary depends on the maintenance of traditional low intensity grazing regimes. Although this species has highly dynamic populations, it is declining due to the isolation and fragmentation of its natural habitats as well as from changing management mainly through agricultural improvements, drainage, abandonment of pasture land, successional changes and inappropriate grassland management. Other encountered threats include afforestation (especially on non-woodland habitats), chemical pollution due to excessive use of herbicides, pesticides and also chemical fertilizers, built-up area development, change,

abandonment of management or even destruction of woodland (e.g., replanting with conifers), recreational pressure and disturbance etc. Moreover, carrying on the traditional agricultural practices in wet meadows as well as in wet forest meadows and clearings is seen as a critical issue not only for the Marsh Fritillary, but also for many other wildlife groups and will require action both at a regional and local level. Finally, the conservation of the Marsh Fritillary requires that wet meadows should be used extensively and that excessive expansion of trees and shrubs should be prevented (van Swaay et al. 2012).

Aside from preserving the natural habitats suitable for this species, the records presented in this paper convincingly demonstrate that further efforts must be carried out for a better mapping and monitoring of this species in Romania, to increase the number of known populations, to assess their conservation status and to fill the gaps in the known distribution of this species. Besides, studies should be undertaken to increase the knowledge of the biology at this species, in order to build effective conservation strategies.

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## References

- Ardelean G (1998) Ordinul Lepidoptera. In: Ardelean G (Ed.) Fauna județului Satu Mare. Țara Oașului, Culmea Codrului și Câmpia Someșului. “Vasile Goldiș” University Press, Satu Mare: 155–218. [in Romanian]
- Bálint Z, Katona G, Ronkay L (2016) Data to the knowledge of the Macrolepidoptera fauna of the Sălaj-region, Transylvania, Romania (Arthropoda: Insecta). *Studia Universitatis “Vasile Goldiș”, Seria Științele Vieții*, 26 supplement 1: 59–74. <http://www.studiauniversitatis.ro/pdf/26-2016/26-%20ssp%201-%202016/2-%20SU26-%20SPP1-%20Z.B-%2059-74.pdf>
- Beshkov S (2009) Contribution to the knowledge of the Macrolepidoptera fauna of the “Strandzha” Natural Park, SE Bulgaria (Lepidoptera, Macrolepidoptera). *Atalanta* 40(3–4): 507–523. [https://www.researchgate.net/publication/312033714\\_Contribution\\_to\\_the\\_knowledge\\_of\\_the\\_Macrolepidoptera\\_fauna\\_of\\_the\\_Strandzha\\_Natural\\_Park\\_SE\\_Bulgaria\\_Lepidoptera\\_Macrolepidoptera](https://www.researchgate.net/publication/312033714_Contribution_to_the_knowledge_of_the_Macrolepidoptera_fauna_of_the_Strandzha_Natural_Park_SE_Bulgaria_Lepidoptera_Macrolepidoptera)
- Burnaz S (1992) Contribuții la cunoașterea faunei macrolepidopterelor din zonele carstice ale Munților Metaliferi. *Buletin de informare. Societatea Lepidopterologică Română* 3(2):

- 19–32. [in Romanian] [http://entobuletin.lepidoptera.ro/03\\_1992/BIE03b199205\\_Burnaz.pdf](http://entobuletin.lepidoptera.ro/03_1992/BIE03b199205_Burnaz.pdf)
- Burnaz S (1993a) Date preliminare privind fauna de macrolepidoptere din etajul pădurilor de foioase ale Munților Șureanu (Sectorul Parcului Natural Grădiștea Muncelului-Ciclovină). *Sargetia, Acta Musei Devensis, Series Scientia Naturae* 14–15: 131–140. [in Romanian]
- Burnaz S (1993b) Date privind fauna de macrolepidoptere din zonele calcaroase situate în bazinul superior al Văii Geoagiului (județul Hunedoara). *Sargetia, Acta Musei Devensis, Series Scientia Naturae* 14–15: 141–156. [in Romanian]
- Burnaz S (1993c) Catalogul colecției de lepidoptere a Muzeului Județean Hunedoara – Deva. *Sargetia, Acta Musei Devensis, Series Scientia Naturae* 14–15: 157–302. [in Romanian]
- Burnaz S (1997) Données concernant les macrolépidoptères de la localité de Săcărâmb (le département de Hunedoara). *Sargetia, Acta Musei Devensis, Series Scientia Naturae* 17: 145–167. [in French]
- Burnaz S (2002) Fauna de lepidoptere diurne (Ord. Lepidoptera, S.ord. Rhopalocera) a județului Hunedoara, România. Considerații ecologice, biologice și zoogeografice. *Buletin de informare. Societatea Lepidopterologică Română*, 13(1–4): 41–66. [in Romanian] [http://entobuletin.lepidoptera.ro/13\\_2002/BIE13200204\\_Burnaz.pdf](http://entobuletin.lepidoptera.ro/13_2002/BIE13200204_Burnaz.pdf)
- Burnaz S (2005) Macrolepidoptera species of the Crăciunești gorges and the neighbourhood of the localities Lunca and Băița (Metaliferi Mountains, Western Carpathians, Romania). *Buletin de informare entomologică* 16: 7–34. [in Romanian]
- Burnaz S (2007) Data about macrolepidoptera (s. ord. Rhopalocera) fauna of the Hațeg basin (Hunedoara county, Romania). *Oltenia. Studii și comunicări. Științele Naturii* 23: 71–76. <http://biozoojournals.ro/oscsn/cont/23/IZ03-Burnaz.pdf>
- Burnaz S (2008b) Butterflies (S.ord. Rhopalocera) of the protected area The lawns of Sălașu de Sus (Hunedoara County, Romania). *Sargetia, Acta Musei Devensis, Series Scientia Naturae* 21: 143–157.
- Burnaz S (2010) Contributions to the knowledge of the Macrolepidoptera fauna of Hunedoara county (Romania). *Oltenia. Studii și comunicări. Științele Naturii* 26(1): 151–159. [http://olteniastudiisicomunicaristiintelenaturii.ro/cont/26\\_1/IZ15-Burnaz.pdf](http://olteniastudiisicomunicaristiintelenaturii.ro/cont/26_1/IZ15-Burnaz.pdf)
- Burnaz S (2011) Data about diurnal Lepidoptera fauna (Ord. Lepidoptera, S. ord. Rhopalocera) of the Poiana Ruscă Mountains (Western Carpathians, Romania); the area of Băuțar-Cornișor-Micota Valley (Caraș-Severin County). *Buletin de informare entomologică* 22: 79–88. [http://entobuletin.lepidoptera.ro/22\\_2011/BIE22201109\\_Burnaz.pdf](http://entobuletin.lepidoptera.ro/22_2011/BIE22201109_Burnaz.pdf)
- Burnaz S, Balász M (2011) Contributions to the knowledge of diurnal Lepidoptera fauna of the North-Eastern part of Țarcu Mountains (Southern Carpathians, Romania). *Buletin de informare entomologică* 22: 41–52. [http://entobuletin.lepidoptera.ro/22\\_2011/BIE22201104\\_Burnaz\\_Balazs.pdf](http://entobuletin.lepidoptera.ro/22_2011/BIE22201104_Burnaz_Balazs.pdf)
- Burnaz S, Ruști D (2009) Butterflies of the Natural Reserves of the Geopark of Dinosaurs-Hațeg country (Hunedoara county, Romania). *Romanian Journal of Biology, Zoology* 54(2): 129–138. <https://www.ibiol.ro/zoology/Volume%2054/PDF%20RJB-Z%2054%202,%202009.pdf>
- Chimișliu C (2011) New data regarding the diversity of the Nymphalidae Family (Insecta: Lepidoptera) in the Oltenia fauna, Romania (I). *Volumul de lucrări al*

- Simpozionului „Biodiversitatea și Managementul Insectelor din România”. Suceava, 24–25 septembrie 2010. În memoria entomologului bucovinean Ioan Nemeș. Suceava, Universitatea „Ștefan cel Mare”, Facultatea de Silvicultură și Societatea Lepidopterologică Română: 48–63. [https://www.researchgate.net/publication/259922284\\_Volumul\\_de\\_lucrari\\_al\\_Simpozionului\\_Biodiversitatea\\_si\\_Managementul\\_Insectelor\\_din\\_Romania\\_Suceava\\_24-25\\_septembrie\\_2010](https://www.researchgate.net/publication/259922284_Volumul_de_lucrari_al_Simpozionului_Biodiversitatea_si_Managementul_Insectelor_din_Romania_Suceava_24-25_septembrie_2010)
- Chimișliu C (2012) Noi date privind diversitatea familiei Nymphalidae (Insecta: Lepidoptera) în fauna Olteniei, România (II). Buletinul științific al Muzeului Național de Etnografie și Istorie Naturală a Moldovei 16(29): 16–26. [in Romanian] [https://ibn.idsi.md/sites/default/files/imag\\_file/Noi%20date%20privind%20diversitatea%20familiei%20Nymphalidae.pdf](https://ibn.idsi.md/sites/default/files/imag_file/Noi%20date%20privind%20diversitatea%20familiei%20Nymphalidae.pdf)
- Chimișliu C, Goga C (2005) Catalogul macrolepidopterelor donației „Ioan Stănoiu”, conservată în patrimoniul Secției de Științele Naturii a Muzeului Olteniei Craiova. Studii și comunicări, Complexul Muzeal de Științele Naturii “Ion Borcea” Bacău 20: 103–120. [in Romanian] <http://studiisicomunicaribacau.ro/pdfs/20-2005/15.%20Chimisliu%20C.,%20Goga%20C.%20-%20Catalogul%20macrolepidopterelor%20donației%20Ioan%20Stanoiu%20conservata%20in%20patrimoniul%20secției%20de%20științele%20naturii%20a%20Muzeului%20Olteniei%20Craiova.pdf>
- Ciochia V, Barbu A (1980) Catalogul colecției de lepidoptere “N. Delvig” a Muzeului Județean Brașov. Cumidava, Muzeul Județean Brașov, Oficiul pentru patrimoniul cultural național 12(4): 1–149. [in Romanian]
- Craioveanu C, Muntean I, Rákossy L (2016) Variații în comunitățile de fluturi diurni din parcele gestionate tradițional sau modern din Situl Natura2000 Dealurile Clujului Est. Buletin de informare. Societatea Lepidopterologică Română, Supliment 2: 13–24. [in Romanian]
- Czekelius D (1895) Beiträge zur Lepidopteren und Odonaten-Fauna Siebenbürgens. Verhandlungen und Mitteilungen des Siebenbürgischen Vereins für Naturwissenschaften Hermannstadt 46: 82–88. [in German] [https://www.zobodat.at/pdf/VerhMittNaturwissHermannstadt\\_46\\_0082-0088.pdf](https://www.zobodat.at/pdf/VerhMittNaturwissHermannstadt_46_0082-0088.pdf)
- Dincă V, Vila R (2008) Improving the knowledge on Romanian Rhopalocera, including the rediscovery of *Polyommatus amandus* (Schneider, 1792) (Lycaenidae) and an application of DNA-based identification. Nota Lepidopterologica 31 (1): 3–23. [https://www.zobodat.at/pdf/Nota-lepidopterologica\\_31\\_0003-0023.pdf](https://www.zobodat.at/pdf/Nota-lepidopterologica_31_0003-0023.pdf)
- Fleck E (1900) Die Macrolepidopteren Rumäniens (I). Bulletin de la Société des Science de Bucarest 8(6): 682–773. [in German] <http://www.jstor.org/stable/43770957>
- Franzenau J (1852) Lepidopterologische Mitteilungen. Verhandlungen und Mitteilungen des Siebenbürgischen Vereins für Naturwissenschaften zu Hermannstadt 3: 181–186. [in German] [https://www.zobodat.at/pdf/VerhMittNaturwissHermannstadt\\_3\\_0181-0186.pdf](https://www.zobodat.at/pdf/VerhMittNaturwissHermannstadt_3_0181-0186.pdf)
- Goia M, Dincă V (2006) Structura și răspândirea faunei de lepidoptere diurne (Hesperioidea & Papilionoidea) în împrejurimile municipiului Cluj-Napoca și aspecte actuale ale influenței antropozogene asupra mediului de viață al acestora. Buletin de informare. Societatea Lepidopterologică română 17: 139–197. [in Romanian] [http://entobuletin.lepidoptera.ro/17\\_2006/BIE17200603\\_Goia\\_Dinca.pdf](http://entobuletin.lepidoptera.ro/17_2006/BIE17200603_Goia_Dinca.pdf)

- Ilie A, Hoza I (2019) Researches about the butterflies (Insecta; Lepidoptera) from Maieru area (Bistrița-Năsăud county, Romania). *Educația omului de azi pentru lumea de mâine / Human education today for tomorrow's world*, Editura Universul Academic (SC Good Luck SRL) 16(2): 89–93. <https://www.ceeol.com/search/article-detail?id=828142>
- Ilie A, Marinescu M (2019) Researches about the butterflies (Insecta, Lepidoptera) from Tinca area (Bihor County, north-western part of Romania). *Annals of the University of Oradea, Fascicle: Ecotoxicology, Animal Husbandry and Food Science and Technology* 18/B: 57–62. [https://protmed.uoradea.ro/facultate/publicatii/ecotox\\_zooteh\\_ind\\_alim/2019B/Agri/09%20Ilie.pdf](https://protmed.uoradea.ro/facultate/publicatii/ecotox_zooteh_ind_alim/2019B/Agri/09%20Ilie.pdf)
- Junker M, Zimmermann M, Ramos A, Gros P, Konvička M, Nève G, Rákósy L, Tammaru T, Castilho R, Schmitt T (2015) Three in one – Multiple faunal elements within an endangered european butterfly species. *PLoS ONE* 10(11): 1–24. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0142282>
- Katona G, Ronkay L, Szabóky C, Bálint Z (2016) New data to the knowledge of the Lepidoptera fauna of the Sălaj-Region, Transylvania, Romania (Arthropoda: Insecta). *Studia Universitatis „Vasile Goldiș”, Seria Științele Vieții (Life Sciences Series)* 26(4): 411–414. [https://www.researchgate.net/publication/314724609\\_New\\_Data\\_to\\_the\\_Knowledge\\_of\\_the\\_Lepidoptera\\_Fauna\\_of\\_the\\_Salaj-Region\\_Transylvania\\_Romania\\_Arthropoda\\_Insecta](https://www.researchgate.net/publication/314724609_New_Data_to_the_Knowledge_of_the_Lepidoptera_Fauna_of_the_Salaj-Region_Transylvania_Romania_Arthropoda_Insecta)
- Kovács S, Kovács Z (1986) Date privind fauna de lepidoptere ale mlaștinilor de turbă din sudul Carpaților Orientali. *Aluta* 17–18: 63–89. [in Romanian] [https://epa.oszk.hu/03300/03316/00013/pdf/EPA03316\\_aluta\\_1985-1986\\_063\\_089.pdf](https://epa.oszk.hu/03300/03316/00013/pdf/EPA03316_aluta_1985-1986_063_089.pdf)
- König F (1975) Catalogul colecției de lepidoptere a Muzeului Banatului. Muzeul Banatului, Timișoara, 248 pp. [in Romanian]
- Leraut P (2016) *Butterflies of Europe and neighbouring regions*. N.A.P Editions, Verrières-le-Buisson, 1116 pp.
- Lungoci A (1972) Papilionoidea (Lepidoptera) din pădurile din nordul podișului Moldovei. *Studii și comunicări – Muzeul de Științele Naturii Dorohoi*: 187–190. [in Romanian]
- Maes D, Verovnik R, Wiemers M, Brosens D, Beshkov S, Bonelli S, Buszko J, Cantú-Salazar L, Cassar L-F, Collins S, Dincă V, Djuric M, Dušej G, Elven H, Franeta F, Garcia-Pereira P, Geryak Y, Goffart P, Gór Á, Hiermann U, Höttinger H, Huemer P, Jakšić P, John E, Kalivoda H, Kati V, Kirkland P, Komac B, Kőrösi Á, Kulak A, Kuussaari M, L'Hoste L, Lelo S, Mestdagh X, Micevski N, Mihoci I, Mihuț S, Monasterio-León Y, Morgun D, Munguira M, Murray T, Nielsen P, Ólafsson E, Öunap E, Pamperis L, Pavlíčko A, Pettersson L, Popov S, Popović M, Pöyry J, Prentice M, Reyserhove L, Ryrholm N, Šašić M, Savenkov N, Settele J, Sielezniew M, Sinev S, Stefanescu C, Švitra G, Tammaru T, Tiitsaar A, Tzirkalli E, Tzortzakaki O, van Swaay C, Viborg A, Wynhoff I, Zografou K, Warren M (2019) Integrating national Red Lists for prioritising conservation actions for European butterflies. *Journal of Insect Conservation* 23: 301–330. <https://doi.org/10.1007/s10841-019-00127-z>
- Mann J (1866) Aufzählung der im Jahre 1865 in der Dobrudscha gesammelten Schmetterlinge. *Verhandlungen des kaiserlich-königlich zoologisch-botanischen Gesellschaft in Wien* 16: 1–40. [in German] [https://www.zobodat.at/pdf/VZBG\\_16\\_0321-0360.pdf](https://www.zobodat.at/pdf/VZBG_16_0321-0360.pdf)



- Mihăilescu S, Strat D, Cristea I, Honciuc V (2015) Raportul sintetic privind starea de conservare a speciilor și habitatelor de interes comunitar din România [Synthetic report on the conservation state of community interest species and habitats in Romania]. Editura Dobrogea, Constanța, 280 pp. [in Romanian]
- Niculescu E (1965) Lepidoptera. Familia Nymphalidae. In Fauna R. P. R., Insecta, Editura Academiei, București, volumul XI, fascicula 7, 358 pp. [in Romanian]
- Papé C, Muntean I, Rákósy L (2013) Macrolepidoptere din Oltenia semnalate pe baza fotografiilor din natură. Buletin de informare. Societatea Lepidopterologică Română 24: 68–84. [in Romanian] [http://entobuletin.lepidoptera.ro/24\\_2013/BIE24201310\\_Pape\\_etal.pdf](http://entobuletin.lepidoptera.ro/24_2013/BIE24201310_Pape_etal.pdf)
- Pecsénye K, Tóth A, Tóth J, Bereczki J, Katona G, Varga Z (2018) Surprising diversity in the Pannonian populations of Marsh Fritillary (*Euphydryas aurinia*, Lepidoptera: Nymphalidae): Morphometric and molecular aspects. *Journal of Zoological Systematics and Evolutionary Research* 56(4): 519–532. doi: doi.org/10.1111/jzs.12227
- Peñuelas J, Sardans J, Stefanescu C, Parella T, Filella I (2006). *Lonicera implexa* leaves bearing naturally laid eggs of the specialist herbivore *Euphydryas aurinia* have dramatically greater concentrations of iridoid glycosides than other leaves. *Journal of Chemical Ecology* 32: 1925–1933. doi: 10.1007/s10886-006-9118-8.
- Rákósy L (1988) A valuable collection of Lepidoptera in the Zoological Museum of the University in Cluj-Napoca (Part II). *Studia Universitatis Babeş-Bolyai, Biologia* 33(1): 72–95
- Rákósy L (2009) Macrolepidoptere din perimetrul comunei Șinca Nouă (jud. Brașov). Buletin de informare. Societatea Lepidopterologică română 20: 5–26. [in Romanian] [http://entobuletin.lepidoptera.ro/20\\_2009/BIE20200901\\_Rakosy.pdf](http://entobuletin.lepidoptera.ro/20_2009/BIE20200901_Rakosy.pdf)
- Rákósy L (2010) Micul ghid al fluturilor din Situl Natura 2000 Sighișoara-Târnava Mare. Editura Fundația ADEPT, Saschiz (jud. Mureș), 54 pp. [in Romanian]
- Rákósy L (2013) Fluturii din România. Cunoaștere, protecție, conservare [The butterflies from Romania. Knowledge, protection, conservation]. Editura Mega, Cluj-Napoca, 352 pp. [in Romanian]
- Rákósy L (2021) *Euphydryas aurinia* (Rottemburg, 1775). In: Murariu D, Maican S (Eds) The Red Book of Invertebrates of Romania. Romanian Academy Publishing House, Bucharest, p. 332. [in Romanian and English]
- Rákósy L, Corduneanu C, Crișan A, Dincă V, Kovács S, Stănescu M, Székely L (2021) Lista roșie a fluturilor din România / Romanian Red List of Lepidoptera. Presa Universitară Clujeană, Cluj-Napoca, 187 pp. [in Romanian and English]
- Rákósy L, Goia M (2021) Lepidopterele din România: lista sistematică și distribuție / The Lepidoptera of Romania: a distributional checklist. Presa Universitară Clujeană, Cluj-Napoca, 369 pp. [in Romanian and English]
- Rákósy L, Weber W (1986) Die Großschmetterlinge von Sighișoara (Schässburg) und Umgebung, Siebenbürgen, Rumänien. (Lepidoptera). *Atalanta* 16: 315–392. [in German] [https://www.zobodat.at/pdf/Atalanta\\_16\\_0315-0392.pdf](https://www.zobodat.at/pdf/Atalanta_16_0315-0392.pdf)

- Ruști D (1987) La faune de Lépidoptères Rhopalocères du département de Bistrița-Năsăud (Roumanie). Écologie et zoogéographie. Travaux du Museum d'Histoire Naturelle "Grigore Antipa" 29: 139–153. [in French]
- Sándor L, Székely L (2020) The butterfly fauna (Lepidoptera, Papilionoidea) of Gheorgheni area (Harghita county, Romania). Brukenthal. Acta Musei 15(3): 445–460.
- Schneider E (1984) Die Groß-Schmetterlinge der Sammlung Dr. V. Weindel. Ein Beitrag zur Faunistik der Lepidopteren Südsiebenbürgens und angrenzender Gebiete. Muzeul Brukenthal, Studii și comunicări de științele naturii 26: 289–316. [in German]
- Stănescu M (1995) The catalogue of "Ludovic Beregszászy" lepidopteran collection (Insecta: Lepidoptera). Travaux du Museum d'Histoire Naturelle "Grigore Antipa" 35: 221–346.
- Stănescu M (2005) The catalogue of the "Ioan Lăzărescu" collection of Lepidoptera (Insecta) from the "Grigore Antipa" National Museum of Natural History (Bucharest). Travaux du Museum Nationale d'Histoire Naturelle "Grigore Antipa" 48: 213–288.
- Szabó I (2008) Fauna de lepidoptere a rezervației Râul Tur. In: Sike T, Márk-Nagy J (Eds) Flora și fauna Rezervației Naturale "Râul Tur"/The Flora and Fauna of the Tur River Natural Reserve". Bihorean Biologist 2, Supplement 1: 63–70. [in Romanian]
- Székely L (1992) Contribuții la cunoașterea faunei de macrolepidoptere din județul Botoșani (Moldova, România). Buletin de Informare. Societatea Lepidopterologică Română 3(3): 7–17. [in Romanian] [http://entobuletin.lepidoptera.ro/03\\_1992/BIE03c199202\\_Szekely.pdf](http://entobuletin.lepidoptera.ro/03_1992/BIE03c199202_Szekely.pdf)
- Székely L (1996) Lepidopterele din sud-estul Transilvaniei. Editura Disz. Tipo, Săcele, 78 pp. <https://szekelylevente.ro/uploads/documents/9bd6ab8ec7a2281492e5570adf2007cc.pdf>
- Székely L (2004) Noutăți Lepidopterologice din sud-estul Transilvaniei (județul Brașov, România). Buletin de informare entomologică 14–15: 41–56. [in Romanian] [http://entobuletin.lepidoptera.ro/14\\_15\\_2003\\_2004/BIE14152003200405\\_Szekely.pdf](http://entobuletin.lepidoptera.ro/14_15_2003_2004/BIE14152003200405_Szekely.pdf)
- Székely L (2008) The Butterflies of Romania / Fluturii de zi din România. C2 Design, Brașov, 305 pp. [in Romanian and English]
- Székely L, Görbe R (2019) The lepidoptera fauna of "Dumbrava Vadului - Poienile cu narcise" forest (Șercaia, Brașov county, Romania). Brukenthal. Acta Musei 14(3): 597–620. <https://szekelylevente.ro/uploads/documents/6e9da14d6d3cf5ceb0b7c69eb5d05c90.pdf>
- Székely L, Kocs I, Szabó G, Stanciu S (2000) Rezultatele taberei entomologice S.L.R. (8–12 iunie 2000) de la "Poienile cu Narcise-Dumbrava Vadului" (Șercaia, jud. Brașov). Buletin de informare. Societatea Lepidopterologică Română 11(1–4): 63–79 [in Romanian] [http://entobuletin.lepidoptera.ro/11\\_2000/BIE11200005\\_Szekely\\_etal.pdf](http://entobuletin.lepidoptera.ro/11_2000/BIE11200005_Szekely_etal.pdf)
- Székely S, Stanciu S, Firța D (2017) Macrolepidopterele din siturile "Natura 2000": Pădurea Bogății, Dumbrăvița, Dealul Lempeș, Pădurea Prejmer (Județul Brașov) și Dealul Ciocaș-Vâlcele (Județul Covasna), România. Buletin de Informare Entomologică 28: 5–25. [in Romanian] [http://entobuletin.lepidoptera.ro/28\\_2017/BIE28201701\\_Szekely\\_etal.pdf](http://entobuletin.lepidoptera.ro/28_2017/BIE28201701_Szekely_etal.pdf)
- Švitra G, Sielezniew M (2010) The first observation of *Euphydryas aurinia* (Lepidoptera, Nymphalidae) developing on *Gentiana cruciata* in Lithuania. Polish Journal of Entomology 79: 195–201. [https://sparrow.up.poznan.pl/pte/ppe/PJE\\_2010/13\\_Svitra\\_Sielezniew.pdf](https://sparrow.up.poznan.pl/pte/ppe/PJE_2010/13_Svitra_Sielezniew.pdf)
- Togănel F (1995) Catalogul colecției de lepidoptere "Ernest Halabori". Marisia. Studia Scientiarum Naturae 23–24(2): 339–359. [in Romanian]

- van Swaay C, Collins S, Dušej G, Maes D, Munguira M, Rákósy L, Ryrholm N, Šašić M, Settele J, Thomas J, Verovnik R, Verstrael T, Warren M, Wiemers M, Wynhoff I (2012) Dos and Don'ts for butterflies of the Habitats Directive of the European Union. *Nature Conservation* 1: 73–153. <https://natureconservation.pensoft.net/article/1326/>
- van Swaay C, Cuttelod A, Collins S, Maes D, Munguira M, Šašić M, Settele J, Verovnik R, Verstrael T, Warren M, Wiemers M, Wynhoff I (2010) *European Red List of Butterflies*. Publications Office of the European Union, Luxembourg, 47 pp. [https://ec.europa.eu/environment/nature/conservation/species/redlist/downloads/European\\_butterflies.pdf](https://ec.europa.eu/environment/nature/conservation/species/redlist/downloads/European_butterflies.pdf)
- van Swaay C, Warren M (1999) *Red Data Book of European Butterflies (Rhopalocera)*. *Nature and Environment* 99. Council of Europe Publishing, Strasbourg, France, 260 pp. [https://www.researchgate.net/profile/Chris-Swaay/publication/234022271\\_Red\\_Data\\_Book\\_of\\_European\\_Butterflies\\_Rhopalocera/links/09e4150e549164db3c000000/Red-Data-Book-of-European-Butterflies-Rhopalocera.pdf](https://www.researchgate.net/profile/Chris-Swaay/publication/234022271_Red_Data_Book_of_European_Butterflies_Rhopalocera/links/09e4150e549164db3c000000/Red-Data-Book-of-European-Butterflies-Rhopalocera.pdf)
- van Swaay C, Warren M (2006) Prime Butterfly Areas of Europe: an initial selection of priority sites for conservation. *Journal of Insect Conservation* 10: 5–11. <https://doi.org/10.1007/s10841-005-7548-1>
- Vicol V (1986) Contribuții la studiul faunei de Rhopalocera (Lepidoptera) din județul Bistrița-Năsăud, R. S. România. *Lucrările celei de a III-a Conferințe de Entomologie, Iași, 20–22 mai 1983*: 141–148. [in Romanian]
- Zlatkov B, Beshkov S (2008) New and rare macrolepidoptera (Insecta: Lepidoptera) from Bulgaria. *Acta zoologica bulgarica, Supplement 2*: 325–330. [https://www.researchgate.net/publication/298361206\\_New\\_and\\_Rare\\_Macrolepidoptera\\_Insecta\\_Lepidoptera\\_from\\_Bulgaria](https://www.researchgate.net/publication/298361206_New_and_Rare_Macrolepidoptera_Insecta_Lepidoptera_from_Bulgaria)
- \*\*\* Article 17 web tool - Species assessments at Member State level. <https://nature-art17.eionet.europa.eu/article17/species/report/?period=5&group=Arthropods&country=RO&region=> (accessed on December 22, 2022)