New data regarding the butterflies (Lepidoptera: Rhopalocera) of Romania, with additional comments (general distribution in Romania, habitat preferences, threats and protection) for ten localized Romanian species

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Abstract. During a field trip from mid July to early August 2006, the authors found new data regarding the distribution of different butterfly species (Rhopalocera: Papilionoidea and Hesperioidea) in Romania. All observations of this joint research trip are presented and focus is given on ten target species by additional comments on the distributional, ecological and legislative aspects in the country. *Erebia sudetica radnaensis* Rebel, 1915 is recorded for the first time in Făgăraş Mountains and the male genitalia of this Romanian taxon is figured for the first time as a novelty. The habitus of male and female *Boloria* (*Clossiana*) *titania transsylvanica* Tiltscher, 1913 is also figured.

Samenvatting. Nieuwe gegevens over de dagvlinders van Roemenië (Lepidoptera: Papilionoidea & Hesperioidea), met aanvullend commentaar (algemene verspreiding in Roemenië, habitatvoorkeuren, bedreiging en bescherming) voor tien lokale, Roemeense soorten
Gedurende een vlinderreis, van midden juli tot begin augustus 2006, vonden de auteurs nieuwe gegevens over de verspreiding van meerdere dagvlindersoorten (Lepidoptera: Papilionoidea en Hesperioidea) in Roemenië. Alle observaties van deze gemeenschappelijke zoektocht worden weergegeven waarbij aandacht gegeven wordt aan tien doelsoorten met additionele commentaren rond de verspreiding, ecologische en legislatieve aspecten in het land. Voor het eerst wordt *Erebia sudetica radnaensis* Rebel, 1915 gemeld uit het Făgăraş gebergte en worden de mannelijke genitalia van dit Roemeens taxon afgebeeld. Ook de habitus van het mannetje en het wijfje van *Boloria* (*Clossiana*) *titania transsylvanica* Tiltscher, 1913 worden geïllustreerd.

Résumé. Nouvelles données sur les papillons de la Roumanie (Lepidoptera: Papilionoidea & Hesperioidea), avec commentaires supplémentaires (répartition générale en Roumanie, préférence de biotope, aspects écologiques et législatifs) pour dix espèces locales en Roumanie
Lors d'un voyage lépidoptérologique, de la mi juillet au début août 2006, les auteurs ont trouvé des nouvelles données concernant la distribution de plusieurs espèces de papillons diurnes (Rhopalocera: Papilionoidea et Hesperioidea) en Roumanie. Toutes les observations de cette recherche sont présentées avec une attention spéciale pour dix espèces clés avec des commentaires sur leur distribution, aspects écologiques et législatifs dans le pays. Pour la première fois, *Erebia sudetica radnaensis* Rebel, 1915 est enregistré des Monts Făgăraş et les genitalia males de ce taxon roumain sont figurés. L'habitus mâle et femelle de *Boloria* (*Clossiana*) *titania transsylvanica* Tiltscher, 1913 sont illustré.

Rezumat. Noi date privind fluturii diurni ai României (Lepidoptera : Rhopalocera), acompaniate de comentarii adiţionale (răspândire în România, preferinţe faţă de habitat, grad de periclitare, statut protectiv) pentru zece specii localizate din România
Cu ocazia cercetărilor pe teren efectuate între a doua jumătate a lunii iulie şi începutul lunii august 2006, autorii au cumulat o serie de date noi referitoare la distribuţia mai multor specii de lepidoptere diurne (Rhopalocera: Papilionoidea şi Hesperioidea) din România. În lucrarea de faţă sunt prezentate rezultatele acestor cercetări, punându-se accentul pe zece taxoni „cheie"; în cazul acestora sunt prezente comentarii adiţionale privind distribuţia pe teritoriul ţării, alături de aspecte ecologice şi legislative. *Erebia sudetica radnaensis* Rebel, 1915 este semnalată pentru prima dată din Munţii Făgăraş, armătura genitală masculă a acestui taxon fiind totodată figurată. Masculul şi femela taxonului *Boloria* (*Clossiana*) *titania transsylvanica* Tiltscher, 1913 sunt de asemenea ilustrate.

Key words: Romania – Rhopalocera – *Colias myrmidone* – *Leptidea morsei major* – *Argynnis laodice* – *Boloria titania transsylvanica* – *Erebia sudetica radnaensis* – *Erebia manto trajanus* – *Glaucopsyche rebeli* – *Glaucopsyche teleius* – *Pyrgus sidae sidae* – *Heteropterus morpheus* – distribution – habitat – protection.

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Introduction

The study of the butterflies of Romania started a few centuries ago with the field trip of Johann Centurius Graf von Hoffmannsegg (1766–1849) from Dresda who collected birds and insects in the area of Băile Herculane (south-western Romania). He is the one who collected there for the first time *Erebia melas* (Herbst, 1796) (based on this material it was later described as new for science by Herbst) and *Kirinia roxelana* Cramer (Rákosy 1996).

The first paper on Lepidoptera published in Romania (referring to Transylvania) was an paper from Fuss (1850) based on the material collected by Joseph von Franzenau (1802–1862). Franzenau's collection is deposited in the Zoological Museum of the Babeş-Bolyai University in Cluj-Napoca.

Many excellent publications have since then shown a high biodiversity and documented endemic species and subspecies in different ecoregions of the country. Despite this exhaustive documentation large parts of the country still remain un(der)explored mainly due to historical reasons.

Actually at least 200 species of butterflies have been recorded; approximately 15 taxa are doubtful or haven't been found back in recent years (Rákosy 2003).

Because nowadays land use is still very traditional, many species that are threatened in most of the European Community, still have good—albeit often local—strongholds in Romania.

As since January 1st 2007 Romania entered the European Community one might expect that just like in other countries joining the Union the agricultural, industrial and anthropogenic pressure will change dramatically and have negative effects on the natural richness and entomological fauna of the country.

Recent data on the distribution and habitats covering the whole territory therefore are urgently needed to secure as much as possible this high biodiversity for the future.

During a joint field trip from July 15th to August 1st 2006 the two authors visited different places in Romania (Transylvania, Banat & Muntenia) to study the entomological fauna. This article is a contribution to increase the knowledge on the distribution of the Rhopalocera of Romania and to identify important habitats to be secured for future generations.

Special attention is given to ten target species with new and unpublished data that are put in perspective with what is actually known on their distribution and habitats. All observations are presented in a synoptic table and all localities visited during this field trip are figured on a map showing the major relief. When

available, information is given on legislative aspects in Romania for these ten species.

Notes

If available, the protective status is mentioned according to the Minister Order no. 1.198/2005 for the actualization of the annexes no. 2, 3, 4 and 5 to the Government Urgency Ruling no. 236/2000 regarding the status of the natural protected areas, safeguarding of the natural habitats and of the wild flora and fauna, approved with modifications and amendments through Law no. 462/2001 (Anonymous 2005). Through this act, while also adding several species of national interest, Romania embraced the latest versions of the Habitats Directive and transposed them into its own legislation (see also Rákosy 2006). Information concerning the Lepidoptera order appears in annexes 2, 3A and 3B.

Annex 2 – includes plant and animal species whose conservation requires the designation of special areas for conservation and of avifaunistical special protection areas. They represent the cornerstone for the establishing of the Natura 2000 network in Romania.

Annex 3A – includes plant and animal species of Community interest, which require strict protection.

Annex 3B – includes plant and animal species of national interest which require strict protection.

A special mention needs to be made concerning the name of the lepidopterist Constantin Hormuzaki. Most of the authors who cited his work used the name "Hormuzachi". This also happened while citing him as the author of the taxon *Erebia pharte romaniae* which was followed by "Hormuzachi, 1937". According to Guşuleac (1937), the correct name is "Hormuzaki" while "Hormuzachi" is an obsolete version used in ancient Moldavia.

The nomenclature used in this paper is according to De Prins & van Oorschot (2005).

Colias myrmidone (Esper, 1781)

This endangered species is relatively widespread in Romania, as it was recorded from all its historical regions (Rákosy *et al*. 2003). Nevertheless, its large Romanian areal consists only of scattered colonies which often have small effectives and are isolated from each other. Faunistical records of *Colias myrmidone* were published by various authors (e. g. Mann 1866, Niculescu 1963, Popescu-Gorj 1964, König 1975, Căpuşe & Kovács 1987, Rákosy 1988, 2002, Rákosy & Neumann 1997, Burnaz 1993, 2001, 2003, Skolka 1994, Székely 1996, Stănescu 1995) and add valuable information to the knowledge of its distribution across the country. On the other hand, we have virtually no data which could indicate the effectives or the evolution of these populations in time. This state of fact raises serious question marks regarding the actual state of the conservation of this species. We have knowledge of a few certain cases of regression recorded in literature (e. g. Goia & Dincă 2006, Székely 2005), but these data are far from being satisfactory at the country's level.

The optimal habitat for *C. myrmidone* seems to be represented by vast mezophilous to mezoxerophilous meadows marked by shrubs and/or trees, reminding of sylvo-steppes. The most suitable meadows are those which are moderately grazed, but still preserve an abundance of *Cytisus* sp., in a patchy habitat consisting of different tree and/or shrub densities alternating to more or less steep slopes of open land (fig. 2).

During our visit in the areas south of Cluj-Napoca, we paid special attention to some places formerly known as very good sites for *C. myrmidone*, where hundreds of individuals could be seen in autumn on a few hectares. This situation persisted until the end of the 90's, when it was followed by a spectacular decline which led to the almost complete extinction of this species in the surroundings of the city (Goia & Dincă 2006). To our surprise and satisfaction, we found out that the species was recovering at these sites as we noticed several males and females.

It is very difficult to asses the true causes which underlay the decline of *C. myrmidone* at these sites, as there were no visible signs of change in land use to which the butterfly seems to be particularly sensitive (Freese *et al*. 2005, Dolek *et al*. 2005) and the climatic factor is in our opinion quite relative and difficult to interpret objectively. A possible cause may have been the land burning practice (Goia & Dincă 2006), but signs of fire were visible only in a part of its habitat. Therefore, until further and more elaborate studies are undertaken, the pronounced populational fluctuations of these colonies in the surroundings of Cluj-Napoca remain quite enigmatic. We do not completely exclude the possibility of a rather naturally induced cycle. As a potential comparison to the case of *C. myrmidone*, we mention that *C. erate* (Esper, 1805) also seems to be strongly regressing in certain parts of the country; this happens for example in the surroundings of Braşov (Székely 2005), where the species used to be very frequent.

Being a Community interest species, *C. myrmidone* is listed on annexes 2 and 3A of the Minister Order no. 1.198/2005. The Romanian Red List for butterflies (Rákosy 2003) designates *C. myrmidone* as a vulnerable species at national level, with populations ranging from near threatened to endangered at a local level.

As a conclusion, compared to the general state of fact present in Europe (Ivinskis 1998, Van Swaay & Warren 1999, Beneš *et al*. 2002, Freese *et al*. 2005, Dolek *et al*. 2005), Romania may be one of the best strongholds for the conservation of *C. myrmidone*. This assumption is based not only on the many literature records, but also on the traditional land use practices which are still relatively widespread in the country and which are often favourable for many butterflies including *C. myrmidone*. This means not only that many of the previously recorded colonies may have survived, but also that there might still be several undiscovered (or unpublished) colonies which would increase the number of known sites. As a matter of fact, a new locality near Băişoara was identified in 2005 (Cuvelier & Spruytte 2006).

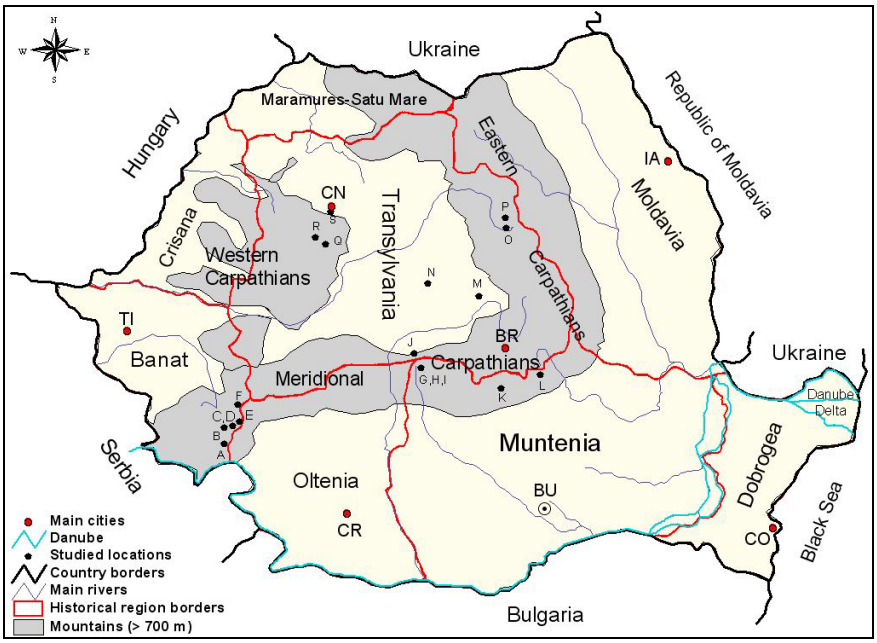

Fig. 1.– Map of Romania with the visited localities (15th of July – 1st of August 2006); BR = Braşov (Transylvania), BU = Bucharest (Muntenia), CN = Cluj-Napoca (Transylvania), CO = Constanta (Dobrogea), CR = Craiova (Oltenia), IA = Iasi (Moldavia), TI = Timişoara (Banat).

Fig. 2.– Habitat of *Colias myrmidone*, Romania, south of Cluj-Napoca, 1.viii.2006 (photo V. Dincă).

Leptidea morsei (Fenton, 1882)

The current faunistical data concerning this species, suggest that *L. morsei* is relatively widely distributed in Romania, with records from several of the country's large historical regions, as shown in the Catalogue of the Romanian Lepidoptera (Rákosy *et al*. 2003). Nevertheless, although the Romanian areal appears to be quite large, there is a low number of records per region.

The Romanian protection status of *L. morsei*, according to the Minister Order no. 1.198/2005, is that of a priority conservation species listed both in annex 2, and annex 3A, embracing the European legislation. The Romanian Red List for butterflies (Rákosy 2003) designates *L. morsei* as an endangered taxon, both at regional and national level.

Although the species is considered as highly threatened and possesses a strong legislative background, we should take into consideration the similarities with the more common and widespread *Leptidea sinapis* (Linnaeus, 1758), which is often neglected by lepidopterists collecting in the field. As identification in flight is practically impossible, it is very likely that many populations have been missed because of this similitude. As an argument, we identified it at seven distinct locations (table 2) during a relatively small number of days in the field and we also collected it at several other locations in the country during the last years (Dincă obs.).

In Romania, the species is usually found along mature deciduous forest margins and clearings, also forest roads. Yet, not all forests are suitable for this species: ecoton areas with a complex structure implying trees, shrubs and parcels of well developed open vegetation seem to be the preferred sites. The adults can very rarely be found far from the forest, flying in open habitats such as hay fields. The statement of Tolman & Lewington (1997) that *L. morsei* often flies in the same habitats as *Neptis sappho* (Linnaeus, 1758) is accurate for Romania too, where *N. sappho* locally develops strong populations.

As both *Lathyrus niger* and *L. verna* are widely distributed and not threatened in Romania (Oprea 2005), the larvae may feed on both these species known as host plants (Tolman & Lewington 1997). Nevertheless, we have no detailed data to prove this statement; Niculescu (1963) in his monograph of the Romanian Pieridae doesn't mention any host plant for Romania, as this wasn't known at all at that time.

All in all, this is a very poorly studied species in Romania. Although the available data suggest a local and fairly rare species, we would say that it is rather a data deficient taxon. Our observations in Romania support the idea that *L. morsei* seems to be associated to a type of habitat which is suitable for other regressing species such as *Parnassius mnemosyne* (Linnaeus, 1758), *Euphydryas maturna* (Linnaeus, 1758), and *Lopinga achine* (Scopoli, 1763) (Beneš *et al*. 2002). Having no accurate data, due to the complete lack of a monitoring activity regarding this species, we can only suppose that it is somehow vulnerable, but with a question mark for the true causes of its (mainly) supposed

decline. Under these circumstances the status of priority conservation species attributed to *L. morsei* through the Minister Order no. 1.198/2005 becomes questionable. Moreover, this is the only Lepidoptera listed as a priority species in the Minister Order no. 1.198/2005. This situation is far from being in concordance with the general status of the Romanian Lepidoptera.

Argynnis laodice (Pallas, 1771)

This species is known to occur in the central and north-western parts of Romania (Crişana, Maramureş-Satu Mare and Transylvania), as well as in the north-east (Moldavia); a very old record (before 1900) comes from Dobrogea (Rákosy *et al*. 2003).

Although a very local species, *A. laodice* still develops strong populations in certain places in Romania. In Transylvania for example, a paper published by Moldoveanu & Dely (1982) showed that, until 1981, there were known 56 locations were this butterfly was recorded, including the ones where we also found it, namely south of Sighişoara (Mureş county) and Racoş (Braşov county) (table 2). At Racoş we identified only very few worn out specimens, probably because we arrived too late in order to catch the climax of the flight period. Nevertheless, the visit to the area located south of Sighişoara corresponded to the peak of the flight period and represented a good opportunity to see if the status of this population changed during the last decades, when it was recorded as common. We had the pleasant surprise to find that the butterfly is still abundant in the area and that its habitat is quite little affected by anthropogenic influences. The habitat of *A. laodice* is always represented by forest skirts (mainly *Quercus* forests) or clearings, characterized by three main features: relatively humid conditions, presence of *Viola* species (larval host plants) and well developed vegetation associated with an abundance of nectar sources (e. g. *Carduus*, *Telekia*). This type of habitat is often maintained in Romania through a traditional type of land use which allows the development of relatively complex forest margins. The fact that such a good flyer presents only localized colonies suggests that this species is very sensitive regarding its ecological requirements and therefore the quality of its habitat. Given the fact that traditional (extensive) land use is becoming rarer and rarer in the country, it is to be expected that this species, as well as many other taxa with similar habitat requirements, will suffer significant declines on medium term. As an example, the vigorous population we identified south of Sighişoara may be severely affected by the recent introduction of mechanical mowing exactly during the flight period of the adults. Another example is represented by the population from Cluj-Napoca which disappeared during the last two decades due to habitat alteration through pine plantation and anthropization (Goia & Dincă 2006).

Figs. 3–4. *Boloria titania transsylvanica*, Romania, east of Gheorgheni, 20.vii.2006, leg. S. Cuvelier; 3.– male, 4.– female (a = upperside, b = underside). (photo S. Cuvelier).

Fig. 5.– Habitat of *Boloria titania transsylvanica*, Romania, east of Gheorgheni, 20.vii.2006 (photo V. Dincă).

A. laodice is protected in Romania through the Minister Order no. 1.198/2005, being listed in annex 3B. The Romanian Red List for butterflies (Rákosy 2003) designates *A. laodice* as an endangered species at national level, with populations ranging from endangered to extinct at a local scale.

All in all, this is a local, but sometimes abundant species which is associated to a type of habitat that is very likely to suffer (or is already suffering) declines in many parts of the country. It is sure that many of the previously cited locations weren't visited during the last two or three decades, so we have no exact knowledge of the actual status of this species at the country's level.

Boloria* (*Clossiana*) *titania (Esper, 1793)

This species is known in Romania only from eastern Transylvania, namely the area of Depresiunea Giurgeului. A single record (5 specimens) comes from Berhina (Retezat Mountains – Meridional Carpathians) (Stănescu 1995); as there are no other records from that relatively well studied area, the presence of *B. titania* in the Retezat Mountains requires confirmation. The Romanian populations are represented by ssp. *transsylvanica* Tiltscher, 1913.

In the past the Romanian population has been classified under *Boloria* (*Clossiana*) *titania cypris* (Meigen, 1828) by different authors (Higgins & Riley 1970, Tolman & Lewington 1997). The habitus of the Romanian population however is quite different (figs. 3, 4). It's a smaller subspecies. The male upperside is brighter orange with finer black markings. The underside of the hind wing is marbled pale yellow-brown with violet tints with less contrast. The marginal chevrons are small and less marked. The ground colour of the females is paler on upper- and underside. Black markings are finer and the underside of the hind wing is less contrasted. The chevrons are less marked. Although brief, the original description given by Tiltscher (1913) points out most of the above mentioned characters which we remarked while analyzing the specimens we had at our disposal.

The habitat of *B. titania* is represented by mesohigrophilous meadows situated in the vicinity of coniferous forests (fig. 5). Males fly actively in the sun, while females are much more difficult to spot. They usually prefer the thin band of small clearings which appears at the interference between the meadow and the forest.

This is one of the most localized and most endangered butterflies in Romania. Looking for the species in suitable habitats in a narrow valley of the above mentioned region (east of Gheorgheni), we had the opportunity to observe several males and a few females. Although the species seems to be fairly abundant in favourable habitats, we noticed that it is highly threatened by land drainage due to the extension of holiday chalets. Therefore, the wet meadows present there are gradually replaced by buildings and often by a lawn while the species is forced to retreat to smaller and smaller areas fragmented by private properties. The traditional land use practices which are generally favourable for

many butterfly species (e.g. manual mowing, moderate grazing) are also expected to regress, especially if the land is seen as a source of income through selling as potential building area. Based on our field observations, we believe that the species might be present in a few other suitable habitats in the area, but the lack of time and the relative inaccessibility of such locations, didn't allow us to investigate those perimeters.

In the Romanian Red List for butterflies (Rákosy 2003), the species is listed as critically endangered, with populations ranging from critically endangered to extinct. *B. titania transsylvanica* is also listed in annex 3B of the Minister Order no. 1.198/2005. Despite its legislative protection status, we have no knowledge of efforts undertaken in order to actually preserve this taxon. The designation of some protected perimeters which should ensure the survival of the largest colonies seems mandatory. Further studies in potential habitats are also necessary in order to have a much more accurate situation of this taxon.

Erebia manto (Denis & Schiffermüller, 1775)

Although this species is relatively widespread in the Romanian Carpathians, its actual distribution has certain discontinuities; therefore, the current faunistical data indicate that *E. manto* is completely absent in the Western Carpathians as well as in the Parâng Massif and presents large areal gaps in the Eastern Carpathians as it doesn't occur in its southern part and in the Ceahlău Massif (Popescu-Gorj 1994). On the other hand, the records from Făgăraş Mountains are very old (Popescu-Gorj 1994). Our data confirm the presence of this species in Făgăraş Mountains and also point out its presence in the central-western part of these mountains.

The habitat is represented by subalpine grassland in the vicinity of coniferous forest untill well above the treeline (fig. 8). The biotopes in Făgăraş Mountains are steep south oriented slopes with tall grasses where grazing is probably not possible.

The populations occurring in the Romanian Carpathians are considered to belong to ssp. *trajanus* Hormuzaki, 1895. This formerly contested taxonomical status was analyzed and confirmed by Popescu-Gorj (1963, 1994) who, based on a rich material collected in different regions of the Romanian Carpathians, stated that all the populations of *E. manto* present in these mountains belong to ssp. *trajanus*. This statement was later also confirmed by Varga 1999. This subspecies is fairly variable and usually develops very local colonies, generally between 1300–1900 m (Popescu-Gorj 1963, 1994).

Due to its endemic character and because it develops local populations, *E. manto trajanus* is listed as vulnerable at national level in the Romanian Red List for butterflies (Rákosy 2003), with populations ranging from near threatened to vulnerable at local level. The species has no legislative protection status in Romania.

Fig. 6.– *Erebia sudetica radnaensis* male; Romania, Făgăraş Mountains (surroundings of Cabana Capra), 25.vii.2006, leg. S. Cuvelier (a = upperside, b = underside) (photo V. Dincă).

Fig. 7.– Male genitalia of *Erebia sudetica radnaensis*, leg. S. Cuvelier; prep. genit. no. 304/Dincă (photo V. Dincă).

Fig. 8.– Habitat of *Erebia sudetica radnaensis* and *E. manto trajanus* in the Făgăraş Mountains (surroundings of Cabana Capra), 24.vii.2006 (photo S. Cuvelier).

Fig. 9.– Piatra Secuiului, biodiversity hotspot with taxa such as *Pyrgus sidae*, *Heteropterus morpheus*, *Glaucopsyche rebeli*, *G. arion*, *Lycaena alciphron*, *Polyommatus dorylas*, *Erebia melas runcensis* etc. 5.vii.2005 (photo V. Dincă).

Erebia sudetica (Staudinger, 1861)

E. sudetica is considered to be one of the rarest and most local *Erebia* species in Romania. Its presence in the country is currently sure for only four areas, namely Rodna Mountains in Eastern Carpathians (Dincă & Goia 2006), Retezat Mountains (Diószeghy 1930, Căpuşe & Kovács 1987, Rákosy 1997), Godeanu-Ţarcu Mountains (König 1975) and Ciucaş Mountains (Czekelius 1900, Székely 1996) (all in the Meridional Carpathians), everywhere in scattered colonies which are poorly known or studied. A single old record is based on material collected during August in Bucegi Mountains (Meridional Carpathians) (Hormuzaki 1902, Popescu-Gorj 1952, 1963); the species has never been found in these mountains again and its presence there needs confirmation.

In 2005, Sylvain Cuvelier and Stef Spruytte collected a pair of small *Erebia* specimens on the southern side of the Făgăraş Mountains which, at a first sight, seemed to belong to *E. pharte* (Hübner, 1804) (Cuvelier & Spruytte 2006). During this 2006 trip to the Făgăraş Mountains, Sylvain Cuvelier had the opportunity to collect more *Erebia* specimens. Yet, after reanalyzing their habitus (fig. 6) and the genital apparatus (fig. 7) of several males, we arrived to the conclusion that they all belong to *E. sudetica*. Under these circumstances, this is the first record of this species from Făgăraş Mountains which therefore become the fifth group of mountains in the Romanian Carpathians where the species is surely present. Another specimen collected by Vlad Dincă during the last decade of July 2004 appreciatively in the same area (cabana Capra) was examined for this study and also proved to belong to this taxon. These new data make us support the assumption of Popescu-Gorj (1963) that the species might indeed be (or was) present in Bucegi Mountains, as this would link the populations from Ciucaş Mountains to those of Făgăraş and Retezat Mountains. On the other hand, Bucegi Mountains represent the recording place of another doubtful *Erebia* taxon, namely *E. pharte romaniae* (Hormuzaki, 1937) (Popescu-Gorj 1952, 1963, Popescu-Gorj & Szabó 1986). Taking into consideration the description by Hormuzaki (Popescu-Gorj 1952, Popescu-Gorj & Szabó 1986), we believe it is possible that *E. pharte romaniae* was confounded with *E. sudetica*. Regarding this subject, Varga (2002) supposes that *E. pharte romaniae* was confounded with aberrant specimens of *E. epiphron transsylvanica* (Rebel, 1908). Although we cannot exclude this possibility, we think it wasn't very likely for Hormuzaki to find four aberrant specimens (2♂ and 2♀) at the end of August 1936 (Popescu-Gorj 1952, 1963, Popescu-Gorj & Szabó 1986), as these specimens generally occur isolated. Furthermore, one of the locations (Valea Jepilor − in orig. "Valea Jepei") (Hormuzaki 1902) where *E. sudetica* was recorded in Bucegi is also a locality where *E. pharte romaniae* has been found (Popescu-Gorj 1952, 1963, Popescu-Gorj & Szabó 1986).

The whole taxonomical status of the Romanian populations of *E. sudetica* has been subject to several modifications. Based on the study of Varga 2002, the current variant is that they belong to ssp. *radnaensis* Rebel, 1915 (Rákosy *et al*. 2003), described from Rodna Mountains. Yet, Popescu-Gorj (1952, 1987)

considered that in the Romanian Carpathians only the nominotypical subspecies flies. In our opinion, these aspects might require additional studies, including molecular aspects.

The fresh specimens collected by us bear small and little marked black spots, sometimes only visible on the hind wing, which makes them very similar to *E. pharte*. In less fresh specimens these small black spots are often absent. This makes us think it is possible that *E. sudetica* and *E. pharte* were sometimes confused (especially if the specimens are not very fresh), meaning that there is a question mark on the real Romanian distribution of the two taxa.

In Făgăraş the habitat consists of subalpine grassland in the vicinity of coniferous forest from 1320 to 1400 m (fig. 8). The butterfly flies on south oriented slopes with tall grasses together with *Pieris bryoniae carpathensis* (Moucha, 1956), *Erebia epiphron transsylvanica* (Rebel, 1908), *E. manto trajanus* (Hormuzaki, 1895), *E. euryale syrmia* (Fruhstorfer, 1919) and *E. medusa psodea* (Hübner, 1804).

According to the current literature data and to our personal observations, in the Romanian Carpathians the species flies mainly in upper-mountain and subalpine regions, generally being confined to tall herbs meadows situated at the upper coniferous tree belt. It seems to develop very local populations, but while for example populations in the Czech Republic were thoroughly analyzed from the dispersal point of view (Kuras *et al*. 2003), we have no data concerning these aspects in Romania.

E. sudetica is listed on annexes 3A and 3B of the Minister Order no. 1.198/2005. Its presence on annex 3B is rather redundant because annex 3A already includes the species among the strictly protected ones at European level (therefore including Romania). In the Romanian Red List for butterflies (Rákosy 2003), the species is listed as endangered, with populations ranging from vulnerable to endangered at regional level.

Glaucopsyche* (*Maculinea*) *rebeli (Hirschke, 1904)

This species has a poorly known distribution in Romania. It has been recorded only from the north-western part of the country (Transylvania) (Rákosy *et al.* 2003), but it is very likely that the lack of records is in many cases due to the confusion with the very similar *G. alcon* (Denis & Schiffermüller, 1775). Nevertheless, the term "confusion" might not be the most appropriate one as the status of these two taxa is not completely clarified yet and it might be better to talk about different ecological forms of the same taxon (Tolman & Lewington 1997). Additionally, recent work regarding the phylogeny of the *Glaucopsyche* (*Maculinea*) group proves that the two "cuckoo" species (*G. alcon* and *G. rebeli*) show little genetic divergence, suggesting that they are probably a single ecologically differentiated species (Als *et al*. 2004, Bereczki *et al*. 2005). Other recent data also support this statement as *Gentiana cruciata* was found to be an

additional host plant for *Glaucopsyche* (*Maculinea*) *alcon* on a site in eastern Poland (Sielezniew & Stankiewicz 2004).

Under these circumstances, one of the most reliable methods of distinguishing between the two (disputed) taxa is by identifying either the larval plant species, or the host ant species. Therefore, we identified the species at three locations (table 2), based not on the adults, but on the eggs laid on *Gentiana cruciata*, considered as larval food plant for *G. rebeli*. While the record from Cluj-Napoca is a confirmation for that area (Goia & Dincă 2006), the record from Lacul Ivanu represents the first known location outside Transylvania, as Caraş-Severin County belongs to Banat (fig. 1).

Given the extremely poorly known distribution of this species in Romania, it is difficult to assess its habitat preferences. The available data suggest that it is a xeromountaineous species (rocky grasslands) (fig. 9), but it may also be found in hilly areas with moderately grazed bushy meadows.

The Romanian Red List for butterflies (Rákosy 2003) designates *G. rebeli* as a vulnerable taxon at national level, but ranging from data deficient to vulnerable at local level. The species has no legislative protection status in Romania.

This is in our opinion a rather normal state of fact; before elaborating concrete protection and conservation measures, it is necessary to undertake sustained actions in order to identify and survey the (supposed) genuine populations of *G. rebeli*. Only then will we be able to correctly evaluate the species' situation at national level. Nevertheless, taking into consideration the habitat preferences of *G. rebeli* and the distribution of *G. alcon* (which is not a common species in Romania), we may already assume that *G. rebeli* is very localized and already endangered in most of the cases. Taking into consideration the species' need for open and short herbaceous vegetation, one of the main management requirements would be, at least for some sites, rotational grazing which should ensure optimal condition both for the ants and larval host plants (Beneš *et al*. 2002).

Glaucopsyche* (*Maculinea*) *teleius (Bergsträsser, 1779)

According to the current data (Rákosy *et al*. 2003), the distribution of *G. teleius* in Romania is restricted to the central, north-western and north-eastern parts of the country. Yet, there is a significant lack of data due to the presence of very large regions that were completely (or almost completely) unstudied.

During our trip, we identified two strong populations belonging to this species (table 2). While the species was known to develop significant populations in the surroundings of Sighişoara (Rákosy & Weber 1981), the record from Racoş is new for the country.

In Romania, *G. teleius* is a local species although more widespread and common than *G. nausithous* (Bergsträsser 1779), the latter being currently known only from no more than three to four sites. Despite this fact, continuous

monitoring of the known populations seems mandatory since *G. teleius* has relatively high ecological standards (Beneš *et al*. 2002, Wynhoff 2001) and is the most sedentary of all the species of the genus (Wynhoff 1996, 2001).

G. teleius is protected in Romania through the Minister Order no. 1.198/2005, being listed both in annex 2 and annex 3A. The Romanian Red List for butterflies (Rákosy 2003) designates *G. teleius* as an endangered species at national level, with populations ranging from endangered to critically endangered at local level. These statements are realistic as the suitable habitats for this species present in Romania are regressing following the sad European trend.

We have no knowledge of any concrete management measures taken in Romania in order to preserve a certain population of *G. teleius*. Under these circumstances, the maintenance of most of the best habitats is due to the traditional land use still practiced in many parts of Romania, but the general tendency is against this state of fact. If accurate conservation measures are not taken during the following years, we estimate that most of the species related to marsh meadows will suffer significant declines in Romania.

Pyrgus sidae (Esper, 1784)

This is a rare species in Romania, usually very local and developing small colonies. It can be found in xeric grasslands or in more humid situations (mesophilous meadows), but almost always in places rich in flowers, similar to most of Europe (Tolman & Lewington 1997). Recent records (after 1980) come only from Transylvania and Dobrogea (Rákosy *et al*. 2003).

Our record from Rimetea - Piatra Secuiului (Western Carpathians) adds another interesting taxon to the list of valuable species recorded from this area (Rákosy *et al*. 1999) and a new locality for *P. sidae* in Transylvania, where it is known from a few records only (Fuss 1850, Schneider 1970, Rákosy 2002, Goia & Dincă 2006).

The species is listed on annex 3B of the Minister Order no. 1.198/2005. The Romanian Red List for butterflies (Rákosy 2003) designates *P. sidae* as an endangered species at national level, with populations ranging from endangered to vulnerable at local level.

Heteropterus morpheus (Pallas, 1771)

Although it was recorded from most of Romania's historical regions, except for vast areas in the south (Rákosy *et al*. 2003), this may be misleading as *H. morpheus* is a very local species in the country with few known colonies.

We found it at Rimetea - Piatra Secuiului (Western Carpathians), this being a new recording place for Romania. This population is of particular interest as it seems to be confined to two small areas of tall herbs surrounded by xeric habitats, at about 900 m (fig. 9); this is an example of how local this species may be, but also it suggests its ecological plasticity, being able to survive in such

isolated and reduced areas. Its frequent association to humid habitats such as marshy heaths (Tolman & Lewington 1997) combined with its local character and relative rarity, makes it a potentially endangered species. In Romania, this species is listed on annex 3B of the Minister Order no. 1.198/2005, while in the Romanian Red List for butterflies (Rákosy 2003) it is considered to be endangered at a national level, with populations ranging from vulnerable to endangered according to regional particularities.

It is again the case of a poorly understood distribution due to the lack of data. It is obvious that the species is local in Romania, but we know nothing about the status of its populations. Given its preference for humid habitats which are almost everywhere menaced, it is prudent to consider it endangered because of habitat loss.

Table 1. Visited localities in Romania (the symbols refer to the localities in table 2).

Symbol	Locality	Altitude (m)	County	Date
A	Pecinişca	200 – 680	Caraş-Severin	15.vii.2006
A	Pecinişca	200 – 250	Caraş-Severin	27.vii.2006
B	Cheile Drăstănicului - Prisăcina	350 – 900	Caraş-Severin	28.vii.2006
C	Bolvaşniţa - Vârful Arjana	500 – 1350	Caraş-Severin	16.vii.2006
D	North Motel Dumbrava - Vârful Arjana	280 – 1500	Caraş-Severin	29.vii.2006
E	Valea Cernei - Lacul Ivanu	535	Caraş-Severin	27.vii.2006
F	Dobraia	850	Caraş-Severin	28.vii.2006
G	Munţii Făgăraş (Cabana Capra)	1320 – 1400	Argeş	24.vii.2006
G	Munţii Făgăraş (Cabana Capra)	1320 – 1400	Argeş	25.vii.2006
G	Munţii Făgăraş (Cabana Capra)	1320 – 1400	Argeş	30.vii.2006
H	South of Vârful Laiţa	2200 – 2300	Argeş	25.vii.2006
I	Bâlea Lac - Vârful Capra	2100 – 2400	Argeş	30.vii.2006
J	Colun	400	Sibiu	26.vii.2006
K	Munţii Bucegi (Cabana Mioriţa - Vârful cu Dor)	1950 – 2100	Prahova	22.vii.2006
L	Munţii Ciucaş (Vf. Ciucaş)	1250 – 1830	Prahova	21.vii.2006
M	Racoş	500 – 550	Braşov	22.vii.2006
M	Racoş	500 – 550	Braşov	31.vii.2006
N	South of Sighişoara	550 – 600	Mureş	23.vii.2006
O	Izvorul Mureşului	850	Harghita	20.vii.2006
P	East of Gheorgheni	950 – 1050	Harghita	20.vii.2006
Q	Rimetea	500 – 800	Alba	18.vii.2006
R	Băişoara	500	Cluj	18.vii.2006
S	South of Cluj-Napoca	670 – 800	Cluj	01.viii.2006

Table 2. Butterfly species observed in Romania, the localities refer to table 1.

Localities:	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**
Papilionidae																			
Papilio machaon	×		×	×	×		×							×	×	×	×	×	×
Iphiclides podalirius	×		×	×	×								×	×					×
Parnassius mnemosyne												×							
Pieridae																			
Aporia crataegi	×																		
Pieris brassicae				×								×	×	×	×	×		×	×

Localities:	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Pieris bryoniae							×					×				×			
Pieris ergane	×																		
Pieris mannii	×	×		×	×														
Pieris napi / balcana	×			×						×		×	×	×		×	×	×	×
Pieris rapae	×			×	×		×	×	×	×	×	×	×	×		×	×	×	×
Pontia edusa												×							
Anthocharis cardamines																×			
Colias alfacariensis	×				×	×				×				×	×		×	×	×
Colias croceus	×			×	×					×			×						
Colias hyale													×						
Colias myrmidone																			×
Gonepteryx rhamni				×			×	×				×	×	×	×	×	×	×	×
Leptidea sinapis / reali	×		×	×	×					×		×	×	×	×		×	×	×
Leptidea morsei				×	×					×			×	×				×	×
Nymphalidae																			
Apatura iris			×	×		×							×	×	×	×			×
Apatura ilia			×											×	×				
Limenitis populi			×													×			
Limenitis reducta	×																		
Neptis sappho	×	×	×	×	×					×			×	×				×	×
Neptis rivularis			×		×										×	×	×		
Nymphalis antiopa	×																		
Nymphalis polychloros			×																
Inachis io	×		×				×	×	×	×	×	×	×	×	×	×	×	×	×
Vanessa atalanta	×		×	×	×		×	×		×		×		×	×	×	×	×	
Vanessa cardui	×		×	×	×					×	×	×	×	×		×	×	×	×
Aglais urticae				×			×	×	×		×	×			×	×	×		×
Polygonia c-album	×		×	×	×		×			×		×	×	×		×			
Araschnia levana	×		×	×						×		×	×			×	×	×	×
Argynnis paphia	×		×	×	×		×			×		×	×	×	×	×	×	×	×
Argynnis laodice													×	×					
Argynnis aglaja			×	×			×						×	×	×	×		×	×
Argynnis adippe	×		×	×	×		×						×	×	×	×	×	×	×
Argynnis niobe			×	×										×	×	×	×	×	
Issoria lathonia				×							×	×			×		×		×
Brenthis hecate			×														×		
Brenthis daphne			×															×	
Brenthis ino														×	×	×			
Boloria pales											×								
Boloria euphrosyne							×					×			×	×			
Boloria titania																×			
Boloria selene	×				×											×		×	×
Boloria dia	×		×							×			×	×	×		×		×
Melitaea phoebe													×						
Melitaea didyma	×			×						×			×	×	×		×	×	×
Mellicta athalia	×		×	×										×	×	×		×	
Mellicta aurelia															×		×	×	
Melanargia galathea	×		×	×	×					×			×	×	×		×	×	×
Hipparchia fagi	×			×													×	×	

Localities:	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Hipparchia semele / volgensis			×	×													×		
Minois dryas										×			×	×				×	
Brintesia circe	×		×	×															
Erebia ligea			×				×									×	×		
Erebia euryale				×			×	×			×	×				×			
Erebia manto							×												
Erebia epiphron				×			×	×			×	×							
Erebia sudetica							×												
Erebia aethiops	×	×	×	×	×								×		×			×	×
Erebia medusa											×	×							
Erebia melas	×			×													×		
Erebia pandrose								×	×										
Maniola jurtina	×			×	×					×			×	×	×		×	×	×
Aphantopus hyperantus	×		×	×	×					×			×	×	×	×	×	×	×
Pyronia tithonus	×																		
Coenonympha pamphilus	×		×	×						×			×	×	×	×	×		×
Coenonympha arcania	×		×	×									×	×	×	×	×	×	×
Coenonympha glycerion															×	×			
Coenonympha tullia																×			
Pararge aegeria	×		×	×									×			×			×
Lasiommata megera	×																×		×
Lasiommata maera	×			×			×					×	×		×	×	×		
Lycaenidae																			
Hamearis lucina													×	×					
Neozephyrus quercus												×							
Satyrium acaciae	×																×		
Satyrium ilicis	×																		
Satyrium spini	×		×		×												×		
Lycaena phlaeas																×	×		×
Lycaena dispar													×			×			
Lycaena virgaureae	×		×	×	×								×	×	×	×	×		
Lycaena tityrus							×						×		×	×			
Lycaena alciphron	×		×												×	×	×		
Lycaena hippothoe																×			
Cupido argiades	×			×	×					×			×	×			×	×	×
Cupido decolorata													×				×		×
Cupido minimus	×			×									×			×	×	×	
Cupido osiris													×						
Celastrina argiolus	×		×	×	×					×			×						
Glaucopsyche alcon / rebeli													×						
Glaucopsyche rebeli					×												×		×
Glaucopsyche arion	×									×							×		
Glaucopsyche teleius													×	×					
Pseudophilotes vicrama																			×
Scolitantides orion	×	×																	
Plebeius argus										×			×	×	×				×
Plebeius idas										×			×						
Plebeius argyrognomon													×						
Plebeius eumedon														×					

Localities:	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Plebeius agestis	×									×									
Plebeius artaxerxes				×								×							
Polyommatus semiargus										×					×	×		×	
Polyommatus thersites	×									×			×						
Polyommatus dorylas															×		×		
Polyommatus daphnis	×			×	×								×	×			×		×
Polyommatus coridon	×			×									×				×		×
Polyommatus bellargus	×																		
Polyommatus icarus	×		×	×	×		×			×		×	×	×	×	×	×	×	×
Hesperiidae																			
Pyrgus malvae										×									
Pyrgus alveus																×	×		
Pyrgus sidae																	×		
Carcharodus alceae	×																		
Carcharodus floccifera			×																
Erynnis tages	×			×	×					×			×	×			×	×	
Heteropterus morpheus																	×		
Carterocephalus palaemon																×			
Thymelicus lineola	×		×							×			×	×			×		×
Thymelicus sylvestris	×									×			×	×	×				
Hesperia comma													×						×
Ochlodes sylvanus	×		×	×	×					×			×	×	×	×	×	×	

Discussion

During our two weeks field trip to Romania, we identified 119 butterfly taxa. An additional four taxa require further and more careful examination in order to be identified at species level (table 2) and they will be subject to another study. All in all, this is an impressive number taking into consideration the fact that it represents about 60 % of the entire Romanian butterfly fauna. On the other hand, many of the visited locations bear an impressive butterfly diversity given the fact that, during only a couple of hours of field investigation on a few hectares, we managed to count more than 40 taxa in the following localities: south of Cluj-Napoca (42), south of Sighişoara (43), east of Gheorgheni (46), Pecinişca (47) on July 15, North Motel Dumbrava - Vârful Arjana (48), Rimetea – Piatra Secuiului (51), Racoş (54) on July 31.

Besides the ten taxa discussed above, several other of the identified species are fairly rare and/or localized in Romania, such as: *Pieris ergane* (Geyer, 1828), *Limenitis reducta* (Staudinger, 1901), *Brenthis ino* (Rottemburg, 1775), *Boloria pales* (Denis & Schiffermüller, 1775), *Erebia melas* (Herbst, 1796), *Coenonympha tullia* (Müller, 1764), *Lycaena hippothoe* (Linnaeus 1761), *Lycaena alciphron* (Rottemburg, 1775), *Cupido osiris* (Meigen, 1829), *C. decolorata* (Staudinger, 1886), *Plebeius eumedon* (Esper, 1780), etc. Our data also add information to the distribution in Romania of several taxa considered as data deficient (Rákosy 2003): *Glaucopsyche* (*Maculinea*) *rebeli* (Hirschke,

1904), *Polyommatus thersites* (Cantener, 1835), *Plebeius artaxerxes* (Fabricius, 1793).

Although these results represent only a "snapshot" of Romania's butterfly diversity, in our opinion it gives convincing clues about the excellent natural capital and potential of the country. We use the term "potential" because, comparing the amount of available data regarding the Romanian Lepidoptera fauna with the vast areas of seminatural habitats present in many regions, it is quite obvious that many butterfly populations of conservative, faunistical or other interest still remain to be discovered. As an additional example to the previously commented species, we mention *Polyommatus daphnis* (Denis & Schiffermüller, 1775), a fairly local species in Romania, which during the last 100 years was recorded only once (1984) in entire south-eastern Transylvania (Székely 2005) which is one of the best studied butterfly regions in Romania (Székely 1996, 2005). Therefore, we had the surprise to ascertain that the several males and females we identified at Racoş represent the second record in south-eastern Transylvania.

Romania's high butterfly diversity is mainly a consequence of its numerous natural and seminatural areas. Nevertheless, the main causes which determined the persistence of this favourable natural context often have nothing to do with active protective measures. It is rather a heritage of the Romanian traditional way of living which, among others implied (mostly involuntary) several very important habitat management aspects which are today highly appreciated and used as effective protection measures: manual mowing, non-chemized agriculture techniques, extensive grazing, selective and rotational deforestations, etc.

Unfortunately, as Romania is struggling to align to the European Union Standards, the traditional way of living once widespread in the countryside is now becoming rarer and rarer. This requires active conservation measures in order to safeguard at least the most important habitats and populations of the many national and Community interest species present in Romania. The studies undertaken in order to asses the effects on invertebrates of land-use type changes in Romania, although very few, provide valuable information concerning the threats emerging from such transformations (Cremene *et al*. 2005, Baur *et al*. 2006).

A significant number of populations belonging to highly threatened butterfly and moth species should be safeguarded through the implementation of the Natura 2000 network in Romania. While the protected areas designation process is under way, we need much more recent distributional data in order to be able to elaborate effective management measures for the conservation of these habitats and species.

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