

Pyrgus andromedae (Wallengren, 1853) (Hesperiidae) in the Romanian Carpathians

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Abstract. The presence of *Pyrgus andromedae* (Wallengren, 1853) (Hesperiidae) is confirmed for the Romanian Carpathians, where it occurs sympatrically with *Pyrgus cacaliae* (Rambur, 1839). The records presented here represent the second area of occurrence in the Carpathian chain. Male and female imagos are illustrated and the genitalia of both sexes are figured in comparison with *P. cacaliae*. The current and potential distribution, habitat preferences, and conservation status of *P. andromedae* are discussed.

Résumé. La présence de *Pyrgus andromedae* (Wallengren, 1853) (Hesperiidae) est confirmée dans les Carpathes roumaines, où elle est sympatrique avec *Pyrgus cacaliae* (Rambur, 1839). Ces données représentent la deuxième région de présence dans la chaîne carpatique. Les adultes mâles et femelles sont illustrés et l'appareil génital des deux sexes est illustré en comparaison avec *P. cacaliae*. La distribution connue et potentielle, les préférences d'habitat et le statut de conservation de *P. andromedae* en Roumanie sont commentés.

Rezumat. Prezența speciei *Pyrgus andromedae* (Wallengren, 1853) (Hesperiidae) este confirmată în Carpații românești, unde este simpatrică cu *Pyrgus cacaliae* (Rambur, 1839). Aceste date reprezintă a doua regiune în care specia este semnalată în lanțul carpatic. Sunt ilustrați adulții ambelor sexe, precum și armătura genitală masculă și femelă a acestora în comparație cu *P. cacaliae*. Sunt discutate distribuția actuală și cea potențială în Carpați, preferințele față de habitat și statutul de conservare la nivelul țării.

Introduction

Although Romania harbours a relatively high butterfly diversity (Rákósy 2003, Schmitt & Rákósy 2007, Cuvelier & Dincă 2007, Dincă & Vila 2008), there are still large regions insufficiently studied from a lepidopterological point of view. The latest version of the Romanian Lepidoptera Catalogue (Rákósy et al. 2003) lists 202 butterfly species, but some of them represent doubtful records for several reasons, such as lack of recent data, nonexistent material or improperly documented publications.

An example of such a species is *Pyrgus andromedae* (Wallengren, 1853), which was not included in the Romanian Lepidoptera Catalogue published by Popescu-Gorj (1987) and is considered as data deficient in the latest version of the catalogue (Rákósy et al. 2003). *Pyrgus andromedae* has only one old published record from Romania (one specimen collected on August 4th in the Bucegi Mountains) (Czekelius 1917) without adult or genitalia illustrations. Also, Rákósy et al. (2003), based on a personal communication, mention a specimen collected in 1978 by E. Schneider in the Piatra Craiului Mountains. Both records are commented as requiring confirmation by Rákósy et al. (2003). Moreover, *Pyrgus cacaliae* (Rambur, 1839), a species rather similar in appear-

ance and habitat preferences to *P. andromedae*, is also present in Romania (Bucegi and Făgăraş Mountains) and misidentifications could be possible.

The species is not mentioned as being present in Romania in any of the recent major studies dealing with the distribution of European butterflies (Karsholt & Razowski 1996, Kudrna 2002). *Pyrgus andromedae* has an arcto-alpine distribution apparently restricted to Europe and is reported as local from the Pyrenees, Alps, Balkans, and parts of Scandinavia (Tolman & Lewington 1997, Kudrna 2002, Lafranchis 2004, Slamka 2004) while in Russia it is cited from the Kola Peninsula (Chibiny Mountains) and the Polar Ural (Tuzov et al. 1997, Gorbunov 2001, Tshikolovets 2003). From the Carpathians it has been reported only from southern Ukraine (Tshikolovets 2003, 2005, Slamka 2004, Popov 2005), where *P. cacaliae* seems not to be present.

Material and methods

Specimens of *P. andromedae* were collected during several field trips to the Meridional Carpathians during 1984–2007. This material is preserved in L. Székely's and S. Kovács & Z. Kovács' personal collections. Genitalia were processed as follows: maceration in 10% potassium hydroxide, dissection and cleaning under the stereomicroscope, and storage in tubes with glycerin.

The terminology used for the description of the male and female genitalia follows De Jong (1972).

Results and discussion

Pyrgus andromedae

Material. Romania: 1♂, Bucegi Mountains, Jepii Mari, 2000 m, 25.vi.1994, leg. Székely; 1♀, Bucegi Mountains, Caraiman, 2100 m, 18.vii.2004, leg. Székely; 1♀, Bucegi Mountains, Cota 2000, 2000 m, 24.vi.2007, leg. Székely; 3♂, 3♀, Bucegi Mountains, Vânturiş, 1800–1900 m, 22.vi.1993, leg. S. Kovács & Z. Kovács; 1♀ Bucegi Mountains, Caraiman, 2100 m, 27.vi.2003, leg. S. Kovács & Z. Kovács; 1♀ Bucegi Mountains, Babele, 2150 m, 24/26.vii.1984, leg. S. Kovács & Z. Kovács.

The species was collected in the alpine area of the Bucegi Mountains (Meridional Carpathians) where it is sympatric with *P. cacaliae* (Fig. 1). The collecting sites range from the southern parts of the Bucegi Mountains (Vânturiş) to the northern peaks (Caraiman and Babele). The linear distance between the southernmost and northernmost sites is about 10 km. Given the position of the collecting sites, it is likely that the species has a continuous distribution in the whole alpine plateau of the Bucegi Mountains. Surprisingly, since the record of Czekelius (1917), the species has never been reported again in the Bucegi Mountains, although this is one of the best studied massifs in the Romanian Carpathians (Popescu-Gorj 1948, 1963, 1995; Székely 1994, 1996).

Our data confirm the presence of *P. andromedae* in Romania and show that the species flies together with *P. cacaliae* in the Bucegi Mountains. Moreover, these data represent



Fig. 1. Distribution of *Pyrgus andromedae* and *Pyrgus cacaliae* in Romania (black and white dot: *P. andromedae* and *P. cacaliae* (Bucegi Mts.); black dot: *P. cacaliae* (Făgăraș Mts.); ?: unconfirmed record of *P. andromedae* (Piatra Craiului Mts.)).



the second region of occurrence for *P. andromedae* in the Carpathian chain, where it was known only from southern Ukraine, near the border with Romania (area of Yaremcha to Hoverla Massif) (Tshikolovets 2003, 2005, Slamka 2004). The distance between the two areas is more than 300 km (Fig. 2). As a matter of fact, the entire eastern distribution of *P. andromedae* is poorly known: two areas in the Carpathians (including the present report), one site in Bulgaria (northern Pirin Mountains) (Kolev 2002) and two regions in Russia (Kola Peninsula and Polar Ural) (Tuzov et al. 1997, Gorbunov 2001, Tshikolovets 2003) (Fig. 2).

Fig. 2. Distribution of *Pyrgus andromedae* in Eastern Europe (black dots: records outside Romania; triangle: Romanian population).



Fig. 3. Dorsal (left) and ventral (right) view of *Pyrgus andromedae* male, Bucegi Mts., Jepii Mari, 2000 m, 25.vi.1994, prep. genit 561/Dincă. Photo L. Székely.

Identification of *Pyrgus andromedae*

Pyrgus andromedae and *P. cacaliae* are rather similar morphologically, but they can be reliably distinguished based both on wing and genital characters.

External characters

The most reliable element of the wing pattern lies at the base of the hind wing underside where *P. andromedae* presents three white spots, while *P. cacaliae* has only two (the middle one is absent). *P. andromedae* also bears a more or less shallow, yet always present, elongated discal white spot on the hind wings upper side, which is absent in *P. cacaliae* (Figs 3, 4). These two diagnostic characters apply equally to both male and female specimens.

Genitalia characters

Male genitalia. The dorsal part of the cuiller (under the base of the style) of *P. andromedae* bears very small and fine teeth, almost invisible, while a series of more obvious sclerified teeth are present in *P. cacaliae*. In *P. andromedae*, the angle where the ventral and dorsal lines of the cuiller meet is about 90 degrees, giving this region a pointed aspect (Figs 5, 6), a feature also mentioned by Warren (1926).

The number and size of setae in the terminal part of the style was found to be slightly variable (gradually increasing in length towards the tip of the style). The setae, rather difficult to count, are more than 12 for *P. andromedae* and more than 18 for *P. cacaliae* from Romania (Figs 7, 8). This is contrary to the findings of Higgins (1975) and Gorbunov (2001) who mention 6 and 6–8 setae for *P. andromedae*, while Fernández-Rubio (1991) mentions 4–6 setae for Spanish specimens. To further test the constancy of this character, we prepared the genitalia of two male specimens of *P. andromedae* from north-eastern Spain (Vall d’Aran) and found that the style bears more than 12 setae, as in the Romanian specimens.



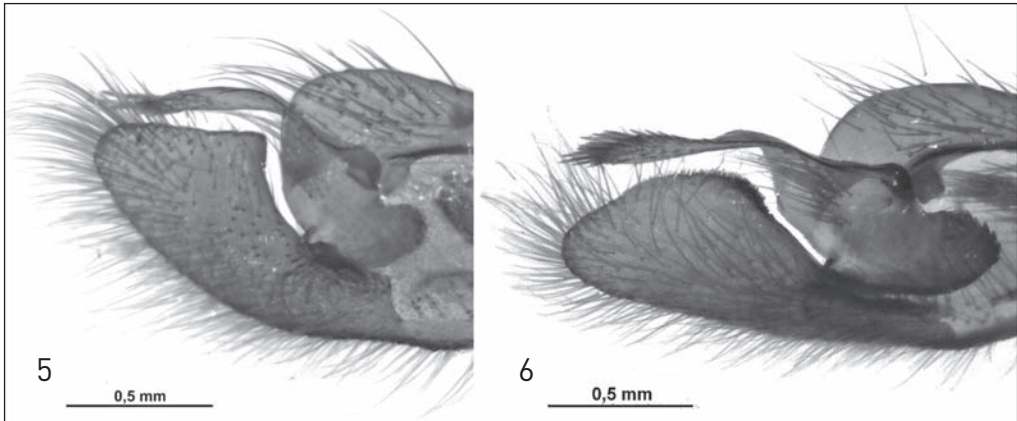
Fig. 4. Dorsal (left) and ventral (right) view of *Pyrgus andromedae* female, Bucegi Mts., Vânturiș, 1800–1900 m, 22.vi.1993. Photo Z. Kovács.

Female genitalia. In *P. andromedae*, the sclerified structures of the eighth abdominal segment lack striations, while in *P. cacaliae* these structures have several obvious and symmetrically disposed striations. The space below the genital plate is shorter and wider in *P. andromedae* in comparison to the longer and narrower space in *P. cacaliae* (Figs 9, 10).

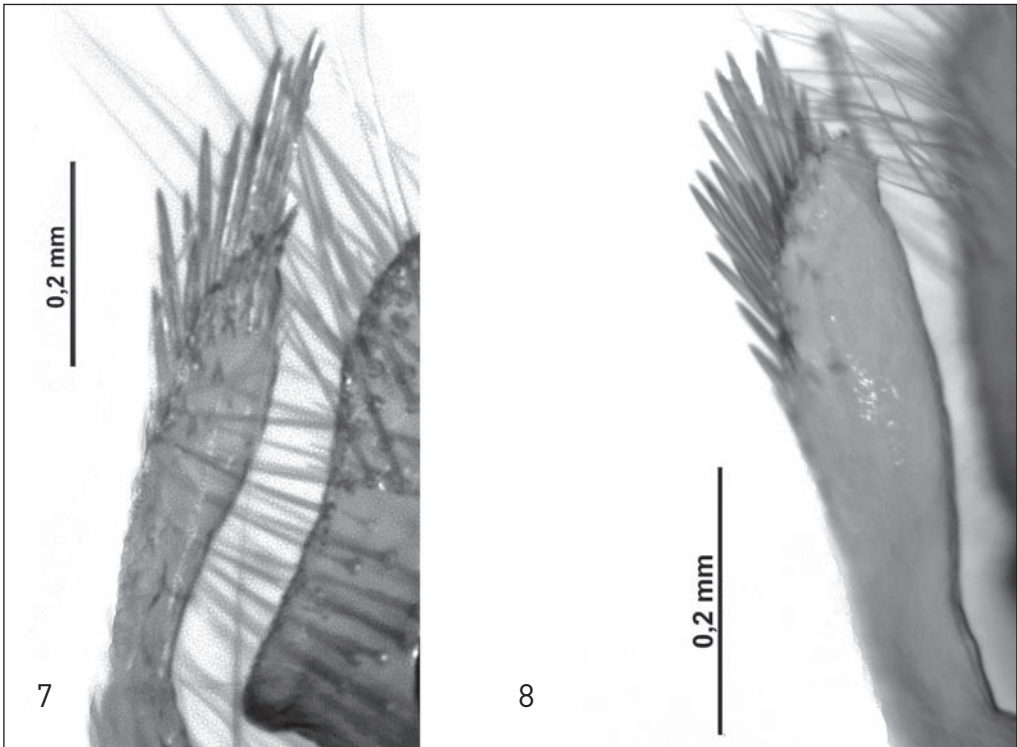
Habitat, biology, and conservation of *Pyrgus andromedae* in the Romanian Carpathians

The habitat of *P. andromedae* in the Bucegi Mountains consists of subalpine and alpine meadows at altitudes between 1700–2200 m, according to the available material (Fig. 11). This habitat is shared with *P. cacaliae*, which in Romania is known to be restricted to alpine meadows from the Bucegi and Făgăraș Mountains (Meridional Carpathians) (Fig. 1).

The Bucegi Mountains probably offer the most suitable habitat conditions for *P. andromedae* in Romania as the alpine plateaus of these mountains are the largest in the country and shelter the highest concentration of typically alpine and arcto-alpine Lepidoptera, such as: alpine elements – *Pyrgus cacaliae*, *Boloria pales* (Denis & Schiffermüller, 1775), *Erebia epiphron* (Knoch, 1783), *Erebia pronoe* (Esper, 1780), *Erebia gorge* (Hübner, 1804), *Glacies noricana* (Wagner, 1898), *Glacies canaliculata* (Hochenwarth, 1785), *Apamea zeta* (Treitschke, 1825), and arcto-alpine elements – *Erebia pandrose* (Borkhausen, 1788), *Apamea maillardi* (Geyer, 1834), *Grammia quenseli* (Paykull, 1793), *Glacies coracina* (Esper, 1805), etc. Several of these taxa are not known from other parts of the Romanian Carpathians. The biology of the *P. andromedae* populations in the Bucegi Mountains is unknown. While some general works mention *Potentilla* sp., *Alchemilla glomerulans* Buser (Rosaceae), and *Malva* sp. (Malvaceae) as larval host plants (Henriksen & Kreutzer 1982; Fernández-Rubio 1991; Tolman & Lewington 1997; Tshikolovets 2003; Slamka 2004), Wagner (2003) indicates that, at least in the Alps, the larval food plant for *P. andromedae* is *Dryas octopetala* L. (Rosaceae) and not

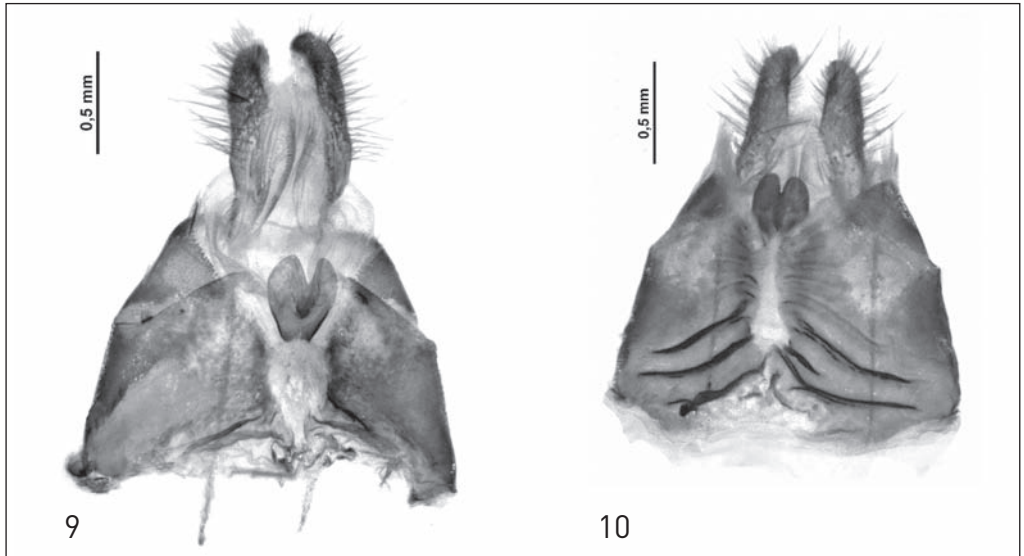


Figs 5–6. Lateral view of male valva. **5.** *Pyrgus andromedae*, Bucegi Mts., Jepii Mari, 2000 m, 25.vi.1994, prep. genit. 561/Dincă. **6.** *Pyrgus cacaliae*, Făgăraș Mts., south of Bălea Lac, 1900 m, 22.vii.2004, prep. genit. 585/Dincă.



Figs 7–8. Style detail. **7.** *Pyrgus andromedae*, Bucegi Mts., Jepii Mari, 2000 m, 25.vi.1994, prep. genit. 561/Dincă. **8.** *Pyrgus cacaliae*, Făgăraș Mts., Bălea Lac, 2040 m, 22.vii.2004, prep. genit. 563/Dincă.

Potentilla sp., which is used by *P. cacaliae*. Gros (1998) highlights the close relationship between *P. andromedae* and *Dryas octopetala* in the Austrian Alps and south-eastern Bavaria. In the area of Salzburg and Berchtesgaden, the butterfly may sometimes



Figs 9–10. Ventral view of the female genitalia. **9.** *Pyrgus andromedae*, Bucegi Mts., Cota 2000, 2000 m, 24.vi.2007, prep. genit. 564/Dincă. **10.** *Pyrgus cacaliae*, Bucegi Mts., Jepii Mici, 1800–2000 m, 11.viii.1984, prep. genit. 565/Dincă

be found at atypical heights of 600–800 m above sea level, following the distribution of *Dryas octopetala*, which locally reaches these low altitudes (Gros pers. comm.). Eliasson et al. (2005) also mention *Dryas octopetala* for Scandinavia.

The Bucegi Mountains and many other parts of the Romanian Carpathians shelter several species of *Alchemilla*, *Malva*, and *Potentilla*, as well as *Dryas octopetala* (Oprea 2005) and therefore *P. andromedae* might be more widespread in the country. The Piatra Craiului Massif, where one unconfirmed record already exists (Rákósy et al. 2003), is particularly promising, as well as the area of the Făgăraș Mountains (Fig. 1) where *P. cacaliae* is already known to occur in similar habitats to those of the Bucegi Mountains (Rákósy et al. 1994, Dincă pers. obs.). Finally, the subalpine-alpine areas near the border with Ukraine might also shelter populations of *P. andromedae* as Ukrainian populations (Hoverla Massif) are situated less than 30 km away from the Romanian border.

Based on the available material, *P. andromedae* flies in June–July in the Bucegi Mountains. Although conclusions cannot be drawn in the absence of monitoring activities, our data suggest that the imago might be active about two weeks earlier than *P. cacaliae* (which flies between the end of June until August), with an overlap of their flight times in July. These dates are roughly similar to the ones reported by Fernández-Rubio (1991) for Spain, Henriksen & Kreutzer (1982), Eliasson et al. (2005) for Scandinavia, and Warren (1926), De Jong (1972), and Tolman & Lewington (1997) for Europe.

In the Red Data Book of European Butterflies (Van Swaay & Warren 1999) *P. andromedae* is not listed as threatened in Europe, but it is considered a species of conservation concern due to its European endemic status. In Romania, the species is considered as “data deficient” and is commented as requiring confirmation (Rákósy 2003, Rákósy et



Fig. 11. Habitat of *Pyrgus andromedae* in the Bucegi Mountains (2000 m). Photo: V. Dincă.

al. 2003) for the country. In the light of our new data, the conservation status of this species can be addressed. Large parts of the Bucegi Mountains are included in a Natural Park where the species should be relatively safe as long as the alpine meadows are preserved in good condition. The main disturbing factor in such areas is overgrazing by sheep. On the other hand, moderate grazing might not greatly affect *P. andromedae*, as it has been observed that in the Hohe Tauern (Salzburg) the species seems to lay eggs preferably on ground leaves of *Dryas octopetala* in very short alpine vegetation (Gros pers. comm.). Therefore, we propose a red list status of “near threatened” at a national level and we recommend a monitoring of the populations in the Bucegi Mountains.

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References

- Cuvelier, S. & V. Dincă 2007. 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. – *Phegea* **35** (3): 93–115.
- Czekelius, D. 1917. Beiträge zur Schmetterlingsfauna Siebenbürgens. – *Verhandlungen und Mitteilungen des Siebenbürgischen Vereins für Naturwissenschaften, Hermannstadt* **67** (1–6): 1–56.

- De Jong, R. 1972. Systematics and geographic history of the genus *Pyrgus* in the Palaearctic region (Lepidoptera, Hesperioidea). – Tijdschrift voor Entomologie **115** (1). 121 pp., 6 pls.
- Dincă, V. & R. Vila 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.
- Eliasson, C.U., N. Ryrholm, M. Holmer, K. Jilg & U. Gärdenfors 2005. Nationalnyckeln till Sveriges flora och fauna. Fjärilar: Dagfjärilar. Hesperioidea – Nymphalidae. – ArtDatabanken, SLU, Uppsala. 407 pp.
- Fernández-Rubio, F. 1991. Guía de mariposas diurnas de la Península Ibérica, Balearesm Canarias, Azores y Madeira. Papilionidae, Pieridae, Danaidae, Satyridae y Hesperioidea. – Ediciones Pirámide Madrid. 418 pp.
- Gorbunov, P. 2001. The butterflies of Russia: classification, genitalia, keys for identification (Lepidoptera: Hesperioidea and Papilionoidea). – Thesis, Ekaterinburg. 320 pp., 13 pls.
- Gros, P. 1998. Eiablage und Futterpflanzen der Falter der Gattung *Pyrgus* Hübner, 1819 im Bundesland Salzburg, unter besonderer Berücksichtigung von *Pyrgus andromedae* (Wallengreen, 1853) (Lepidoptera: Hesperioidea, Pyrginae). – Zeitschrift der Arbeitsgemeinschaft österreichischer Entomologen **50**: 29–36.
- Henriksen, H. & I. Kreutzer 1982. The butterflies of Scandinavia in nature. – Skandinavisk Bogforlag, Odense. 215 pp.
- Higgins, L. G. 1975. The Classification of European butterflies. – Collins, London. 320 pp.
- Karsholt, O. & J. Razowski 1996. The Lepidoptera of Europe. A distributional checklist. – Apollo Books, Stenstrup. 380 pp.
- Kolev, Z. 2002. Critical notes on some recent butterfly records (Lepidoptera: Papilionoidea & Hesperioidea) from Bulgaria and their source collection. – Phegea **30** (3): 95–101.
- Kudrna, O. 2002. The distribution atlas of European butterflies. – Oedippus **20**: 1–342
- Lafranchis, T. 2004. Butterflies of Europe. – Diatheo, Paris. 351 pp.
- Oprea, A. 2005. Lista critică a plantelor vasculare din România. – Ed. Universităţii "Alexandru Ioan Cuza" Iaşi. 668 pp.
- Popescu-Gorj, A. 1948. Contributions à l'étude des lépidoptères de la région Sinaia et des Monts Bucegi. – Notationes biologicae, Bucarest **6** (1–2): 138–145.
- Popescu-Gorj, A. 1963. Genul *Erebia* Dalm. (Lepidoptera-Satyridae) și răspândirea sa verticală în Măslăc Bucegi. – Ocotirea Naturii **7**: 53–62.
- Popescu-Gorj, A. 1987. La liste systématique révisée des espèces de macrolépidoptères mentionnées dans la faune de Roumanie. Mise à jour de classification et nomenclature. – Travaux du Muséum National d'Histoire Naturelle „Grigore Antipa“, Bucarest. **29**: 69–123.
- Popescu-Gorj, A. 1995. Lepidopteres from the surroundings of the town Sinaia and from Bucegi Mountains (Romania). – Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa" Bucharest **35**: 161–220.
- Popov, G. 2005. SW Ukrainian butterfly database: report 1973–2005. Lepidoptera: Papilionoidea & Hesperioidea. – <http://www.alexanor.uzhgorod.ua/Listbu00.htm>
- Rákósy, L. 2003. Lista rosie pentru fluturii diurni din România. – Buletin informare Societatea Lepidopterologică Română **13** (1–4): 9–26.
- Rákósy, L., Wieser, C., Stangelmaier, G., Székely, L. 1994. Rezultatele colectărilor realizate în a doua tabără entomologică a SLR. Munții Făgăraș 23–27 (30) iulie, 1994. Lepidoptera. – Buletin informare Societatea Lepidopterologică Română **5** (3–4): 201–216
- Rákósy, L., Goia, M., Kovács, Z. 2003. Catalogul Lepidopterelelor României / Verzeichnis der Schmetterlinge Rumäniens. – Societatea Lepidopterologică Română, Cluj-Napoca. 446 pp.
- Schmitt, T. & L. Rákósy 2007. Changes of traditional agrarian landscapes and their conservation implications: a case study of butterflies in Romania. – Diversity and Distributions **13**: 855–862.
- Slamka, F. 2004. Die Tagfalter Mitteleuropas - östlicher Teil. – Published by the author. 288 pp. 60 pls.
- Székely, L. 1994. Lepidopterele din zona subalpină și alpină a Munților Bucegi. – Buletin de Informare Societatea Lepidopterologică Română **5** (3–4): 187–200.
- Székely, L. 1996. Lepidopterele (Fluturii) din sud-estul Transilvaniei (România). – Săcele (published by the author). 78 pp.

- Tolman, T. & R. Lewington 1997. Field Guide of the Butterflies of Britain and Europe. – Collins, London. 320 pp., 104 pls.
- Tshikolovets, V. V. 2003. Butterflies of Eastern Europe, Urals and Caucasus. – Kyiv-Brno. 176 pp., 47 pls.
- Tshikolovets, V. V. 2005. The Butterflies of Ukraine. – Zbirnik Prats Zoologichnogo Muzeyu, Kyiv **37**: 13–62.
- Tuzov, V. K., P. V. Bogdanov, A. L. Devyatkin, L. V. Kaabak, V. A. Korolev, V. S. Murzin, G. D. Samodurov & E. A. Tarasov 1997. Guide to the butterflies of Russia and adjacent territories (Lepidoptera, Rhopalocera). Volume 1. Hesperiiidae, Papilionidae, Pieridae, Satyridae. – Pensoft, Sofia-Moscow. 480 pp.
- Van Swaay, C. & M. Warren 1999. Red Data Book of European Butterflies (Rhopalocera). – Nature and Environment **99**. 260 pp.
- Wagner, W. 2003. Beobachtungen zur Biologie von *Pyrgus andromedae* (Wallengren, 1853) und *Pyrgus cacaliae* (Rambur, 1840) in den Alpen (Lepidoptera: Hesperiiidae). – Entomologische Zeitschrift Stuttgart **113** (12): 346–353.
- Warren, B. C. S. 1926. Monograph of the tribe Hesperiiidi (European species) with revised classification of the subfamily Hesperiiinae (Palaeartic species) based on the genital armature of the males. – Transactions of the Entomological Society of London **74**: 1–170, 60 pls.