

New Records for Four Butterfly Species (Lepidoptera: Papilionoidea & Hesperioidea) in the Republic of Macedonia

Dime Melovski^{1*}, Emilija Bozhinovsk²

1. Macedonian Ecological Society, Arhimedova 5, Skopje, Republic of Macedonia
2. Biology Students' Research Society, Arhimedova 5, Skopje, Macedonia

* E-mail of the corresponding author: melovskid@mes.org.mk

Abstract

The Macedonian butterfly fauna numbers 205 species. In this paper we record *Nymphalis vaualbum* for the first time and confirm the presence in Macedonia of the so-far omitted *Polyommatus aroaniensis*. Furthermore, the second locality in the country of the *Carterocephalus palaemon* is reported, along with new localities of *Papilio alexanor*. The findings of this work will contribute both towards the increased knowledge of this insect group in the region as well as the conservational efforts to locate and map rare and endemic butterfly species.

Keywords: Macedonian butterfly fauna, new records, *Nymphalis vaualbum*, *Polyommatus aroaniensis*, *Carterocephalus palaemon*, *Papilio alexanor*.

1. Introduction

Butterflies are one of the exceptional groups of insect that are well studied in the Republic of Macedonia. An overview of the collected knowledge on the Macedonian butterfly fauna is provided by Rebel (1913), Alberti (1922), Thurner (1964) and Scheider and Jaksic (1989). In recent years, several publications updated the list of butterfly species in Macedonia (Kolev & Van der Porten, 1997; Krpač and Mihajlova, 1997; Melovski, 2004; Verovnik & Micevski, 2008; Micevski *et al.*, 2009a; Verovnik *et al.*, 2010), as well as contributed towards the faunistic records of certain regions in the country (Jakšić, 1998; Melovski, 2003, 2010; Melovski *et al.*, 2004; Micevski *et al.*, 2009b; Huemer *et al.*, 2011; Krpač *et al.*, 2011; Arsovski *et al.*, 2012; Abdija *et al.*, 2013a, 2013b, 2013c). On the European continent, the butterfly fauna of Macedonia is one of the most diverse, with a total of 205 published species, i.e. more than 40% of the European butterfly fauna. This high butterfly diversity in a comparatively small European country is mostly due to its geographical position; providing the most southern occurrence of typical European species and being the northern border of Mediterranean species. Macedonia is also home to several Balkan endemics. Furthermore, the predominantly mountainous relief of the country, with several high mountain ranges and steep gorges, provides microclimatic conditions for species whose range in Europe is very limited (Verovnik, 2012). Several species with a distribution range close to the Macedonian territory are also expected to be found, which implies that more research is needed in order to increase the general knowledge of this insect group in the country.

The aim of this paper is to present new findings regarding four relatively rare butterfly species: the False Comma *Nymphalis vaualbum* (Denis & Schiffermüller, 1775), recorded for the first time in the Macedonian butterfly fauna; new localities and confirmations for the Grecian Anomalous Blue *Polyommatus (Agrodiaetus) aroaniensis* (Brown, 1976), the Chequered Skipper *Carterocephalus palaemon* (Pallas, 1771) and the Southern Swallowtail *Papilio alexanor* Esper, 1800.

2. Materials and methods

The research was carried out within the framework of the Biology Students' Research Society research camps in the following regions: Mt. Shar Planina and Mariovo. Collected specimens are conserved in the private collection of the first author.

We used entomological nets for collecting butterfly specimens, which we conserved inside paper envelopes. Date, location/site, habitat and altitude were stated for each butterfly specimen. Easily recognisable butterfly specimens were recorded and freed. The rest of the specimens were conserved and subjected to further analyses. Determination was conducted according to various publications (Popović & Đurić, 2011; Lafranchis, 2004; Tolman & Lewington 1997; Pamperis, 1997; Schaidler and Jaksic, 1989, and personal communication between colleagues (Beshkov pers. com.). The nomenclature in this paper is in accordance with Fauna Europaea (<http://www.faunaeur.org>).

3. Results

We carried out the research in July 2009 on Mt. Shar Planina, and in May 2008 and July 2012 for the region of Mariovo. In May 2013, a one-day field trip was organized in the Radusha region, close to Skopje, where we observed a small colony of the Southern Swallowtail (Fig. 1). In total, we collected one specimen of the False Comma, six Grecian Anomalous Blue and three Chequered Skipper. The Southern Swallowtail was

photographed in its original habitat (Fig. 2). In the following text we give a detailed review of the four species targeted in our study:

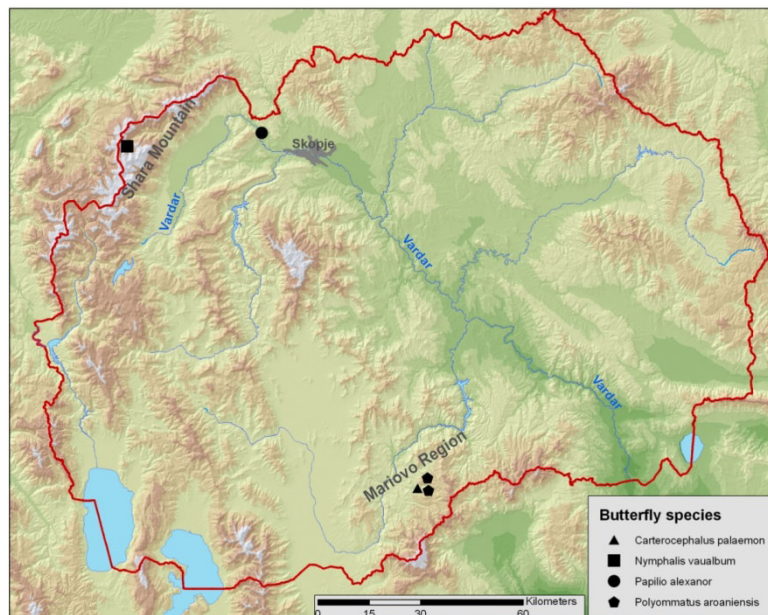


Figure 1. Map of the investigated area.



Figure 2. The southern swallowtail (*Papilio alexanor*) resting on *Euphorbia glabriflora* (Vis.). Photo by Slavcho Hristovski.

3.1 False Comma *Nymphalis vaualbum* (Denis & Schiffermüller 1775)

Mt. Shar Planina, Dolna Leshnica, 1500 m, clearing in a beech forest, 14.07.2009, leg. E. Bozhinovska (coll. D. Melovski).

The False Comma is a holarctic butterfly that ranges from Eastern Europe across Russia to China, Korea and Japan, as well as from Alaska and Labrador, south to West Virginia and Utah (Gillham 1956, van Swaay et al. 2010). In Eastern Europe it occurs in deciduous or mixed woodlands of the lowlands, but it also prefers damp woods and is found in clearings or at the forest edges. It is a mobile butterfly and a strong migrant (<http://eol.org/pages/164189/details>). The False Comma has one generation a year and because it hibernates as a butterfly, can be seen for much of the year (van Swaay et al. 2010).

In 2009 this butterfly was recorded for the first time in Macedonia on Mt. Shar Planina (Fig. 1). We collected one specimen in a beech woodland clearing, at an altitude of 1500 m. Because there are no other official finding records of this species in the Macedonian fauna, and because of its migratory behaviour, it is difficult to ascertain whether populations are permanent or temporary in Macedonia. Follow up research in the same region in August 2009 and July 2010 revealed no further evidence of its presence.

3.2 Grecian Anomalous Blue *Polyommatus (Agrodiaetus) aroaniensis* (Brown 1976)

Mariovo, v. Polchishte, 1000 m, mountain stream, 14.07.2012, 3 ♂, leg. D. Melovski (coll. D. Melovski).

Mariovo, river Satoka, 700 m, riparian habitat, 11.07.2012, 2 ♂/1 ♀, leg. D. Melovski & E. Bozhinovska (coll. D. Melovski).

The Grecian Anomalous Blue is a Balkan endemic. It is native to the mountains of the north, west and south of Greece. It is also found in southern Bulgaria (where it is rare) (van Swaay *et al.* 2010) and southern Macedonia (Lafranchis 2004, Kolev & Van der Porten, 1997). Found at altitudes from 400-2,000 m, mostly below 1,500 m, this butterfly prefers dry grassland and scrub, rocky slopes and also woodland rides or forest clearings.

Although omitted in most of Europe's field guides and Macedonian checklists, this species was reported for the first time for the Macedonian butterfly fauna by Kolev & Van der Porten (1997). In this study we give detailed data on its location and habitat.

During our research, this butterfly was recorded on riparian habitats in Mariovo region, southern Macedonia (Fig. 2). At one of the localities (River Satoka) this species was observed to be sympatric with other species of the same complex: *Polyommatus admetus* and *Polyommatus ripartii*. In total, we have collected six specimens (5 ♂ & 1 ♀), at altitudes of 700 and 1,000 m. The specimens were determined using the Lafranchis (2004) identification keys, while photos were sent to Bulgarian colleagues for further clarification (Stoyan Beshkov pers. com.). All except for one specimens lack the white stripe of the underside hindwing, which is one of the morphological characteristics that can be observed in almost half of the specimens in a population (Kolev & Van der Porten, 1997).

3.3 Chequered Skipper *Carterocephalus palaemon* (Pallas 1771)

Mariovo, v. Beshishte, 720 m, mountain stream, 18.05.2008, 2 ♂/1 ♀, leg. D. Melovski (coll. D. Melovski).

The Chequered Skipper is widely distributed throughout Europe and Asia, reaching Japan. It also occurs in North America up to Alaska (<http://eol.org/pages/164189/details>). The species occurs on grassy, woodland clearings, often in damp places (Tolman & Lewington, 1997). In our study, we collected three specimens (2 ♂ & 1 ♀) of this butterfly near the village of Beshishte, in the Mariovo region (Fig. 2). The specimens were caught in open habitat, near a stream at an altitude of 720 m. Taking into account the fact that this species is present in all the neighbouring countries (Lafranchis, 2004; Verovnik & Popović, 2013), it is not surprising that it was recorded in Macedonia. The species was previously published by Verovnik & Micevski (2008) based on field observations from the northern part of Macedonia. Nevertheless, more detailed research is needed in other parts of the country in order to establish a more accurate distribution range of this species.

3.4 Southern Swallowtail *Papilio alexanor* Esper, 1800

Skopje, 5km SW of Radusha, Orljak hill, 450m, clearing in degraded oak forest (*Quercus-Carpinetum orientalis*), 17.05.2013. Observed and photographed by Lj. Melovski and S. Hristovski.

It is distributed in southern Europe, in the Middle East through to Iran and Afghanistan. In Europe it is native to Macedonia, Albania, Montenegro, Croatia, France, Greece and Italy (<http://www.faunaeur.org>). The Southern Swallowtail is mostly found on warm, dry, calcareous slopes with flower-rich vegetation and low-growing bushes. They prefer slopes that are steep and rocky (van Swaay *et al.* 2010).

In our study a small colony of this butterfly was found 15 km northwest of Skopje, in a clearing in a degraded oak forest at an altitude of 450 m (Fig. 1). This finding represents the third finding of this species in Macedonia (Schaider & Jakšić, 1989). Taking into account the vicinity of the closest already known colony of this species in Macedonia (Kozjak Mt. at around 20 km distance from the new locality) and the fact that this species was never recorded at the presented locality, a possible spread of the distribution range can be expected further north.

4. Discussion and conclusion

The total number of butterfly species in Macedonia is a debated issue. While some species like *Melitaea telona* (*Melitaea phoebe* f. *punica*) and *Polyommatus eroides* (lately regarded as subspecies of *Polyommatus eros*) are subject to differences of opinion regarding their taxonomic status (Tolman & Lewington 1997; Hesselbarth *et al.*, 1995; Abadjiev 1995, 2000, 2001; Vodolazhsky *et al.*, 2009), others, such as *Nymphalis vaualbum* and *Pseudochazara graeca* (Anastassiou *et al.*, 2009) as well as *Plebejus dardanus* (Verovnik, 2012), have an uncertain residence status or were recorded with questionable observations in the past.

The Grecian Anomalous Blue (*Polyommatus aroaniensis*) has never been part of the species list of Schaider & Jakšić (1989) for the territory of the Republic of Macedonia. Nevertheless, *P. aroaniensis* in Macedonia was published by Lafranchis (2004) and Kolev & Van der Porten (1997). The latter reported on the sympatric presence of another *Agrodiaetus* species of the same complex – *Polyommatus (Agrodiaetus) pelopi* (regarded as synonym to *Polyommatus ripartii*) in the territory of Macedonia.

The list of Schaider and Jaksic (1989), which counted 198 species, was amended with seven more species in recent years: *Gonepteryx cleopatra* (Krupač & Mihajlova 1997), *Polyommatus aroaniensis* (Kolev & Van der Porten 1997), *Araschnia levana* (Melovski 2004), *Carterocephalus palaemon* (Verovnik & Micevski 2008),

Melitaea aurelia (Micevski *et al.*, 2009a), *Melitaea telona* (Verovnik *et al.* 2010), *Nymphalis vaualbum* (this paper). Thus, the total number of butterfly species in Macedonia at the present moment is 205.

However, five more species are listed for Macedonia in Fauna Europaea: *Apatura metis*, *Pyronia cecilia*, *Hipparchia semele*, *Lycaena thetis* and *Colias hyale*, with no further references for their presence.

Admittedly, the constant presence of the False Comma is doubtful. More research is needed in order to confirm its true distribution status and the possible establishment of a colony in Macedonia as the most southern territory of its distribution.

The huge diversity of butterflies in Macedonia is not just due to the country's geographical position, but also to its relatively preserved habitats and extensive agricultural system. Alongside its neighbouring countries, (196 species published for Albania (Verovnik *et al.* 2013), 197 for Serbia (Popović & Đurić, 2011), 216 for Bulgaria (Abadjiev, 2001) and 232 for Greece (Pamperis, 1997)), Macedonia, with 205 species, is another example of the rich butterfly diversity of the Balkans. However, the complete checklist of the country is far from finished and this is especially true for its south-eastern part where species such as: *Pseudochazara amydone*, *P. orestes*, *Pyronia cecilia*, *Lycaena thetis*, *Chilades trochylus*, *Leptidea morsei*, *Polyommatus nephohiptamenos* and *Colias aurorina* are to be expected.

Following this direction, future research of this insect group should focus on the endangered (both on a country and on a European scale) and endemic butterfly species in order to investigate their threats and stop possible decline. Moreover, a lot less has been done in Macedonia for the research of the moths. Missing knowledge on their distribution and abundance is a first priority on the future research of the Lepidoptera order.

References

- Abadjiev, S. (2001). An Atlas of the Distribution of the Butterflies in Bulgaria (Lepidoptera: Hesperioidea & Papilionoidea). Vol. 1. Pensoft Publishers, 335 pp.
- Abdija, Xh., Beadini, N., Beadini, S. & Rexhepi, B. (2013a). A Taxonomic Study of the Family Hesperioidea (Rhopalocera) of the Massif Mountains of Sharr, Pollog Valley and Mavrovo National Park. Journal of Natural Science Research. Vol. 3 No. 12: 47-51.
- Abdija, Xh., Beadini, N. & Beadini, S. (2013b). The basic characteristics of the study of Butterfly (Rhopalocera) fauna in the mountain massif of Sharr, Pollog Valley and the National Park of Mavrovo. Advances in Life Science and Technology. Vol. 8: 28-34.
- Abdija, Xh., Beadini, N., Beadini, S. & Iseni, A. (2013c). Taxonomic data for Pieridae Family (Rhopalocera) of the Sharr Mountain and its Surroundings (Mavrovo and Pollog). American Journal of Zoological Research. Vol. 1, No. 1: 12-16.
- Alberti, B. (1922). Beitrag zur Kenntnis der Macrolepidopteren Mazedoniens. Zeitschr. wissensch. Insektenbiologie, 17: 33-40, 73-82.
- Anastassiou, T.H., Coutsis, G.J & Chavalas, N. (2009). New data regarding the geographical distribution of *Pseudochazara graeca* in Greece, with notes about its wing coloration, the status of its ssp. *coutsisi* (= *zagoriensis*), as well as the supposed correlation between the HW underside ground colour and the geological character of the habitat in both *P. graeca* and *Hyponephele lycaon* (Lepidoptera: Nymphalidae, Satyrinae). Phegea, 37 (4): 135-145.
- Arsovski, D., Bozinovska, E., Spirkovska, A. & Melovski, D. (2010). Diversity of daily butterflies in the Struga Prime Butterfly Area. Biol. Stud. Res. Soc., 4: 77-80, Skopje. (in Macedonian).
- Gillham, N.W. (1956). *Nymphalis vau-album* (Schifferrmuller & Denis), a holarctic species (Lepidoptera: Nymphalidae). Psyche 63:27-29.
- Hesselbarth, G., Oorschot, H. & Wagens, S. (1995). *Die Tagfalter der Türkei unter Berücksichtigung der angrenzenden Länder*: (Lepidoptera Papilionoidea and Hesperioidea). Bocholt, Sigbert Wagens. 3 vols.
- Huemer, P., Krpač, V., Plössl, B. & Tarmann, G. (2011). Contribution to the fauna of Lepidoptera of the Mavrovo National Park (Republic of Macedonia). Acta entomologica slovenica, 19 (2): 169-186.
- Jakšić, P. (1998). The butterflies of Šar-planina Mt. (Lepidoptera: Hesperioidea & Papilionoidea). *Zaštita prirode*, Beograd, 50: 229-252 (in Serbian).
- Kolev, Z. & Van der Poorten, D. (1997). Review of the distribution of the Balkan endemic *Polyommatus (Agrodiaetus) aroaniensis* (Lepidoptera: Lycaenidae), with notes on its sympatry with related species. Phegea 25 (1): 35-40.
- Krpač, V. T., Mihajlova, B. (1997). *Gonepteryx cleopatra* (Linnaeus 1767), a new species of the butterfly fauna in Macedonia (Lepidoptera: Pieridae). Acta Entomologica Slovenica, 5 (1): 113-116.
- Krpač, T.V., Darcemont, C., Krpač, M. & Darcemont-Lemonnier, M. (2011). Fauna of butterflies (Papilionoidea) in the National Park Galičica, Republic of Macedonia. Nota lepid. 34 (1): 49-78.
- Lafranchis, T. (2004). Butterflies of Europe. Diatheo, Paris. 351 pp.

- Melovski, D. (2003). Daily butterflies (Rhopalocera) of Shara Mt. Bull. Biol. Stud. Res. Soc., 2: 125-138, Skopje. (in Macedonian).
- Melovski, D. (2004). *Araschnia levana* (Linnaeus, 1758), a new species for the Macedonian butterfly fauna (Lep.: Nymphalidae). Entomologist's Rec. J. Var. 116: 273-275.
- Melovski, D. (2010). Composition of the fauna of butterflies (Lepidoptera: Papilionoidea & Hesperioidea) on Jablanica Mt. Bull. Biol. Stud. Res. Soc., 4: 67-76, Skopje.
- Melovski, D., Meloski, N., Avukatov, A. (2004). Daily butterflies (Rhopalocera) of Bistra Mt. Bull. Biol. Stud. Res. Soc., 3: 61-66, Skopje. (in Macedonian).
- Micevski, B., Micevski, N. & Keymeulen, A. (2009a). *Melitaea aurelia* Nickerl 1850 (Nymphalidae, Lepidoptera), a new species for the Republic of Macedonia. *Lambillionea*, 109, 3:322-325.
- Micevski, B., Micevski, N. & Verovnik, R. (2009b). New records of the rare Escher's Blue, *Polyommatus escheri* (Lepidoptera: Lycaenidae), from the Republic of Macedonia. *Phegea*, 37 (2): 69 - 73.
- Pamperis, N.L. (1997). The Butterflies of Greece. Bastas-Plessas publ. 560 pp.
- Popović, M. & Đurić, M. (2011). Dnevni leptiri Srbije – priručnik HabiProt, 198 str. (in Serbian).
- Rebel, H. (1913). Studien Über die Lepidopterenfauna der Balkanländer, m. Tl. Sammelergebnisse aus Montenegro, Albanien, Mazedonien und Thrazien. *Ann.k. k. naturm. Hofmus. Wien*, 27: 281-334. (in German).
- Schaider, P. & Jakšić, P. (1989). Die Tagfalter von Jugoslawisch Mazedonien (Rhopalocera und Hesperidae). Selbstverlag Paul Schaidler, München, 199 pp. (in German).
- Thurner, J. (1964). Die Lepidopterenfauna jugoslawisch Mazedoniens. I. Rhopalocera, Grypocera und Noctuidae. Posebno Izdanje. Prirodonaučen Muzej Skopje 1: 1-158. (in German).
- Tolman, T., Lewington, R. (1997). Collins field guide. Butterflies of Britain and Europe. Harper Collins Publishers, London, 320 pp.
- Toth, J.P & Varga, Z. (2010). Morphometric study on the genitalia of sibling species *Melitaea phoebe* and *M. telona* (Lepidoptera: Nymphalidae). *Acta Zoologica Academiae Scientiarum Hungaricae* 56 (3), pp. 273-282, 2010.
- van Swaay, C., Wynhoff, I., Verovnik, R., Wiemers, M., López Munguira, M., Maes, D., Sasic, M., Verstrael, T., Warren, M. & Settele, J. (2010). *Nymphalis vaualbum*, *Polyommatus aroaniensis*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on 21 January 2014
- Verovnik, R. (2012). Contribution to the knowledge of the spring butterfly fauna of the Republic of Macedonia (Lepidoptera: Papilionoidea & Hesperioidea). *Natura Sloveniae*, 14(2): 39-50.
- Verovnik, R., Micevski B. (2008). Chequered skipper (*Carterocephalus palaemon*) new species for the fauna of the Republic of Macedonia (Lepidoptera: Hesperidae). *Biol. Macedonica*, 61: 93-96.
- Verovnik, R., Micevski B., Đurić, M., Jakšić, P., Keymeulen, A., Van Swaay, C. & Veling, K. (2010). Contribution to the knowledge of the butterfly fauna of the Republic of Macedonia (Lepidoptera: Papilionoidea & Hesperioidea). *Acta entomologica Slovenica*, 18 (1): 31-46.
- Verovnik, R. & Popović, M. (2013). Annotated checklist of Albanian butterflies (Lepidoptera, Papilionoidea and Hesperioidea). *ZooKeys* 323: 75-89.
- Vodolazhsky, D.I., Wiemers, M. & Stradomsky, B.V. (2009). A comparative analysis of mitochondrial and nuclear DNA sequences in blue butterflies of subgenus *Polyommatus* (s. str.) Latreille, 1804 (Lepidoptera: Lycaenidae: *Polyommatus*). *Caucasian Entomological Bulletin* 2009. 5(1): 115-120. www.eol.org : (<http://eol.org/pages/164189/details> - Downloaded on 9th of January 2014)

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
<http://www.iiste.org>

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: <http://www.iiste.org/journals/> All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

Recent conferences: <http://www.iiste.org/conference/>

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

