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Original Article

Butterfly species (Lepidoptera: Hesperioidea and Papilionoidea) new to the Serbian fauna

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***Abstract*:**
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A species *Pyrgus trebevicensis* (Warren, 1926), *Melitaea telona* (Fruhstorfer, 1908) and *Coenonympha orientalis* (Rebel, 1913) are here recorded in Serbia for the first time. The key morpho-anatomical parameters for identification were done. Original pictures of *C. orientalis* in situ and photos of genital apparatuses are given. Original map of distribution examined species in Serbia was made.

Key words: Butterflies, Serbia, faunistics

Introduction

The first fauna list of Serbian butterfly species was provided by Gradojević (1931), where 150 species are mentioned. For this crucial work the knowledge about the Serbian butterfly fauna has been significantly increased due to activity of national and foreign lepidopterists. Until now, the existence of 193 good species in Serbia has been verified (Jakšić & Đurić, 2008).

On the basis of morphometric study on the male genitalia, statistic analysis of populations and the DNA sequences analysis, a new contemporary approach gives us the possibility to solve old taxonomic problems, mostly among the sibling species.

The „sibling species“ concept denotes morphologically similar or identical natural populations that have been reproductively isolated. Soon after the formation of this concept, Heydemann (1943) published a list of 40 sibling species. Recently, Descimon and Mallet (2009) have published a long paper about sibling species among butterflies. Sibling species are easy to distinct by the differences in their habits, early stages and ecophysiology. But, their fine variations in morphology and anatomy, however, are also essential for their differentiation. As a rule, these differences are most dificult to discover.

All the three newly established species shown here belong to a grup of sibling species.

Materials and methods

The adults material has been collected on the field using entomological net. After preparing, we determined the specimens by the wing-patterns and in all cases the identification has been also carried out by an examination of the male genitalia. The preparations were carried out following the well known standard procedure: maceration by boiling in potash, dissecting and cleaning, clearing in xylolum and mounting in Canada balsam. The photos of genital parameters were taken using the "Leica DM 1000" microscope with the "Camera Leica DEC 290"; photos of *in situ* specimen were taken using “Olympus” SP-510UZ (7,1 megapixel and 10X optical zoom). All the material (specimens and genitalia slides) are deposited in the author's collection.

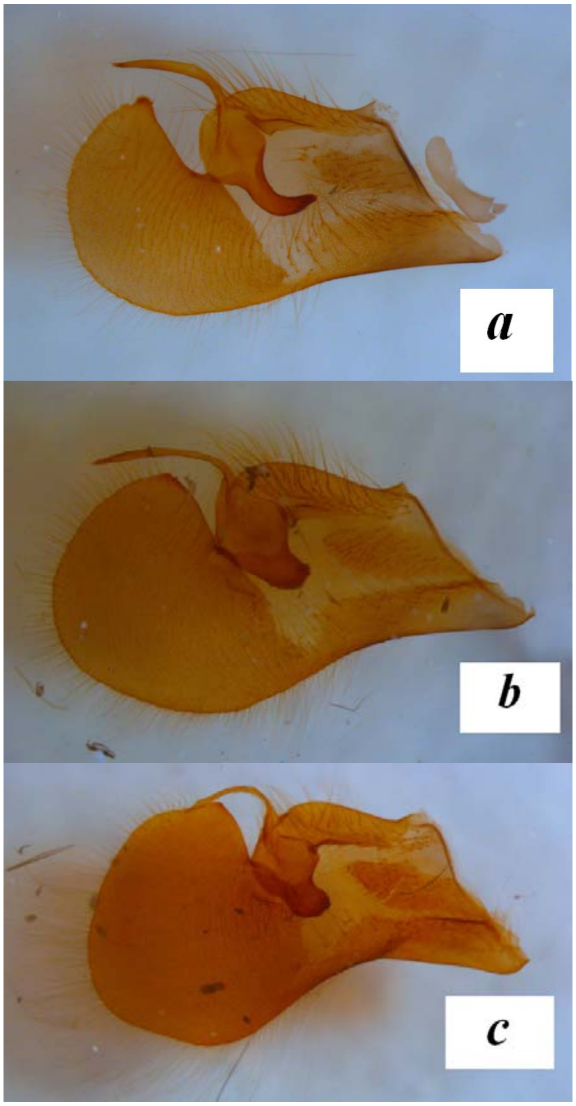


Figure 1. Male genitalia (valva) of: *P. armoricanus*, Serbia, Šar-Planina Mt., Brezovica, 1400 m, Octob., 3rd, 1975., Jakšić P. leg., Prep. no. Srb-5148 (a); *P. alveus*, Serbia, Kopaonik Mt., Žljeb, 1770 m, July, 21st, 2005., Jakšić P. leg., Prep. no. Srb-2278 (b); *P. trebevicensis*, Serbia, Tara Planina Mt., Kaluđerske bare, 1020 m, July, 8-9th, 1985., Jakšić P. leg., Prep. no. Srb-638 (c).

Results

Pyrgus trebevicensis (Warren, 1926)

In the new list, The butterfly species of Europe (Swaay et al., 2010) this species does not exist as a distinct species separated from *Pyrgus alveus*. As a good species within the national faunas it has been listed by the following authors: Austria (Rennier, 1991; Gros & Embacher, 1998; Habeler, 1999); Czech Republic (Beneš et al. 2001); Deutschalnd (Rennier, 1991; Wagner, 2002); Bosnia and Herzegovina (Schawerda, 1918; Rennier, 1991; Lelo, 2007).

Shawerda (1918) described this species as *P. reverdini*: „Etwas grösser, oberseits heller braun, nicht so dunkel wie die Nennform, normal stark weiss gefleckt. Unterseits sind die weissen Flecke grösser, das Braun lichter, Breitere Flügelspannung meist 29 mm. 5 ♂, 2 ♀, Trebevic, Vucijabara. Von mir im Juli 1907 und 1912 erbeutet." Warren (1926) proposed to replace the name *trebevicensis* into *reverdini* Schawerda, 1918, because *reverdini* is a primary junior homonym of *P. reverdini* Oberhur. He citated Schawerda (1918) that *reverdini* differs from the type in being slightly larger, with the ground-colour of the upperside lighter brown and not so black as in typical *alveus*, and with the white markings strongly pronounced. The underside has all the white markings broader and the ground-colour of the hind-wings paler yellow. All the wings are said to be a litle broader than in the type."

New data for Serbia:

Material examined: - Serbia, Tara Planina Mt., Kaluđerske bare, 1020 m (X = 43^0 54' 33"; Y = 19^0 32' 55") 1m, 8-9. VII 1985., Jakšić P. leg., prep. no. Srb-638; - Serbia, Užice, 670 m (X = 43^0 50' 44"; Y = 19^0 49' 25") 1m, 4. VI 1982., Toševski I. leg., Prep. no. Srb-100; - Serbia, Divčibare, 950 m (X = 44^0 06' 09"; Y = 19^0 59' 20") 1m, 27. VI 2006., Đurić M., leg., Prep no. Srb-2323; - Serbia, Fruška Gora Mt., 130 m (X = 45^0 12' 47"; Y = 19^0 50' 02") 1 m, VII 1929., Rogulja M. leg., Prep no. Srb-96; - Serbia, Golija Mt., 1800 m (X = 43^0 20' 20"; Y = 20^0 16' 38") 1 m, 22. VII 1937., Vagner O. leg., Prep. no. Srb-60; - Serbia, Golija Mt., 1800 m (X = 43^0 20' 20"; Y = 20^0 16' 38") 1 m, 22. VII 1937., Vagner O. leg., Prep. no. Srb-87; - Serbia, Stol Mt., 900 m (X = 44^0 10' 24"; 22^0 07' 20") 1 m, 28. VII 1974., Zečević M. leg., Prep. no. Srb-82 (**Fig. 4**: ●)

Melitaea telona (Fruhstorfer, 1908)

In the new list The butterfly species of Europe (Swaay et al., 2010) this species exists as a distinct species separated from *M. phoebe*. As a good species within the national faunas it has been listed by the following authors: Hungary (Tóth & Varga, 2010); Macedonia (Verovnik et al., 2010).

Tóth and Varga (2010) pointed their basic characteristics in male genitalia: „In males the depth of the central notch of the saccus proved to be the most important difference. Except two characters all show significant differences, but if these differences are considered separately we can found major overlaping. In general we observed that in *M. telona* we can see a more notched saccus, and more symetric shape of processus posterior (in same side) because the inner process in the processus posterior is shorter than *M. phoebe*. These two characters are essentially the same as the distinctive characters in the original description of *M. „phoebe“ kovacsi*.“ According to Pecsenye et al. (2007) – cited by Tóth & Varga (2010) - enzyme electrophoretic study of Hungarian populations has also shown obvious difference between *M. phoebe* and *M. telona* without any mark of hybridisation.

New data for Serbia:

Material examined: - Serbia, Stara Planina Mt., Janja, 520 m (X = 43^0 24' 47"; 22^0 31' 04") 1 m, 8. VII 2010., Jakšić P. leg., Prep. no. Srb-2484; - Serbia, Stara Planina Mt., Janja, 520 m (X = 43^0 24' 47"; 22^0 31' 04") 1 m, 8. VII 2010., Jakšić P. leg., Prep. no. Srb-2485 (**Fig. 4**: ▲)

Coenonympha orientalis (Rebel, 1913)

In the new list, The butterfly species of Europe (Swaay et al., 2010) this species exists as a distinct species separated from *C. gardetta.* As a good species within the national faunas it has been listed by Coutsis & Ghavalás (2005) for the territory of Greece.

Boillat (1990) gives the first detailed presentation of arguments suppotring *C. orientalis* as a „bona species“. According to Coutsis & Ghavalas (2005): „... *C. orientalis* is being raised to specific level apparently on the basis of what is believed to be unique external characters, that do not relate to any of the other taxa under consideration, of sympatry with *C. leander* (though no actual syntopism is involved here), and of the supposed absence of intermediates between the two.“ In our specimens of *C. gardetta* the underside of fore-wing apex is grey and there is no ocelli; in *C. orientalis* the underside of fore-wing apex is brown-orange, with one or two ocelli. Analysing the available material it can be concluded that *C. gardetta* is not present whereas *C. orientalis* is present in this part of the Balkan Peninsula.

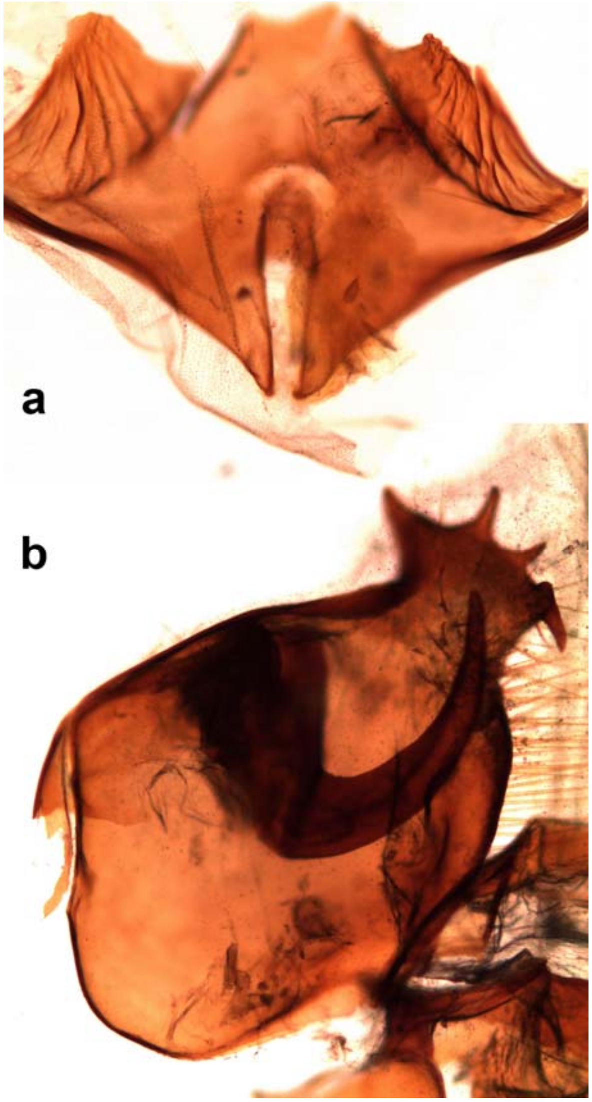


Figure 2. *Melitaea telona* (Fruhstorfer, 1908): Saccus and valva, Srbija, Stara Planina Mt., Janja, 520 m, July, 8th, 2010., Jakšić P. leg., Prep. no. Srb-2484;

New data for Serbia:

Material examined: -Serbia, Tutin, Smolućka reka, Crkvine, 950 m (X = 43^0 02' 44"; Y = 20^0 21' 40") 1 m, 23. VI 2006., Jakšić P. leg; - Serbia, Kopaonik Mt., Žljeb, 1750 – 1770 m (X = 43^0 18' 46"; Y = 20^0 50' 00") 2 mm, 21. VII 2005., Jakšić P. leg.; - Serbia, Kopaonik Mt., Bele stene, 1760 m (X = 43^0 18' 30"; Y = 20^0 49' 53") 1m, 23. VII 2010., Jakšić P. leg. (**Fig. 4**: ■).

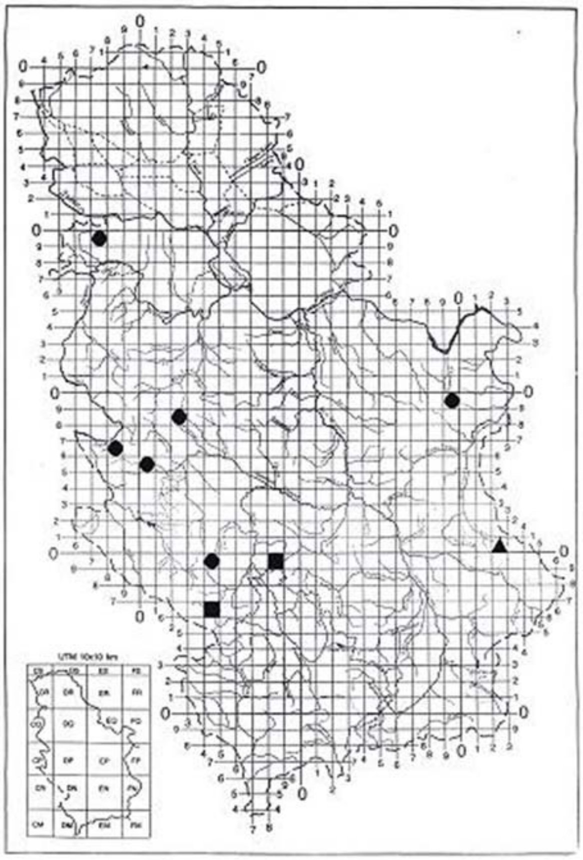
Figure 3. *C. orientalis* (Rebel, 1913), specimen from Serbia, Kopaonik Mt., Bele stene, 1760 m, July, 23rd, 2010., Jakšić P. leg.

Discussion and conclusion

The combination of morpho-anatomical, physiological-biochemical characteristics, ecological characteristics, as well as taxa biogeography present a good basis for solving the boundary taxonomic cases. Even today, we are still impressed by the sensibility of the classical entomologists who were insightful enough to describe new taxa a century ago. Out of three sibling species analysed here, two were raised to the status of species. In the near future combinig the morphological and DNA analysis, the taxon *Pyrgus trebevicensis* could be classified as a „bona species"

After this review 195 butterfly species have been noted in the territory of Serbia: 22 species of Hesperioidea and 171 species of Papilionoidea (Jakšić, 2008) + two new species. This excludes *C. gardetta,* but includes the presence of *C. orientalis* instead.

Related to the butterfly fauna of Europe (482 species, Swaay et al., 2010), the species present in Serbia make up 40%.



Figire 4. UTM distribution map of examined species - *Pyrgus trebevicensis* (Warren, 1926) ●; *Melitaea telona* (Fruhstorfer, 1908) ▲ and *Coenonympha orientalis* (Rebel, 1913) ■.

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