

RURAL SPRING GEOMETER MOTHS (LEPIDOPTERA, GEOMETROIDEA LEACH, 1815) IN KOSOVO AND METOHIA (SERBIA)

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ABSTRACT

This paper shows the presence of the rural geometer moths in 15 localities of Kosovo and Metohia (Serbia). A review of existing data regarding the area of Kosovo and Metohia is given. Through research, the presence of 48 species was revealed. Between them, five species are reported as new for the fauna of Kosovo and Metohia: *Plagodis pulveraria* (Linnaeus, 1758), *Scotopteryx luridata* (Hufnagel, 1767), *Catarhoe cuculata* (Hufnagel, 1767), *Anticlea badiata* (Denis & Schiffermüller, 1775) and *Anticlea derivata* (Denis & Schiffermüller, 1775).

Keywords: Lepidoptera, Geometridae, Kosovo and Metohia (Serbia).

INTRODUCTION

The order Lepidoptera Linnaeus 1758, with 45 superfamilies, represents one of the larger order of insects. Among them, the superfamily of geometer moths (Geometroidea Leach, 1815), with 999 species in Europe, belongs to the number of species in the more significant group of Lepidoptera (Nieuwerkerken et al., 2011). In Serbia, this group of insects is represented by more than 350 species (Dodok, 2006). With this in mind, it is clear that the fauna of this group is insufficiently explored in Serbia.

The first faunistic data on the geometer moths in Kosovo and Metohia are found in the work of Rebel (1917). At that time, during the First World War, part of Metohija was connected to Montenegro ("Neumontenegro"). The area of Žljeb Mt., Novo Selo (north of Peć) and the surroundings of Peć, Ribarić and Čečevo Brdo were investigated. The presence of 95 species was established and this result represents a pioneering contribution of the author.

Vukčević (1954) published next data on the geometer moths in Kosovo and Metohia. Among the identified species of plant diseases and pests, the author also lists the winter moths specie *Operophtera brumata* L. and *Erannis defoliaria* (Clerck, 1759). Đorđije Đorović, from the Forestry Institute in Peć, specialized in studying the defoliators of oak. Among the numerous representatives of defoliators, Đorović identified 25 species of Geometridae (Đorović, 1974, 1976, 1979, 1980 and 1992).

After this period, practically no one specialized in the study of geometer moths in Kosovo and Metohia. In the period from 1972 to 1999, Predrag Jakšić collected specimens of this group. Some of the data are published (Jakšić, 2016; Jakšić & Ristić (1999) 2001). (Tomić et al., 2002). One part of his data, comprising 80 species, is included in a study of the family of this

group in Serbia (Tomić et al., 2002). In addition, several other authors have contributed to the knowledge of this group, as indicated in the References.

Some of rural and urban Geometridae species were primarily known for melanism, an example of a well-investigated species of the genus *Biston* (Bishop, 1972; Ford, 1955). Therefore, they can be indicators of the quality of the environment. Considering Rebel's (1917) research is already 100 years old, it was interesting to compare his results with ours.

As can be seen from this review, the fauna of this group of Lepidoptera is still insufficiently studied in Serbia. Likewise, the fauna of urban and rural areas, which usually contains synanthropic species, has remained under-researched. In addition, previous research was carried out for the most part during the summer period.

Bearing these facts in mind, we thought it would be important to study the urban and rural spring fauna of geometer moths in a few localities of Kosovo and Metohia.

MATERIALS AND METHODS

Specimens of the studied species were collected in the territory of Kosovo and Metohia in a period from 1974 to 2019. Collection was carried out at the following sites (Tab. 1).

Altitude and site coordinates are determined according to Google Earth, available on the Internet.

Collection was carried out at night, using a 160 W bulb (Mercury vapour Lamp, 160 W, BB Link Lighting). Preparation of the collected material and the production of permanent microscope slides of the genital armatures were carried out by standard procedure. Genital armatures were recorded as needed on a Nikon binocular microscope using a digital Nikon camera with an AF-S Micro Nikkor Lens.

Species determination was based on wing parameters and analysis of genital armatures, if necessary. The literature given in

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the References was used for determination based on the wing parameters.

The classification of Lepidoptera at the levels of order, superfamily and family is according to Nieuwerkerken et al. (2011). Taxonomy and nomenclature of examined species was done according to Müller et al. (2019). Species ID numbers and

systematic order are done according to Karsholt & Razowski (1996). Species determination was carried out on the basis of contemporary literary sources.

Abbreviations: m – Male, f – Female; K & M – Kosovo & Metohia (Kosovo i Metohija, Srbija).

Tabela 1. List of examined places.

LOCALITY	ELEVATION (m)	COORDINATES	
		Latitude φ (N)	Longitude λ (E)
Bostane (Novo Brdo)	860	42° 36' 47"	21° 25' 33"
Gornje Kusca (Gnjilane)	556	42° 29' 48"	21° 28' 56"
Leposavić	508	43° 06' 10"	20° 48' 30"
Parteš (Gnjilane)	490	42° 24' 07"	21° 26' 01"
Pasjane (Gnjilane)	500	42° 24' 25"	21° 29' 44"
Pridvorica	580	42° 55' 22"	20° 41' 21"
Priština, Gazimestan	630	42° 41' 20"	21° 07' 46"
Priština, Grmija	700	42° 40' 30"	21° 11' 57"
Sevce (Šar-Planina)	1060	42° 12' 48"	20° 56' 22"
Stanišor (Gnjilane)	548	42° 29' 30"	21° 27' 43"
Štrpce (Šar-Planina)	890	42° 14' 19"	21° 01' 45"
Velji Breg (Zubin Potok)	630	42° 55' 54"	20° 40' 41"
Vrbeštica (Šar-Planina)	1011	42° 14' 34"	20° 58' 32"
Zubin Potok	567	42° 54' 52"	20° 41' 23"
Zvečan	583	42° 54' 24"	20° 50' 35"

RESULTS: LIST OF EXAMINED SPECIES

Superfam. Geometroidea Leach, 1815

Fam. Geometridae Leach, 1815

7530 *Ligdia adustata* ([Denis & Schiffermüller], 1775): Pridvorica, 5. May 2018, 1m; Velji Breg, 13. April 2018., 1m; Zubin Potok, 16. April 2018., 1m. New species for Serbia.

7540 *Macaria alternata* ([Denis & Schiffermüller], 1775): Gornje Kusce, 16. May 2018., 1m; Štrpce, 24. June 2018., 1f.

7581 *Neognopharmia stevenaria* (Boisduval, 1840): Pasjane, 19. April 2018., 1m.

7606 *Plagodis pulveraria* (Linnaeus, 1758): Gornje Kusce, 4. May 2018., 1f.

7613 *Opisthograptis luteolata* (Linnaeus, 1758): Štrpce, 20. May 2018., 1m.

7618 *Therapis flavicaria* ([Denis & Schiffermüller], 1775): Pridvorica, 5. May 2018., 1m.

7622 *Eilicrinia cordiaria* (Hübner, 1790): Gnjilane, Gornje Kusce, 7. May 2018., Genitalia checked, slide SR-3120 (Fig. 1).



Figure 1. *E. cordiaria* (Hübner, 1790): Gnjilane, Gornje Kusce, 7. May 2018., Male genitalia.

7636 *Ennomos erosaria* ([Denis & Schiffermüller], 1775): Leposavić, 26. May 2018., 1m Genitalia checked, slide SR-3135 (Figs. 2a & 2b).

7642 *Selenia lunularia* (Hübner, [1788]): Gornje Kusce, 8. April, 2018., 1m; Pasjane, 4. April 2018., 1f.

7650 *Dasycorsa modesta* (Staudinger, 1879): Gnjilane, Gornje Kusce, 15. Mart 2018., 1m; 30. Mart 2018., 1m; 10.-16.

April 2018., 3m; Gnjilane, Stanišor, 5.–22. April 2018., 3m, Genitalia checked. (Figs. 3a & 3b).



Figure 2a. *E. erosaria* ([Denis & Schiffermüller], 1775): Leposavić, 26. May 2018., Male adult.



Figure 2b. *E. erosaria* ([Denis & Schiffermüller], 1775): Leposavić, 26. May 2018., Male genitalia.



Figure 3a. *D. modesta* (Staudinger, 1879): Gnjilane, Gornje Kusce, 16. April 2018. Male, adult.



Figure 3b. *D. modesta* (Staudinger, 1879): Gnjilane, Gornje Kusce, 30. Mart 2018. Male, genitalia.

7661 *Asovia maeoticaria* (Alphéraky, 1876): Gnjilane, Gornje Kusce, 13. April 2018., 1f. So far, for Serbia this species reported Djuric & Hric (2013) and Beshkov (2015). New species for K & M.

7663 *Colotois pennaria* (Linnaeus, [1760]): Sevce, 20. October, 1m; Štrpce, 18. October 2018., 1f. So far, Đorović (1976, 1992) reported this species for K & M.

7671 *Apocheima hispidaria* ([Denis & Schiffermüller], 1775): Gornje Kusce, 2. February 2018, 1 m; 17. February 2018., 1m; 15. March 2018., 1m. Đorović (1976 & 1979) reported this species for K & M.

7672 *Phigalia pilosaria* ([Denis & Schiffermüller], 1775): Vrbeštica, 1. March 2018., 4m. Genitalia checked, slide SR-3125 (Figs.4a & 4b). Đorović (1976, 1979, 1992) reported this species for K & M.



Figure 4a. *P. pilosaria* ([Denis & Schiffermüller], 1775). Šar-Planina, Vrbeštica, 1011m, 1. Mart, 2019. Male adult.



Figure 4b. *P. pilosaria* ([Denis & Schiffermüller], 1775). Šarplanina, Vrbeštica, 1011 m, 1. Mart, 2019. Male genitalia.

- 7674 *Lycia hirtaria* (Clerck, 1759): Štrpce, 29. April 2018., 1m.
 7676 *Lycia graecarius* (Staudinger, 1861): Gornje Kusce, 19. March 2018, 1m; Velji Breg, 30. March 2018, 1m. Jakšić (2016; 2018) and Jakšić & Ristić (1999) reported this species for K & M.
 7685 *Biston strataria* (Hufnagel, 1767): Gornje Kusce, 5. March 2018., 1m; 29. March 2018., 1m.
 7694 *Agriopis bajaria* ([Denis & Schiffermüller], 1775): Štrpce, 25. October 2018., 1m. This is the second data for this species on K & M, so far Đorović (1979) reported it for Dulje and Birač.
 7695. *Agriopis aurantiaria* (Hübner, 1799): Stanišor, 31. September 2018., 1m.; Štrpce, 25. October 2018., 1m.
 7696 *Agriopis marginaria* (Fabricius, [1777]): Vrbeštica, 1. March 2018., 2m; Štrpce, 29. April 2018., 1m; Priština, Grmija, 6. March 1979., 1m; 20. March 1980., 1m. Genitalia checked, slides SR-3124 & SR-3126.
 7699 *Erannis defoliaria* (Clerck, 1759): Zvečan, 26. October 2018., 1m; Bostane (Novo Brdo), 27. November 1982., 1m; 10. December 1982., 1m. Genitalia checked, slides SR-3128 and SR-3129. (Fig. 5).



Figure 5. *E. defoliaria* (Clerck, 1759), Bostane (Novo Brdo), 10. December 1982. Male genitalia.

- 7804 *Ematurga atomaria* (Linnaeus, 1758): Velji Breg, 9. May 2018., 1m.
 7824 *Cabera pusaria* (Linnaeus, 1758): Parteš, 12. May 2018., 1f.
 7826 *Cabera exanthemata* (Scopoli, 1763): Štrpce, 20 May 2018., 1m.
 7831a *Aleucis orientalis* (Staudinger, 1892): Priština, Gazimestan, 9. April 1974., 1f.; Štrpce, 29. April 2018., 1m.
 7916 *Siona lineata* (Scopoli, 1763): Gornje Kusce, 7. May 2018., 1m; Zubin Potok, 15. May 2018., 1f.
 7953 *Alsophila aescularia* ([Denis & Schiffermüller], 1775): Gornje Kusce, 17. March 2018., 2m; Štrpce, 29. April 2018., 3m; Vrbeštica 1. March 2018., 5m.
 7971 *Comibaena bajularia* ([Denis & Schiffermüller], 1775): Leposavić, 24. May 2018., 1m Genitalia checked, slide SR-3136 (Figs. 6a & 6b).



Figure 6a. *C. bajularia* ([Denis & Schiffermüller], 1775): Leposavić, 24. May 2018., Male adult.



Figure 6b. *C. bajularia* ([Denis & Schiffermüller], 1775): Leposavić, 24. May 2018., Male genitalia.

- 8000 *Hemistola chrysoprasaria* (Esper, 1795): Gornje Kusce, 20. May 2018., 1f.
 8020 *Cyclophora quercimontaria* (Bastelberger, 1897): Pridvorica, 7. May 2018., 1m and 1f.
 8024 *Cyclophora linearia* (Hübner, [1799]): Pridvorica, 5. May, 2018., 1m; Zubin Potok, 15. May 2018, 1f.

- 8028 *Timandra comae* A. Schmidt, 1931: Pridvorica, 5. May 2018, 1m & 7. May 2018., 1m.
 8036 *Scopula immorata* (Linnaeus, 1758): Parteš, 10 May 2018., 1f.
 8045 *Scopula ornata* (Scopoli, 1763): Šar-Planina Mt., Štrpce, 20. May 2019., 1m. Genitalia checked, slide SR-3116 (Fig. 7).



Figure 7. *S. ornata* (Scopoli, 1763): Šar-Planina Mt., Štrpce, 20. May 2019. Male genitalia.

- 8051 *Scopula decorata* ([Denis & Schiffermüller], 1775): Pasjane, 6. June 2018., 1f. (Fig. 8). Genitalia checked, slide SR-3117.



Figure 8. *S. decorata* ([Denis & Schiffermüller], 1775): Pasjane, 6. June 2018., Female, adult.

- 8059 *Scopula marginepunctata* (Goeze, 1781): Pridvorica, 9. May 2018., 1m. Genitalia checked, slide SR-3121.; Šar-Planina, Štrpce, 20. May 2019.
 8062 *Scopula imitaria* (Hübner, [1799]): Pridvorica, 13. May 2018., 1f. Rebel was (1917) first who reported this species for Metohia.
 8241 *Scotopteryx luridata* (Hufnagel, 1767): Pasjane, 22. April 2018., 1f.

- 8269 *Catarhoe cuculata* (Hufnagel, 1767): Pridvorica, 7. May 2018., 1f.
 8309 *Earophila badiata* ([Denis & Schiffermüller], 1775): Štrpce, 29. April 2019., 8m.
 8310 *Anticlea derivata* ([Denis & Schiffermüller], 1775): Pridvorica, 15. April 2018., 1f.
 8335 *Gandaritis pyraliata* ([Denis & Schiffermüller], 1775): Gornje Kusce, 13. June 2018., 1f.
 8338 *Ecliptopera silaceata* ([Denis & Schiffermüller], 1775): Štrpce, 20. May 2019., 1m.
 8341 *Chloroclysta siterata* (Hufnagel, 1767): Šar-Planina, Štrpce, 890 m, 20. May 2019., 1f. Genitalia checked, slide SR-3123.
 8400 *Horisme vitalbata* ([Denis & Schiffermüller], 1775): Pridvorica, 10. May 2018., 1m; Štrpce, 20. May, 1m.
 8411 *Melanthia procellata* ([Denis & Schiffermüller], 1775): Pridvorica, 5-10. May 2018., 3m; 20. May – 6. June 2018., 6m; Šar-Planina, Štrpce, 20. May 2019. (Fig. 9).



Figure 9. *M. procellata* ([Denis & Schiffermüller], 1775) Šar-Planina, Štrpce, 890 m, 20. May 2019., Female.

- 8447 *Operophtera brumata* (Linnaeus, 1758): Vrbeštica, 23 December 2018., 7m.
 8622 *Aplocera efformata* (Guené, [1858]): Štrpce, 9. June 2018., 1f.

DISCUSSION AND CONCLUSION

Presented here are the 48 species of the Geometridae Leach, 1815 family recorded in Kosovo and Metohia. The specimens were collected from 15 localities during winter and spring in 1979., 1980., 1982., 2018. and 2019.

Five species are reported as new for the fauna of Kosovo and Metohia: *Plagodis pulveraria* (Linnaeus, 1758), *Scotopteryx luridata* (Hufnagel, 1767), *Catarhoe cuculata* (Hufnagel, 1767), *Earophila badiata* (Denis&Schiffermüller, 1775) and *Anticlea derivata* (Denis & Schiffermüller, 1775).

Special attention was paid to the genus *Scopula* Schrank, 1802. Sihvonen (2005) treated the *drenowskii* Sterneck, 1941 taxon as a subspecies of *decorata* ([Denis & Schiffermüller], 1775). However, Can (2009) proved that this taxon is a valid

species (bona species). Alphéraky (1876) described the *orientalis*, which has recently been found in Romania by Dinca & Székely (2018). Since the original description was given in Russian, we kindly asked Dr Konstantin Efetov (Simferopol, Russia) to provide us with a translation which we present here:

« – *Decorata* Brkh. Specimens from Taganrog are strongly lighter than German ones; transverse lines crossing middle of wings are slightly visible; lace-shaped pattern near outer margin is much more pale and does not rich upper angle of forewing. Size of specimens from Taganrog is similar to those of Northern Iran: 27–29mm, while German specimens: 20–23mm. According to my information specimens of this species are larger and lighter in the East than type from Western Europe and I propose to name the eastern form for example as varietas *Orientalis*. Moth is not rare; flying from end of May till September.»

Among the specimens examined in Kosovo and Metohia, 5 species of the *Scopula* Schrank, 1802 genus were found, but not the two aforementioned species.

Members of the Geometridae family are particularly sensitive to industrial pollution. This is why melanistic forms occur. Among the specimens collected, we found no melanistic forms. This serves to show that the environment is relatively well preserved.

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