

THE LONGHORN BEETLES (COLEOPTERA: CERAMBYCIDAE) OF THE GLEDIĆ MOUNTAINS (CENTRAL SERBIA)

Filip Vukajlović and Nenad Živanović

Department of Biology and Ecology, Faculty of Science, University of Kragujevac,
Radoja Domanovića 12, 34000 Kragujevac, Republic of Serbia
e-mail: fvukajlovic@hotmail.com

(Received April 2, 2014)

ABSTRACT. This paper presents the results of the fauna of longhorn beetles (Coleoptera: Cerambycidae) of the Gledić Mountains (Central Serbia). The obtained data present the first contribution to the study of longhorn beetles of the mountains. Based on the material collected from 2011 to 2013, 41 species from four subfamilies were recorded and the highest number of species is registered within the subfamilies Cerambycinae (15) and Lamiinae (14). *Stictoleptura cordigera* (Fuessly, 1775) is reported for the first time for Central Serbia. The additional rare longhorn beetle *Stictoleptura erythroptera* (Hagenbach, 1822) has been recorded. A single subspecies *Saphanus piceus ganglbaueri* Brancsik, 1886 is Balkan endemic. Four recorded taxa [(*Cerambyx* (*Cerambyx*) *cerdo cerdo* Linnaeus 1758., *Morimus asper funereus* Mulsant, 1862., *Agapanthia kirbyi* (Gyllenhal, 1817) and *Saphanus piceus ganglbaueri* Brancsik, 1886)] are protected both nationally and internationally. According to the system of chorotype classification of Serbian longhorn beetles, proposed by ILIĆ (2005), the most of recorded species belong to Euro-Mediterranean chorotype and prefer steppe habitats, what suggests that habitats in the Gledić Mountains and Šumadija region are increasingly assuming more sub-Mediterranean and steppe features due to negative human impact, stronger presence of continental climate and deforestation.

Keywords: Cerambycidae, fauna, Gledić Mts., Central Serbia.

INTRODUCTION

Gledić Mountains are the biggest mountain massif in Šumadija region of Central Serbia, located near city of Kragujevac. It extends 35 km in the northwest-southeast direction, between the Lepenica River in the north, the Gruža River in the west, Levač region in the east and the Zapadna Morava River in the south (Fig. 1). The highest peak is Samar (922 m a.s.l.). The Gledić Mountains originated during the Alpine Orogeny and are located on the western edge of the old Rhodope Massif (STEPANOVIĆ, 1980).

The vegetation of the Gledić Mountains belongs to the transitional form between Eastern and Western Serbia. These mountains are located in the territory of Eastern Balkan continental zone of deciduous forests (VELJOVIĆ, 1967). The forest vegetation is characterized by a xerothermal forest of *Quercetum confertae-cerris* Rudski 1940 type and mesophile forests of *Querceto-Carpinetum serbicum* Rudski 1940 and *Fagetum montanum serbicum* Rudski 1940 types (VELJOVIĆ, 1967). The two main types of meadow vegetation are present there: valley and

submontane meadows. Valley meadows belong to the two alliances: *Deschampsion caespitosae* Horvatić 1930 and *Arrhenatherion elatioris* Koch 1926. These meadows are natural formations formed in river valleys. Submontane meadows, which were formed as a result of degradation of forest communities, are represented with the alliance *Festucion valesiacae* Klika 1931 (VELJOVIĆ, 1967).

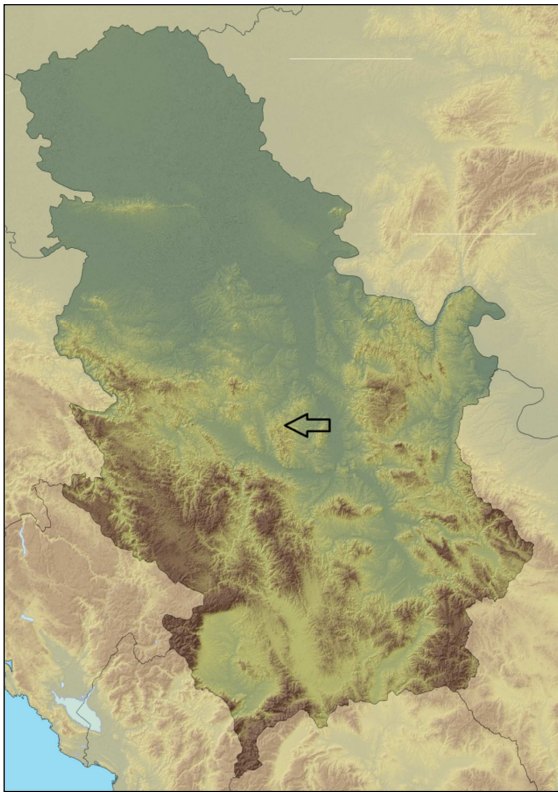


Figure 1. Position of the Gledić Mountains on the map of the Republic of Serbia (http://upload.wikimedia.org/wikipedia/commons/4/49/Relief_map_of_Serbia.png).

In the last 100 years the Gledić Mountains are highly exposed to human impact (VUKOVIĆ, 1999). Deforestation of the mountains caused the creation of submontane meadows and pastures at higher altitudes, while agricultural fields at lower altitudes. Consequences of this impact are erosion and climate changes. Continentalisation of the climate and erosion disabled natural succession of the vegetation. In some parts of the mountains, communities of Austrian pine and black locust were planted. Agricultural communities are present mainly with small grains and corn (VUKOVIĆ, 1999).

The longhorn beetles in the territory of the Gledić Mountains are poorly studied so far. In the Republic of Serbia, the longhorn beetle research has a long tradition (ADAMOVIĆ, 1965; MIKŠIĆ and GEORGIJEVIĆ, 1971, 1973; MIKŠIĆ and KORPIČ, 1985; ILIĆ, 2005). Previous presence of longhorn beetles on the Gledić Mountains was only recorded in the work of ILIĆ (2005), who reported just two taxa near the Grošnica Reservoir – *Rhagium (Megarhagium) mordax* (De Geer, 1775) and *Saphanus piceus ganglbaueri* Brancsik, 1886. Other data on longhorn beetles in the surrounding areas were given by ADAMOVIĆ (1965), TREBJEŠANIN (1990), ĐORĐEVIĆ (2002), and ILIĆ (2005). Together it was

recorded totally only 26 species for the territory of the city of Kragujevac.

The aim of this paper was to contribute to the study of longhorn beetle fauna of the Gledić Mountains as the Kragujevac vicinity and central part of the Republic of Serbia, and to give a short biogeographical pattern of this fauna based on chorotype analysis shown through overview on the state of habitats on the mountains.

MATERIALS AND METHODS

Adult longhorn beetles were collected from May 2011 to June 2013 at different localities of the Gledić Mountains (Grošnica Reservoir surroundings, villages of Baljkovac, Dulene, and Donja Sabanta). The beetles were collected in many different habitats, such as oak and beech forests, ruderal vegetation, meadows, etc.

Many collecting techniques were used, such as sweeping the vegetation with entomological net, hand collecting under rotten stumps and tree bark and pitfall trap technique.

The sex of each specimen was identified, and all the specimens were labeled. For identification we used different keys (MIKŠIĆ and GEORGIJEVIĆ, 1971, 1973; MIKŠIĆ and KORPIČ, 1985). Classification was performed as in DANILEVSKY (2014). The material is kept in the author's collection.

RESULTS AND DISCUSSION

During the research period, a total of 97 adult longhorn beetle specimens was collected. There were recognised 41 species classified into 25 genera, 16 tribes and four subfamilies. The following is a list of them with the data findings and chorotype identification based on the system proposed by ILIĆ (2005).

Family Cerambycidae

Subfamily Prioninae

Tribe Prionini

1. *Prionus (Prionus) coriarius* (Linnaeus, 1758), village of Dulene, 15 May 2011, 1♀, leg. F. Vukajlović. Chorotype: Euro-Siberian.

Subfamily Lepturinae

Tribe Rhagiini

2. *Rhagium (Megarhagium) sycophanta* (Schrank, 1781), Grošnica Reservoir surroundings, 18 May 2013, 1♀, 1♂, leg. F. Vukajlović. Chorotype: Euro-Siberian.

3. *Dinoptera collaris* (Linnaeus, 1758), village of Donja Sabanta, 09 June 2013, 1♀, leg. F. Vukajlović. Chorotype: Euro-Siberian.

4. *Pidonia (Pidonia) lurida* (Fabricius, 1792), village of Donja Sabanta, 09 June 2013, 1♂, leg. F. Vukajlović. Chorotype: Central-South European.

Tribe Lepturini

5. *Vadonia unipunctata unipunctata* (Fabricius, 1787), Grošnica Reservoir surroundings, 13 June 2012, 2♀, 2♂, leg. F. Vukajlović. Chorotype: Pontic.

6. *Stictoleptura (Stictoleptura) cordigera* (Fuessly, 1775), village of Dulene, 15 May 2011, 1♀, leg. F. Vukajlović; Grošnica Reservoir surroundings, 13 June 2012, 1♂, leg. F. Vukajlović. First data from Central Serbia. Very rarely found in Serbia. Previously recorded in South (ILIĆ, 2005) and North Serbia (PIL AND STOJANOVIĆ, 2008). Chorotype: Euro-Mediterranean.

7. *Stictoleptura (Stictoleptura) erythroptera* (Hagenbach, 1822), Grošnica Reservoir surroundings, 13 June 2012, 1♂, leg. F. Vukajlović. Very rarely found in Serbia (ILIĆ, 2005; ILIĆ AND ĆURČIĆ, 2013; ILIĆ ET AL., 2013). Chorotype: Central-South European.

8. *Pachytodes erraticus* (Dalman, 1817), village of Donja Sabanta, 09 June 2013, 3♀, 3♂, leg. F. Vukajlović; village of Baljkovac, 16 June 2013, 3♀, 1♂, leg. N. Živanović; village of Dulene, 15 May 2011, 1♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

9. *Rutpela maculata* (Poda, 1761), village of Donja Sabanta, 09 June 2013, 2♀, 1♂, leg. F. Vukajlović; village of Baljkovac, 16 June 2013, 2♀, leg. N. Živanović; Grošnica Reservoir surroundings, 18 May 2013, 2♀, leg. F. Vukajlović; village of Dulene, 15 May 2011, 1♀, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

10. *Stenurella (Stenurella) melanura* (Linnaeus, 1758), village of Baljkovac, 16 June 2013, 1♂, leg. N. Živanović. Chorotype: Euro-Siberian.

11. *Stenurella (Priscostenurella) septempunctata septempunctata* (Fabricius, 1792), village of Donja Sabanta, 09 June 2013, 2♀, 1♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

12. *Stenurella (Nigrostenurella) nigra* (Linnaeus, 1758), village of Donja Sabanta, 09 June 2013, 1♀, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

Subfamily Cerambycinae

Tribe Hesperophanini

13. *Stromatium unicolor* (Olivier, 1795), Grošnica Reservoir surroundings, 13 June 2012, 1♀, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

Tribe Stenopterini

14. *Stenopterus flavicornis* Küster, 1846, Grošnica Reservoir surroundings, 13 June 2012, 2♀, 1♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

Tribe Molorchini

15. *Molorchus (Glaphyra) umbellatarum* (Schreber, 1759), village of Dulene, 15 May 2011, 1♀, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

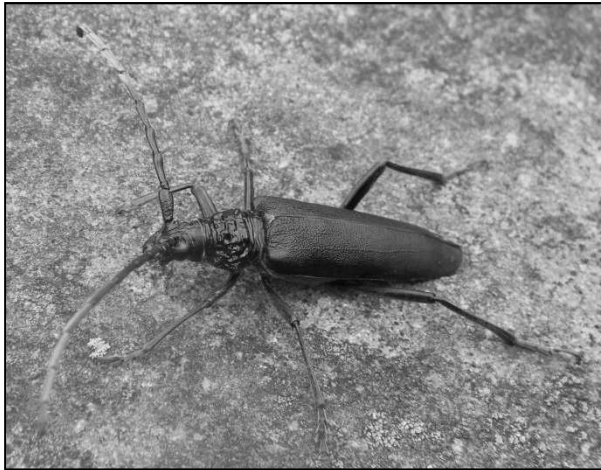


Figure 2. *Cerambyx (Cerambyx) cerdo cerdo* Linnaeus, 1758 (photo Filip Vukajlović, 2012).

Tribe Cerambycini

16. *Cerambyx (Cerambyx) cerdo cerdo* Linnaeus, 1758 (Fig. 2), Grošnica Reservoir surroundings, 13 June 2012, 1♀, leg. F. Vukajlović. Chorotype: Palearctic.

17. *Cerambyx (Microcerambyx) scopoli* Fuessly, 1775, Grošnica Reservoir surroundings, 13 June 2012, 1♀, 1♂, leg. F. Vukajlović; village of Baljkovac, 16 June 2013, 1♀, 1♂, leg. N. Živanović. Chorotype: Euro-Mediterranean.

Tribe Purpuricenini

18. *Purpuricenus kaehler* (Linnaeus, 1758), Grošnica Reservoir surroundings, 13 June 2012,

1♀, 1♂, leg. F. Vukajlović. Chorotype: Central-South European.

19. *Purpuricenus budensis* (Goeze, 1783), Grošnica Reservoir surroundings, 13 June 2012, 1♂, leg. F. Vukajlović. Chorotype: Pontic.

Tribe Callidiini

20. *Phymatodes (Phymatodes) testaceus* (Linnaeus, 1758), Grošnica Reservoir surroundings, 13 June 2012, 1♀, 1♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

Tribe Anaglyptini

21. *Anaglyptus mysticus* (Linnaeus, 1758), village of Dulene, 15 June 2011, 1♀, leg. F. Vukajlović. Chorotype: Central-South European.

Tribe Clytini

22. *Plagionotus detritus* (Linnaeus, 1758), Grošnica Reservoir surroundings, 13 June 2012, 1♀, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

23. *Chlorophorus (Immaculatus) varius* (Müller, 1766), Grošnica Reservoir surroundings, 13 June 2012, 1♂, leg. F. Vukajlović. Chorotype: Euro-Siberian.

24. *Chlorophorus (Humeromaculatus) figuratus* (Scopoli, 1763), Grošnica Reservoir surroundings, 13 June 2012, 3♀, 2♂, leg. F. Vukajlović. Chorotype: Euro-Siberian.

25. *Chlorophorus (Perderomaculatus) sartor* (Müller, 1766), Grošnica Reservoir surroundings, 13 June 2012, 1♂, leg. F. Vukajlović. Chorotype: Euro-Siberian.

26. *Clytus (Clytus) arietis* (Linnaeus, 1758), village of Baljkovac, 16 June 2013, 1♀, leg. N. Živanović. Chorotype: Euro-Siberian.

27. *Clytus (Clytus) rhamni* Germar, 1817, Grošnica Reservoir surroundings, 13 June 2012, 1♂, leg. F. Vukajlović. Chorotype: Central-South European.

Subfamily Lamiinae

Tribe Mesosini



Figure 3. *Morimus asper funereus* Mulsant, 1862 (photo Filip Vukajlović, 2012).

28. *Mesosa (Aplocnemia) nebulosa* (Fabricius, 1781), village of Baljkovac, 16 June 2013, 1♀, leg. N. Živanović. Chorotype: Euro-Mediterranean.

Tribe Lamiini

29. *Morimus asper funereus* Mulsant, 1862, Grošnica Reservoir surroundings, 13 June 2012, 1♂, leg. F. Vukajlović; village of Dulene, 15 May 2011, 1♂, leg. F. Vukajlović. Chorotype: South-east European.

Tribe Dorcadionini

30. *Dorcadion (Carinatodorcadion) fulvum canaliculatum* (Fischer, 1823), village of Donja

Sabanta, 09 June 2013, 2♀, 2♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

31. *Dorcadion (Carinatodorcadion) aethiops aethiops* (Scopoli, 1763), village of Baljkovac, 16 June 2013, 1♀, 1♂, leg. N. Živanović; Grošnica Reservoir surroundings, 13 June 2013, 2♀, 1♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

32. *Dorcadion (Pedestrodorcadion) pedestre pedestre* (Poda, 1761), village of Donja Sabanta, 09 June 2013, 2♀, leg. F. Vukajlović; village of Baljkovac, 16 June 2013, 1♂, leg. N. Živanović. Chorotype: Euro-Mediterranean.

33. *Dorcadion (Pedestredorcadion) scopolii* (Herbst, 1784), Grošnica Reservoir surroundings, 18 May 2013, 1♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

34. *Dorcadion (Neodorcadion) bilineatum* (Germar, 1824), village of Donja Sabanta, 09 June 2013, 2♀, 1♂, leg. F. Vukajlović; village of Baljkovac, 16 June 2013, 1♂, leg. N. Živanović; Grošnica Reservoir surroundings, 13 June 2012, 1♀, 2♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

Tribe Phytoeciini

35. *Phytoecia (Musaria) affinis affinis* (Harrer, 1784), village of Donja Sabanta, 09 June 2013, 1♀, 1♂, leg. F. Vukajlović. Chorotype: Euro-Siberian.

36. *Phytoecia (Phytoecia) icterica* (Schaller, 1783), village of Dulene, 15 May 2011, 1♂, leg. F. Vukajlović. Chorotype: Central-South European.

37. *Phytoecia (Phytoecia) pustulata* (Schrank, 1776), village of Dulene, 15 May 2011, 1♂, leg. F. Vukajlović. Chorotype: Central-South European.

Tribe Agapanthiini

38. *Calamobius filum* (Rossi, 1790), village of Donja Sabanta, 09 June 2013, 1♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

39. *Agapanthia (Synthapsia) kirbyi* (Gyllenhal, 1817), village of Donja Sabanta, 09 June 2013, 2♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

40. *Agapanthia (Epoptes) villosoviridescens* (De Geer, 1775), village of Donja Sabanta, 09 June 2013, 1♀, leg. F. Vukajlović; Grošnica Reservoir surroundings, 18 May 2013, 2♂, leg. F. Vukajlović; village of Dulene, 15 May 2011, 1♀, leg. F. Vukajlović. Chorotype: Euro-Siberian.

41. *Agapanthia (Smaragdula) violacea* (Fabricius, 1775), village of Donja Sabanta, 09 June 2013, 1♂, leg. F. Vukajlović; Grošnica Reservoir surroundings, 18 May 2013, 1♂, leg. F. Vukajlović. Chorotype: Euro-Mediterranean.

The highest number of species is registered within the subfamilies Cerambycinae (15) and Lamiinae (14) (Tab. 1). Tribes Lepturini (eight), Clytini (six) and Dorcadionini (five) are the most numerous according the number of registered species. Genera *Dorcadion* Dalman, 1817 (with five species), *Stenurella* Villiers, 1974, *Chlorophorus* Chevrolat, 1863, *Phytoecia* Dejean,

1835 and *Agapanthia* Audinet-Serville, 1935 (each represented by three species), have the highest number of species among the analyzed genera.

Two species are rarely found in Serbia so far: *Stictoleptura cordigera* (Fuessly, 1775) and *S. erythroptera* (Hagenbach, 1822). *S. cordigera* is reported for the first time for Central Serbia. As far as endemics are concerned, one Balkan endemic subspecies (*Saphanus piceus ganglbaueri*) was recorded in investigated area (ILIĆ, 2005).

Four recorded taxa (*Cerambyx* (*Cerambyx*) *cerdo cerdo* (Fig. 2), *Morimus asper funereus* (Fig. 3), *Agapanthia kirbyi*, and *Saphanus piceus ganglbaueri*) are protected both nationally (ANONYMOUS, 2010) and internationally (EU 1992; IUCN 2013) (ILIĆ, 2005).

Table 1. Total number of longhorn beetle taxa collected on the Gledić Mountains from 2011 to 2013 and the numbers of the taxa within subfamilies.

Subfamily	Number of tribes	Number of genera	Number of species
Prioninae	1	1	1
Lepturinae	2	8	11
Cerambycinae	8	10	15
Lamiinae	5	6	14
Totally	16	25	41

The analysis of their distribution showed that 20 species belong to Euro-Mediterranean, 10 to Euro-Siberian, seven to Central-South European, two to Pontic, one to Palaeartic and one to Southeast European chorotypes following the system suggested by ILIĆ (2005). Eight species are common to steppe habitats: *Vadonia unipunctata unipunctata* (Fabricius, 1787), *Chlorophorus (Immaculatus) varius* (Müller, 1766), *Phytoecia (Phytoecia) pustulata* (Schrank, 1776), *Dorcadion (Carinatodorcadion) fulvum canaliculatum* (Fischer, 1823), *D. (Carinatodorcadion) aethiops aethiops* (Scopoli, 1763), *D. (Pedestrodorcadion) pedestre pedestre* (Poda, 1761), *D. (Pedestredorcadion) scopolii* (Herbst, 1784), *D. (Neodorcadion) bilineatum* (Germar, 1824) (PIL and STOJANOVIĆ, 2008). *Pidonia lurida* is typical for mountain habitats (PIL and STOJANOVIĆ, 2008).

CONCLUSIONS

A total of 43 species of longhorn beetles from 26 genera, 17 tribes and five subfamilies was recorded on the Gledić Mountains (combined data from literature and the current paper; ILIĆ, 2005), which represents 16.41% of the species of longhorn beetles registered to date in Serbia (262) (ILIĆ and ĆURČIĆ, 2013; ILIĆ *et al.*, 2013; STANČIĆ, 2013).

Negative human impact (especially deforestation) and stronger presence of continental climate causes that the territory of the Gledić Mountains and the whole Šumadija region is assuming more sub-Mediterranean and steppe features which can be also observed by analyzing chorotypes and presence of the recorded species.

The richness of longhorn beetle fauna on the Gledić Mountains is not yet completely known. The total number of the species might become even higher with future continuous, more methodical research during the whole annual period.

Acknowledgments

The study was supported by the Serbian Ministry of Education, Science, and Technological Development (Project III 41010) and the Fund for Environmental Protection and Sustainable Development of the City of Kragujevac (Project „Biodiversity of the Gledić

Mountains in the City of Kragujevac“, realised by the students' Ecological Research Association „Mladen Karaman“). We thank Olivera Gavrilović, MSc. of English language and Filip Grbović PhD. student of Botany for spelling checking and technical corrections of the manuscript.

References:

- [1] ADAMOVIĆ, Ž. (1965): Cerambycidae (Coleoptera) collected in Serbia. *Bulletin of the Natural History Museum in Belgrade* **B (20)**: 147-183. [in Serbian]
- [2] ANONYMOUS (2010): Rulebook on the Declaration and Protection of Protected and Strictly Protected Wild Species of Plants, Animals and Fungi. *Official Gazette of the Republic of Serbia* **5**: 46-99. [in Serbian]
- [3] DANILEVSKY, M.L. (2014): *A Check-List of Longicorn Beetles (Coleoptera, Cerambycoidea) of Europe*, 36 pp.
Available through: <http://www.cerambycidae.net/europe.pdf>. [Accessed on: 17 January 2014].
- [4] ĐORĐEVIĆ, B. (2002): *Contribution to the Studies on Cerambycidae of Serbia*. B.Sc. Thesis, Faculty of Science, University of Kragujevac, Kragujevac, 39 pp. [in Serbian]
- [5] EU (1992): Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora. *Official Journal of the European Union* **206**: 1-66.
- [6] ILIĆ, N. (2005): *The Longhorn Beetles of Serbia (Coleoptera, Cerambycidae) – Faunistic Review*. Author's Edition, Belgrade, 179 pp. [in Serbian]
- [7] ILIĆ, N. and ČURČIĆ, S. (2013): The longhorn beetles (Coleoptera: Cerambycidae) of Rtanj Mountain (Serbia). *Acta entomologica Serbica* **18** (1-2): 69-94.
- [8] ILIĆ, N., ČURČIĆ, S. and STOJANOVIĆ, D. (2013): The longhorn beetles (Coleoptera: Cerambycidae) of the Đerdap National Park (Serbia). *Acta entomologica Serbica* **18** (1-2): 95-127.
- [9] IUCN (2013): *IUCN Red List of Threatened Species*. IUCN, Gland, Switzerland. Version 2013.2, <http://www.iucnredlist.org/>. [Accessed on: 25 December 2013]
- [10] MIKŠIĆ, R. and GEORGIJEVIĆ, E. (1971): *Cerambycidae of Yugoslavia, Part I*. Academy of Sciences and Arts of Bosnia and Herzegovina, Sarajevo, 175 pp. [in Serbian]
- [11] MIKŠIĆ, R. and GEORGIJEVIĆ, E. (1973): *Cerambycidae of Yugoslavia, Part II*. Academy of Sciences and Arts of Bosnia and Herzegovina, Sarajevo, 153 pp. [in Serbian]
- [12] MIKŠIĆ, R. and KORPIČ, M. (1985): *Cerambycidae of Yugoslavia, Part III*. Academy of Sciences and Arts of Bosnia and Herzegovina, Sarajevo, 148 pp. [in Serbian]
- [13] PIL, N. and STOJANOVIĆ, D. (2008): The longhorn beetles (Coleoptera: Cerambycidae) of Mt. Fruška Gora. In: ČURČIĆ, S.B. (Ed.): *The Diversity of Coleoptera of the Fruška Gora National Park. Part One*. Fruška Gora National Park and Directorate of Forests, Ministry of Agriculture, Forestry, and Water Management of the Republic of Serbia, Novi Sad, pp. 1-88.
- [14] STANČIĆ, J. (2013): The Beetles (Insecta: Coleoptera) of the Ram-Golubac Sands (Eastern Serbia). *Acta entomologica serbica. Special Issue*. Entomological Society of Serbia, Belgrade, 488 pp. [in Serbian, with English summary]

- [15] STEPANOVIĆ, Ž. (1980): Natural and geographical characteristics of the Gledić Mountains. *Research Proceedings – “Gledić Mountains”*. Polet Society of Young Researchers, Kragujevac, pp. 3-13. [in Serbian]
- [16] TREBJEŠANIN, S. (1990): *Cerambycidae of Kragujevac*. B.Sc. Thesis, Faculty of Science, University of Kragujevac, Kragujevac, 27 pp. [in Serbian]
- [17] VELJOVIĆ, V. (1967): Vegetation of Kragujevac. *Bulletin of the Natural History Museum in Belgrade. Special Edition*. Natural History Museum, Belgrade, 108 pp. [in Serbian]
- [18] VUKOVIĆ, N. (1999): *Bird Distribution in Modified Habitats – Assay on the Gledić Mountains*. B.Sc. Thesis, Faculty of Biology, University of Belgrade, Belgrade, 37 pp. [in Serbian]

Additional Internet source:

http://upload.wikimedia.org/wikipedia/commons/4/49/Relief_map_of_Serbia.png