

NMNH, BAS

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### **Project**

*State and prospects of the *Castanea sativa* population in Belasitsa mountain: climate change adaptation; maintenance of biodiversity and sustainable ecosystem management.*

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### **Report**

Biodiversity of beetles (Insecta: Coleoptera) in chestnut forests, Belasitsa Mountain

# **Biodiversity of beetles (Insecta: Coleoptera) in chestnut forests, Belasitsa Mountain**

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## **1. Previous studies**

Beetles can be found in almost all habitats. They contain more species than any other order in the animal kingdom on the Earth, constituting about 25% of all known life-forms (Liebherr & McHugh 2003).

The faunistic data on this taxonomic group from the Bulgarian sector of the Belasitsa Mt. are scattered among numerous publications of foreign and Bulgarian authors. That is why, it is difficult to state with confidence who and when first announced records for the region. The scarcity of information about the Coleoptera in the region is due to two reasons: 1/ comparatively late inclusion of the region within the political boundaries of the country (1912) and its permanent frontier position (from 1912 – up to now), and 2/ presence of strict boundary regime during the totalitarian period 1945-1991. However, for a few taxonomic groups like Carabidae and Buprestidae, the data have been summarized. For instance, 53 species of Carabidae and 23 of Buprestidae are cited from the Bulgarian part of Belasitsa (Guéorguiev & Guéorguiev 1995a,b; Sakalian 2003).

## **2. Material and methods**

The present investigation concerns the chestnut forest within altitudinal range of 500-800 meters above sea level, including the “Kongura” Reserve. Tree age among the

examined plots varied between 50 and 180 years. Main object of assessment was the species structure of beetle communities. The material was collected in the period 26.III-7.X.2010 from 17 experimental plots. Altogether five field trips were carried out, each of them with duration of 4 days.

Basic approach followed in the course of terrain work is collecting original faunistic and ecological data. The material has been collected using pitfall traps type "Barber". Like preservative agent in the traps, convenient for capture soil-inhabiting beetles and their preservation, is used propylenglicol (C<sub>3</sub>H<sub>8</sub>O<sub>2</sub>). Ten traps were disposed around 10 meters each other in each plot. The traps were emptied in 50 days.

The cameral work consisted in two main tasks. First, the samples were washed in water and then were carefully divided into taxonomic groups. After that, the beetles were identified. Part of the material is kept in entomological boxes, and another one in 70 % alcohol. It is currently stored in the National Museum of Natural History, Sofia.

### **3. Results**

In the course of research, intensive terrain and cameral activities were accomplished. More than 7000 specimens of Coleoptera have been collected, and 6375 of them were identified to species or genus level (Appendix 1).

The faunistic results are object of scientific publications. One paper has been accepted for publication (Guéorguiev in press), and another one is submitted (Guéorguiev submitted).

#### **3.1. Species composition**

The identified beetles belong to 143 species and 121 genera from 37 families of order Coleoptera. Almost 3/4 of the species represent first findings for the Belasitsa Mt. Seven species, namely *Catops kirbyi*, *Dima macedonica*, *Lymexylon navale*, *Symbiotes gibberosus*, *Hypulus bifasciatus*, *Mycetochara humeralis*, and *Prostomis mandibularis* are new ones for the fauna of Bulgaria. Similarly, new records for Bulgaria are the genera *Benibotarus* Kôno, 1932, *Lymexylon* Fabricius, 1775, *Symbiotes* L. Redtenbacher, 1849 and *Prostomis* Latreille, 1825, as well as subfamily Lymexylinae Fleming, 1821 and family Prostomidae C.G. Thomson, 1859.

### 3.2. Analysis of the faunal data

The grand total of 143 species found in the region represents approximately 2.4 % of the Coleoptera species recorded in Bulgaria and ca. 12 % of those expected to live in the Bulgarian part of Belasitsa Mt.

The distribution of the species among the different plots is uneven and varies between 18 and 46 (Appendix 1). The highest number of species was found in plot № 6 (46) as well plots № 20 and № 22 (44 ones in each of them). Smaller number of species was found in plots № 7 (18) and № 9 (24).

Families with highest number of species are Carabidae (24), Elateridae (20), Tenebrionidae (14), Cerambycidae (9) and Leiodidae (8). Families with highest number of specimens are Carabidae, Leiodidae, Geotrupidae, Tenebrionidae, Silphidae, Lucanidae and Elateridae (Table 1), as more than half of all the collected specimens belong to the first family. The clear domination of soil-inhabiting taxonomic groups (Carabidae, Leiodidae, Geotrupidae, and Silphidae) can be explained with the methods of catch. As a rule, the species from dominant soil-inhabiting groups are carnivores (Carabidae), carrion-feeders (Leiodidae, Silphidae) or feeders on decomposing plant material (Geotrupidae). Tenebrionidae, Lucanidae and Elateridae have comparatively smaller number of individuals. The species from the last three groups are predominantly dendrobionts and xylophagous.

**Table 1.** Families with highest number of specimens (total number and percentage) in the studied plots.

<b>Families</b>	<b>Total number</b>	<b>Percentage</b>
Carabidae	3359	52.67 %
Leiodidae	740	11.61 %
Geotrupidae	592	9.29 %
Tenebrionidae	590	9.25 %
Silphidae	545	8.55 %
Lucanidae	155	2.43 %
Elateridae	87	1.36 %
<b>Total number of specimens from all families</b>	<b>6375</b>	<b>100 %</b>

Beetles found in big numbers in all or almost all experimental plots are *Carabus coriaceus cerisyi*, *Molops rufipes belasicensis*, *Myas chalybaeus*, *Tapinopterus balcanicus belasicensis* (Carabidae), *Sciodrepoides watsoni watsoni* (Leiodidae), *Nicrophorus interruptus* (Silphidae), *Anoplotrupes stercorosus* (Geotrupidae) and *Enoplopus dentipes* (Tenebrionidae). Each of these taxa was established with more than 300 specimens in total.

According to the taxonomic structure of the 143 beetle species found, the chestnut forests of Belasitsa Mt. are relatively rich in terms of beetle diversity. All data were collected using only one (although very effective) method of catch. We accomplished a year study, i.e. there is no annual reiteration of the samples. Last but not least, only part of the chestnut forest niches in the mountain was available for study in the examined plots.

#### **4. Species of conservation significance**

The Bern Convention places a particular importance on the need to protect endangered natural habitats and endangered vulnerable species. The conservation significance of habitats can be defined on criteria elaborated by this convention: species and population richness and presence of rare, endemic, and threatened species included in World and European Red Lists.

Thirty species or 21 % of all beetles are designated as species of conservation importance (Appendix 2). These species are arranged in three groups below.

##### **4.1. Protected species in World and European Red Lists**

Six species of Coleoptera are included in international and national agreements for protection of the biodiversity. *Carabus convexus dilatatus* and *C. intricatus* are listed in CORINE. The species *C. intricatus*, *Cerambyx cerdo* and *Morimus asper funereus* are listed in the IUCN Red List of Threatened Species, with categories LR/nt, VU A1c+2c, and VU A1c respectively (IUCN 2010). In the region, the populations of the last two species have low numbers of individuals, while those of *C. convexus dilatatus* and *C. intricatus* are assessed as having high numbers of individuals. In Bulgaria, *C. convexus* is widespread, eurytopic species, while *C. intricatus* is specialized forest dweller. Beetles found in the chestnut forests are also listed in annexes II and IV of DCE 92/43 of Natura 2000, the largest network of protected areas in the World. *Lucanus cervus*, *Osmoderma eremita*, *Cerambyx cerdo* and

*Morimus asper funereus* belong here. The same taxa are included in applications 2 and 3 of the Biological Diversity Act of Republic of Bulgaria.

#### **4.2. Endemic species**

Nine beetles are classified as endemic species (Appendix 2). This category unites taxa living only in the boundaries of the Balkan Peninsula. They could be divided into Balkan endemics (7) and Local endemics (2). *Cychnus semigranosus balcanicus*, *Pterostichus vecors*, *Bryaxis comita*, *Pselaphogenius bulgaricus*, *Dima macedonica*, *Lycoperdina pulvinata* and *Probatiscus obesus* belongs to the first group. The Local endemic species inhabit only the Belasitsa Mt. and nowhere else. Over one fifth (20.69 %) of all collected specimens belong to two Local endemic species - *Molops rufipes belasicensis* and *Tapinopterus balcanicus belasicensis*. In fact, every seventh specimen, or 15.78 % of all the individuals, belongs to *M. rufipes belasicensis*. The populations of all Balkan endemic species (with the exception of *Probatiscus obesus*) are found in low numbers. That is why such taxa are at the same time rare species. In contrast with that, the two Local endemic species were found in large number and to live in all or almost all experimental plots.

#### **4.3. Rare (stenotopic) species**

Some species are known from single findings and having sparse populations with very low numbers of individuals, not only in the region, but in the country. Such taxa are rare species. In most cases, the rare species are adapted to specific niches and are able to tolerate only a narrow range of environmental changes, i.e. these taxa are stenotopic. By reason of that, the stenotopic species are the most endangered of unfavourable conditions or human activities, in comparison with more frequent species from the above two categories. Fifteen beetles have been classified as rare species (Appendix 2).

### **5. Habitat threats**

There are several main threats for chestnut habitats in the Belasitsa Mountain:

- Forrest cutting.
- Replacement broadleaved forest with coniferous ones; planting monocultivations.
- Road construction.
- Fires.

- Change of river and stream beds.
- Disposal of litter (garbage) in proximity to running waters, roads, and chalets.

## **6. Recommendations for habitat preservation**

- Prohibition on forests cuttings in areas inhabited by species of conservation significance.
- Prohibition against rotting wood (both standing and lying) destruction.
- Prohibition on replacement of primary forest in return for plantations in areas inhabited by species of conservation significance.
- Prohibition on deprivation of forest soil and forest leaf litter.
- Decreasing risk of fires as a result of human activities.
- Prohibition against all manner of buildings in areas inhabited by species of conservation significance.

## **7. Acknowledgements**

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## **8. References**

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**Appendix 1.** Distribution of families and species of Coleoptera in the study plots (p). Abbreviations: p – plot number; tot – total number of collected specimens; \* - new species to the fauna of Bulgaria.

TAXA	p3	p4	p6	p7	p8	p9	p10	p11	p12	p13	p19	p20	p21	p22	p23	p24	p25	tot
<b>Carabidae</b>																		
<i>Notiophilus rufipes</i> Curtis	1		13				1	1	2			3		15			3	<b>39</b>
<i>Calosoma inquisitor</i> (Linnaeus)			1		1							2						<b>4</b>
<i>Carabus convexus dilatatus</i> Dejean	31	8	11	10	27	45	6	14	14	57	1	20		8	1	12	8	<b>273</b>
<i>Carabus coriaceus cerisyi</i> Dejean	34	22	23	19	41	11	20	39	47	35	12	15	4	12	16	3	31	<b>384</b>
<i>Carabus intricatus intricatus</i> Linnaeus	15	6	12	3	13		1	21	14	6	8	33	5	54	15	5	13	<b>224</b>
<i>Carabus montivagus montivagus</i> Palliardi	26	5	5	1	16		21	5	2	14		3		1			19	<b>118</b>
<i>Cychrus semigranosus balcanicus</i> Hopffgarten					1								9	1				<b>11</b>
<i>Trechus quadristriatus</i> (Schrank)			2						1									<b>3</b>
<i>Abax carinatus</i> (Duftschmid)	2						2								1			<b>5</b>
<i>Molops rufipes belasicensis</i> Mlynář	72	63	48	27	40	7	53	22	37	28	51	88	129	103	164	25	49	<b>1006</b>
<i>Myas chalybaeus</i> (Palliardi)	112	71	141	8	103	37	41	42	63	42	9	5	49	85	35	2	110	<b>955</b>
<i>Pterostichus vecors</i> (Tschitschérine)													1					<b>1</b>
<i>Tapinopterus balcanicus belasicensis</i> Mařan	36	4	56	1	56		15	11	4	2	3	20	51	24	23		7	<b>313</b>
<i>Amara aenea</i> (DeGeer)						1				1								<b>2</b>
<i>Harpalus atratus</i> Latreille	1																	<b>1</b>
<i>Harpalus distinguendus</i> (Duftschmid)										2								<b>2</b>
<i>Harpalus honestus</i> (Duftschmid)										2								<b>2</b>
<i>Harpalus rubripes</i> (Duftschmid)								1										<b>1</b>
<i>Harpalus serripes serripes</i> (Quensel)						1				2								<b>3</b>
<i>Harpalus tardus</i> (Panzer)									1	2								<b>3</b>
<i>Harpalus tenebrosus</i> Dejean																1		<b>1</b>
<i>Calathus fuscipes fuscipes</i> (Goeze)						1			1									<b>2</b>
<i>Laemostenus venustus</i> (Dejean)					2									1				<b>3</b>

<i>Platyderus rufus</i> (Duftschmid)			3															<b>3</b>
<b>Histeridae</b>																		
<i>Dendrophilus punctatus championi</i> Lewis												1						<b>1</b>
<i>Margarinotus merdarius</i> (Hoffmann)					1													<b>1</b>
<i>Margarinotus neglectus</i> (Germar)												1						<b>1</b>
<b>Leiodidae</b>																		
<i>Agaricophagus balcanicus</i> Hlisnikovsky								1			3						1	<b>5</b>
<i>Anisotoma humeralis</i> (Fabricius)			1									1		1				<b>3</b>
<i>Catops fuliginosus</i> Erichson						1												<b>1</b>
* <i>Catops kirbyi</i> (Spence)		1								1								<b>2</b>
<i>Colenis immunda</i> (Sturm)	4	1	3			1	18	12	5	1		1			1		1	<b>48</b>
<i>Nargus badius</i> (Sturm)		1	3				1	2							1		3	<b>11</b>
<i>Nargus wilkini</i> (Spence)			1					3		1	1				1			<b>7</b>
<i>Sciodrepoides watsoni watsoni</i> (Spence)	88	26	53	18	44		22	26	33	18	7	85	20	109	32	35	47	<b>663</b>
<b>Silphidae</b>																		
<i>Dendroxena quadrimaculata</i> (Scopoli)														1				<b>1</b>
<i>Nicrophorus humator</i> (Gleditsch)	1				1					2		7		3	3	1		<b>18</b>
<i>Nicrophorus interruptus</i> Stephens	48	11	27	7	21		19	6	35	21		57	9	69	40	20	38	<b>428</b>
<i>Nicrophorus vespilloides</i> Herbst	11	4	8		5		1	3		7		10	2	34	4	5		<b>94</b>
<i>Nicrophorus vestigator</i> Herschel					1													<b>1</b>
<i>Silpha obscura orientalis</i> Brulle			1											1				<b>2</b>
<i>Silpha olivieri</i> Bedel	1																	<b>1</b>
<b>Pselaphinae (Staphylinidae)</b>																		
<i>Bryaxis comita</i> (Rambousek)			1															<b>1</b>
<i>Bryaxis roumaniae</i> Raffray	1							1			1			1		1		<b>5</b>
<i>Claviger handmanni</i> Wasmann		1									2							<b>3</b>
<i>Pselaphogenius bulgaricus</i> Löbl		2	1								2					1		<b>6</b>
<i>Trimium carpathicum</i> Saulcy												1						<b>1</b>

<b>Lucanidae</b>																		
<i>Dorcus parallellipipedus</i> (Linnaeus)	3		2		11	8	1		1	5	1	46	36	14	16	3	3	<b>150</b>
<i>Lucanus cervus</i> (Linnaeus)				1								2						<b>3</b>
<i>Platycerus caraboides</i> (Linnaeus)													2					<b>2</b>
<b>Geotrupidae</b>																		
<i>Anoplotrupes stercorosus</i> (Scriba)	123	26	46	27	53		22	29	31	33	1	45	57	58	2	3	35	<b>591</b>
<i>Geotrupes spiniger</i> (Marsham)														1				<b>1</b>
<b>Ochodaeidae</b>																		
<i>Ochodaeus chrysomeloides</i> (Schrank)		1			1		1	7	10	1	4					4	5	<b>34</b>
<b>Scarabaeidae</b>																		
<i>Onthophagus coenobita</i> (Herbst)	2	7	1	3	7		9	2		10		2		4	3	4	1	<b>55</b>
<i>Onthophagus dellacasai</i> Pittino & Mariani	1					1												<b>2</b>
<i>Onthophagus ovatus</i> (Linnaeus)					1													<b>1</b>
<i>Onthophagus verticicornis</i> (Laicharting)	1																1	<b>2</b>
<i>Sisyphus schaefferi</i> (Linnaeus)	1				1													<b>2</b>
<b>Melolonthidae</b>																		
<i>Haplidia transversa transversa</i> (Fabricius)				1		4										1		<b>6</b>
<b>Cetoniidae</b>																		
<i>Cetonia aurata aurata</i> (Linnaeus)						6		1	1			2	2				1	<b>13</b>
<i>Gnorimus nobilis nobilis</i> (Linnaeus)												1						<b>1</b>
<i>Osmoderma eremita</i> (Scopoli)			2															<b>2</b>
<b>Byrrhidae</b>																		
<i>Pedilophorus rhodopensis</i> Paulus									1		1							<b>2</b>
<b>Elateridae</b>																		
<i>Agriotes pilosellus</i> (Schonherr)																1		<b>1</b>
<i>Ampedus</i> sp.												1						<b>1</b>
<i>Athous</i> sp.1			1			1						1		5				<b>8</b>
<i>Athous</i> sp.2			1											1				<b>2</b>

<i>Athous</i> sp.3			2						1			1				4
<i>Brachygonus ruficeps</i> (Mulsant & Guillebeau)												1	1			2
<i>Cardiophorus</i> cf. <i>gramineus</i> (Scopoli)			1								1					2
<i>Cardiophorus nigerrimus</i> Erichson					1											1
<i>Cidnopus parvulus</i> (Panzer)		1	1		2	12						4	3	6		29
<i>Cidnopus</i> ? <i>ruzenae</i> Laibner													1			1
* <i>Dima macedonica</i> Schimmel	1	5						1	1	1						9
<i>Elater ferrugineus</i> Linnaeus			2									1		1		4
<i>Hemicrepidius hirtus</i> (Herbst)			1													1
<i>Hypogonus inunctus</i> (Lacordaire)		1							2					1		4
<i>Lacon punctatus</i> (Herbst)								1				1				2
<i>Melanotus crassicollis</i> (Erichson)						3										3
<i>Melanotus villosus</i> (Geoffroy)					1								1			2
<i>Prokraerus tibilais</i> (Lacordaire)													1			1
<i>Prosternon tessellatum</i> (Linnaeus)						6								2		8
<i>Stenagostus villosus</i> (Geoffroy)												1		1		2
<b>Lycidae</b>																
<i>Benibotarus taygetanus</i> (Pic)														1	2	3
<b>Nosodendridae</b>																
<i>Nosodendron fasciculare</i> (Olivier)			1													1
<b>Dermeestidae</b>																
<i>Trinodes hirtus</i> (Fabricius)	1															1
<b>Lymexylidae</b>																
* <i>Lymexylon navale</i> (Linnaeus)									1							1
<b>Sphindidae</b>																
<i>Arpidiphorus lareyniei</i> (Jacquelin du Val)			1					2	1		1	2				7
<i>Arpidiphorus orbiculatus</i> (Gyllenhal)											1					1
<b>Nitidulidae</b>																

<i>Soronia grisea</i> (Linnaeus)																	1	1
<b>Cryptophagidae</b>																		
<i>Sternodea baudii</i> Reitter	1		1	1				1			2	1		1				8
<b>Erotylidae</b>																		
<i>Dacne bipustulata</i> (Thunberg)	1							1					1		2			5
<b>Biphyllidae</b>																		
<i>Diplocoelus fagi</i> (Chevrolat)															1			1
<b>Cerylonidae</b>																		
<i>Philothermus semistriatus</i> (Perris)											1							1
<b>Endomychidae</b>																		
<i>Lycoperdina pulvinata</i> Reitter					1		1	1	1		1	1	1		3	1	1	12
<i>Mycetina cruciata</i> (Schaller)								1									1	2
* <i>Symbiotes gibberosus</i> (Lucas)															1			1
<b>Coccinellidae</b>																		
<i>Halyzia sedecimguttata</i> (Linnaeus)												2		1				3
<b>Mycetophagidae</b>																		
<i>Mycetophagus quadriguttatus</i> Muller	1							1										2
<i>Mycetophagus quadripustulatus</i> (Linnaeus)			1		5				1		3					1		11
<i>Triphyllus bicolor</i> (Fabricius)	4				1			2		1		1		2				11
<b>Melandryidae</b>																		
* <i>Hypulus bifasciatus</i> (Fabricius)	1	3	1				8		1		1	1	2	3		2		23
<b>Colydiidae</b>																		
<i>Colydium filiforme</i> Fabricius											1							1
<b>Zopheridae</b>																		
<i>Nosodomodes tuberculatus</i> (Germar)			1									3						4
<i>Pycnomerus sulcicollis</i> (Germar)					1				1	4			3	1	1			11
<i>Pycnomerus terebrans</i> (Olivier)	1																	1
<b>Tenebrionidae</b>																		

<i>Diaclina testudinea</i> (Piller & Mitterpacher)													1					<b>1</b>
<i>Diaperis boleti</i> (Linnaeus)														1				<b>1</b>
<i>Enoplopus dentipes</i> (Rossi)	42	34	43	17	49	14	13	30	23	19	12	36	14	20	28	16	42	<b>452</b>
<i>Gnaptor spinimanus</i> (Pallas)									1									<b>1</b>
<i>Helops coeruleus</i> (Linnaeus)	3	7	6	1	1	1	2	12	2	2	4	4		5	2	4	11	<b>67</b>
<i>Lagria atripes</i> Mulsant & Guillebeau							1											<b>1</b>
<i>Lagria hirta</i> (Linnaeus)				1														<b>1</b>
* <i>Mycetochara humeralis</i> (Fabricius)	1													1				<b>2</b>
<i>Neatus picipes</i> (Herbst)					1													<b>1</b>
<i>Probaticus obesus</i> (Frivaldsky)	1	3	3		3	9	8	3	7		3	3	2	1	5	3	2	<b>56</b>
<i>Probaticus tenebricosus</i> (Brulle)					2	1												<b>3</b>
<i>Pseudocistela ceramboides ceramboides</i> (Linnaeus)									2									<b>2</b>
<i>Tenebrio opacus</i> Duftschmid									1									<b>1</b>
<i>Uloma culinaris</i> (Linnaeus)					1													<b>1</b>
<b>Prostomidae</b>																		
* <i>Prostomis mandibularis</i> (Fabricius)											1	1		2		1		<b>5</b>
<b>Oedemeridae</b>																		
<i>Oedemera rufofemorata rufofemorata</i> Germar						1											1	<b>2</b>
<b>Cerambycidae</b>																		
<i>Alosterna tabacicolor</i> (De Geer)														1				<b>1</b>
<i>Cerambyx cerdo</i> Linnaeus								2	2									<b>4</b>
<i>Cerambyx scopolii</i> Fuessly						1												<b>1</b>
<i>Morimus asper funereus</i> Mulsant				1						1	1					1		<b>4</b>
<i>Prionus coriarius</i> (Linnaeus)			1			1												<b>2</b>
<i>Rutpela maculata</i> (Poda)			1															<b>1</b>
<i>Saphanus piceus ganglbaueri</i> Brancsik			2		1			2	1			1						<b>7</b>
<i>Stenurella septempunctata</i> (Fabricius)					1													<b>1</b>
<i>Xylosteus spinolae</i> Frivaldszky	1												1					<b>2</b>

<b>Chrysomelidae</b>																		
<i>Leptinotarsa decemlineata</i> (Say)		1																1
<i>Mniophila muscorum muscorum</i> (Koch)	1	1	1				2											5
<b>Anthribidae</b>																		
<i>Dissoleucas niveirostris</i> (Fabricius)											1	1						2
<i>Phaeochrotes pudens</i> (Gyllenhal)									1									1
<i>Platyrhinus resinosus</i> (Scopoli)											1			1				2
<i>Platystomos albinus</i> (Linnaeus)												1						1
<b>Attelabidae</b>																		
<i>Attelabus nitens</i> (Scopoli)																1		1
<b>Scolytinae (Curculionidae)</b>																		
<i>Dryocoetes villosus</i> (Fabricius)								1	1	1	1			1				5
<i>Scolytus carpini</i> (Ratzeburg)			1															1
<i>Xyleborus dispar</i> (Fabricius)																	1	1
<i>Xyleborus dryographus</i> (Ratzeburg)	1								1							1	2	5
<i>Xyleborinus saxesenii</i> (Ratzeburg)										1								1
<b>Total number of specimens</b>	<b>676</b>	<b>316</b>	<b>538</b>	<b>147</b>	<b>518</b>	<b>174</b>	<b>289</b>	<b>311</b>	<b>352</b>	<b>325</b>	<b>136</b>	<b>517</b>	<b>412</b>	<b>661</b>	<b>400</b>	<b>162</b>	<b>441</b>	<b>6375</b>
<b>Total number of species</b>	<b>38</b>	<b>27</b>	<b>46</b>	<b>18</b>	<b>37</b>	<b>24</b>	<b>25</b>	<b>36</b>	<b>37</b>	<b>33</b>	<b>28</b>	<b>44</b>	<b>30</b>	<b>44</b>	<b>25</b>	<b>31</b>	<b>30</b>	

**Appendix 2.** Families and species of Coleoptera of conservation importance in the study plots (p). Abbreviations: p – plot; tot – total number of collected specimens; con – taxa of conservation importance; Int – species included in international and national lists for conservation of the biodiversity; Bal – Balkan endemic; Loc – local endemic; Rar – rare species.

TAXA	p3	p4	p6	p7	p8	p9	p10	p11	p12	p13	p19	p20	p21	p22	p23	p24	p25	tot	con
<b>Carabidae</b>																			
<i>Carabus convexus dilatatus</i> Dejean	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	273	Int
<i>Carabus intricatus intricatus</i> Linnaeus	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	224	Int
<i>Cychrus semigranosus balcanicus</i> Hopffgarten					+								+	+				11	Bal
<i>Molops rufipes belasicensis</i> Mlynář	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	1006	Loc
<i>Pterostichus vecors</i> (Tschitschérine)													+					1	Bal
<i>Tapinopterus balcanicus belasicensis</i> Mařan	+	+	+	+	+		+	+	+	+	+	+	+	+	+		+	313	Loc
<i>Platyderus rufus</i> (Duftschmid)			+															3	Rar
<b>Leiodidae</b>																			
<i>Agaricophagus balcanicus</i> Hlisnikovsky									+		+						+	5	Rar
<b>Silphidae</b>																			
<i>Silpha olivieri</i> Bedel	+																	1	Rar
<b>Pselaphinae (Staphylinidae)</b>																			
<i>Bryaxis comita</i> (Rambousek)			+															1	Bal
<i>Claviger handmanni</i> Wasmann		+									+							3	Rar
<i>Pselaphogenius bulgaricus</i> Löbl		+	+								+					+		6	Bal
<b>Lucanidae</b>																			
<i>Lucanus cervus</i> (Linnaeus)				+								+						3	Int
<b>Cetoniidae</b>																			
<i>Osmoderma eremita</i> (Scopoli)			+															2	Int
<b>Elateridae</b>																			
<i>Dima macedonica</i> Schimmel	+	+						+	+	+								9	Bal
<i>Elater ferrugineus</i> Linnaeus			+									+		+				4	Rar

<b>Lycidae</b>																				
<i>Benibotarus taygetanus</i> (Pic)															+			+	<b>3</b>	<b>Rar</b>
<b>Lymexylidae</b>																				
<i>Lymexylon navale</i> (Linnaeus)									+										<b>1</b>	<b>Rar</b>
<b>Endomychidae</b>																				
<i>Lycoperdina pulvinata</i> Reitter					+		+	+	+		+	+	+		+	+	+	<b>12</b>	<b>Bal</b>	
<i>Symbiotes gibberosus</i> (Lucas)																+		<b>1</b>	<b>Rar</b>	
<b>Mycetophagidae</b>																				
<i>Mycetophagus quadriguttatus</i> Muller		+							+									<b>2</b>	<b>Rar</b>	
<b>Colydiidae</b>																				
<i>Colydium filiforme</i> Fabricius												+						<b>1</b>	<b>Rar</b>	
<b>Zopheridae</b>																				
<i>Nosodomodes tuberculatus</i> (Germar)			+											+				<b>4</b>	<b>Rar</b>	
<i>Pycnomerus sulcicollis</i> (Germar)					+				+	+				+	+	+		<b>11</b>	<b>Rar</b>	
<i>Pycnomerus terebrans</i> (Olivier)		+																<b>1</b>	<b>Rar</b>	
<b>Tenebrionidae</b>																				
<i>Probaticus obesus</i> (Fivaldsky)		+	+	+		+	+	+	+	+		+	+	+	+	+	+	<b>56</b>	<b>Bal</b>	
<b>Prostomidae</b>																				
<i>Prostomis mandibularis</i> (Fabricius)												+	+		+		+	<b>5</b>	<b>Rar</b>	
<b>Cerambycidae</b>																				
<i>Cerambyx cerdo</i> Linnaeus								+	+									<b>4</b>	<b>Int</b>	
<i>Cerambyx scopolii</i> Fuessly						+												<b>1</b>	<b>Rar</b>	
<i>Morimus asper funereus</i> Mulsant				+						+	+					+		<b>4</b>	<b>Int</b>	
<b>Total number of species</b>	<b>9</b>	<b>8</b>	<b>11</b>	<b>6</b>	<b>8</b>	<b>4</b>	<b>6</b>	<b>9</b>	<b>11</b>	<b>7</b>	<b>12</b>	<b>9</b>	<b>8</b>	<b>9</b>	<b>8</b>	<b>10</b>	<b>8</b>			
<b>Total number of specimens</b>	<b>159</b>	<b>92</b>	<b>140</b>	<b>43</b>	<b>142</b>	<b>62</b>	<b>84</b>	<b>76</b>	<b>83</b>	<b>99</b>	<b>77</b>	<b>169</b>	<b>201</b>	<b>197</b>	<b>213</b>	<b>51</b>	<b>83</b>	<b>1971</b>		