

DATA ON THE COLEOPTERAN (INSECTA: COLEOPTERA) FAUNA FROM THE LEAOTA MOUNTAINS (ROMANIA)

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ABSTRACT. In this study was presented the results of the research on the coleopteran (Insecta: Coleoptera) fauna from the Leaota Mountains. In the period May to September 2016, were identified 157 species of coleopteran belonging to 32 families. The coleopteran species were grouped taking into account the biogeographical distribution and ecological preferences. From conservative point of view, four species were of community interest: *Carabus variolosus* Fabricius, 1787, *Lucanus cervus* (Linnaeus, 1758), *Morimus funereus* Mulsant, 1863 and *Rosalia alpina* (Linnaeus, 1758), which are protected by national and European legislation; one species, *Carabus intricatus* Linnaeus, 1761 is included by IUCN in the Near Threatened category (NT), and other four species are considered rare for Romanian fauna: *Peltis grossa* (Linnaeus, 1758), *Thymalus limbatus* (Fabricius 1787), *Nosodomodes tuberculatus* (Germar, 1831) and *Cryphaeus cornutus* (Fischer de Waldheim 1823).

Keywords: coleopteran, fauna, Leaota Mountains, Romania.

REZUMAT. Date asupra faunei de coleoptere (Insecta: Coleoptera) din Munții Leaota (România). În acest studiu sunt prezentate rezultatele cercetării asupra faunei de coleoptere (Insecta: Coleoptera) din Munții Leaota. În perioada mai-septembrie 2016, au fost identificate 157 de specii de coleoptere grupate în 32 familii. Speciile de coleoptere au fost grupate în funcție de distribuția biogeografică și de preferințele ecologice. Din punct de vedere conservativ, patru specii sunt de interes comunitar: *Carabus variolosus* Fabricius, 1787, *Lucanus cervus* (Linnaeus, 1758), *Morimus funereus* Mulsant, 1863 și *Rosalia alpina* (Linnaeus, 1758), protejate de legislația națională și europeană, o specie, *Carabus intricatus* Linnaeus, 1761 este inclusă de IUCN în categoria Near Threatened (NT), iar alte 4 specii pot fi considerate rare pentru fauna României: *Peltis grossa* (Linnaeus, 1758), *Thymalus limbatus* (Fabricius 1787), *Nosodomodes tuberculatus* (Germar, 1831) și *Cryphaeus cornutus* (Fischer de Waldheim 1823).

Cuvinte cheie: coleoptere, faună, Munții Leaota, România.

INTRODUCTION

The context in which this study was realized is represented by the general decline of the biodiversity under the influence of anthropogenic pressure, what ultimately leads to the degradation of natural ecosystems, with direct and indirect repercussions on people's quality of life. In this situation, the first step to be accomplished, for the protection of natural ecosystems, consist in the inventory of habitats and species.

If we refer to the Leaota Mountains, we have little data on coleopteran fauna from this area. We could assume that some coleopteran species (especially those with high ecological valence) quoted for neighboring regions, much better studied (the mountains: Bucegi, Piatra Craiului, Făgăraș), are also present in the Leaota Mountains. In the period 2014-2015, a study on the invertebrate fauna from the edaphic environment and the superficial underground environment, the last being represented by several types of screes, was carried out in the Leaota Mountains (Giurgincă et al., 2015, Popa & Dorobăț, 2015, Nae & Dorobăț, 2015 - unpublished data). The material collected during the study (spiders, springtails) also contains species of coleopteran, but the data obtained for this group have not yet been published. N. Olenici and collaborators (Olenici et al., 2015), indirectly, mentions the presence of the species *Xylosandrus germanus* (Blandford, 1894), identified in the Leaota Mountains by Eugen Nițu, PhD from the Speleology Institute "Emil Racoviță" Bucharest, in 2014.

In 2016, a study over several groups of invertebrates from the Leaota Mountains was performed. The purpose of the study was to make a preliminary inventory of some invertebrate groups, from different types of habitats, to identify species of community interest and to establish appropriate measures to protect them.

The following invertebrate groups were considered: Gastropoda, Myriapoda, Araneae, Acari, Orthoptera, Coleoptera and Lepidoptera. The most of the species identified belonged to the order Coleoptera. The study looked only qualitative aspects, those related to biodiversity.

MATERIALS AND METHODS

The Leaota Mountains are located in the central south-eastern part of the Romania, to the eastern limit of the Meridional Carpathians (Fig. 1). Limits of the massif are: at the north and west the Dragoslavele-Bran Passage, to the south Subcarpații Ialomiței and to the east the Bucegi Mountains. The Leaota Massif covers an area of approximately 336 km², which represents 2.24% of the Meridional Carpathians (Murătoreanu, 2009).

About three-quarters from the surface of the mountain is composed of crystalline schists, with compact appearance, less fragmented, with an average altitude of 1,262 m and slopes with gradients between 25% and 50% (Murătoreanu, 2009, Dorobăț, 2016).

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The average annual temperature ranges between 6 °C, at approximately 1,000 m altitude and 0 °C, at nearly 2,000 m height, with deviations from these values depending on exhibition. In the Leaota Mountains, the average temperature of the coldest month (January) vary between -8 °C, at heights of over 1,800 m and -4 °C, in the Dâmbovița Valley, at the south-western extremity of the massif. The hottest months are July and August with average temperatures around 10 °C, on the main ridge and 18 °C, in the Dâmbovița Valley (Murătooreanu, 2009).

The pluviometric regime (average annual values) varies with altitude, from less than 900 mm, in south of the region, to over 1,200 mm, at altitudes higher than 1,500 m.

The lowest quantities of rainfall are recorded in January. These range between 50 mm, at altitudes lower than 1,000 m and 70 mm, to over 1,600 m height. The rainiest month is June. Rainfall recorded this month has values between 100 mm, in south-western extremity and over 160 mm, at altitudes higher than 1,400 m (Murătooreanu, 2009).

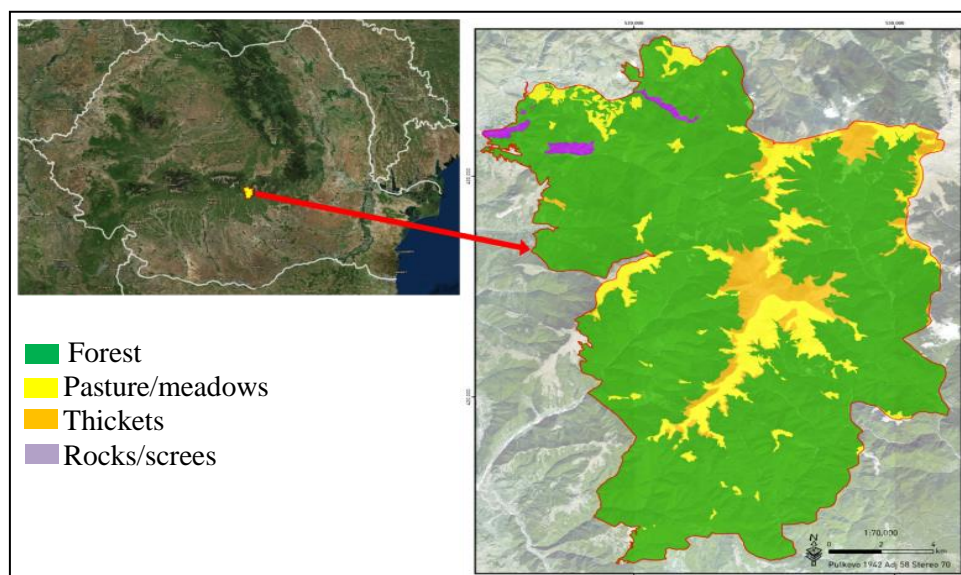


Figure 1 - The location of the Leaota Mountains in the Meridional Carpathians (adapted from https://upload.wikimedia.org/wikipedia/commons/1/19/Romania_location_map_Topographic.png and Google Earth 2016; adapted from Management Plan Natura 2000 of site ROSCI0102 Leaota).

The study was conducted during May to September 2016. Except for May, data collection from the field was done twice in a month. The coleopteran collecting was done concurrently with the collection of other invertebrate species. Several collection methods have been used: a) the mowing of the vegetation with entomological net, along a transect about 100 m long and about 1-1.5 m wide; after each minute of mowing, the contents of the entomological net was visually

examined to verify the existence of individuals from the target groups; b) collecting of the material along the transects of variable length, depending on the habitat and surface configuration; the length of a transect varied between 100 and 500 meters and width between 10 to 20 meters; examination on the transects was made in zigzag to better investigate researched area; the collect was done directly, with hand or with the help of a tweezer or with a entomological pooter on different substrates: off the soil, boscage, plants, from under stones and logs, from under the bark of the dead trees, off the rocks and their cracks, etc.; c) collecting with pitfalls (Barber traps): plastic cups of 500 ml with the height of 11.5 cm and the aperture of 9 cm, with 4% formaldehyde solution. In each station for collecting, three traps were placed arranged in line at 10 meters distance from each other; the traps remained in the field between a month and two months, emptying them bi-monthly.

92 transects were analysed, in 12 habitat types: spruce forest, spruce plantation, mixed forest (spruce and beech), mixed deciduous forest (beech, birch, poplar and very rarely fir and spruce), edge of mixed forest (spruce and beech), beech forest and edge of the beech forest, riparian zone - edge of the mixed forest (spruce, beech and alder), riparian area, grassland/meadows, natural regeneration area (birch and beech), scree - edge of mixed forest (spruce and beech), an area where the spruce forest was cut off (Fig. 2).

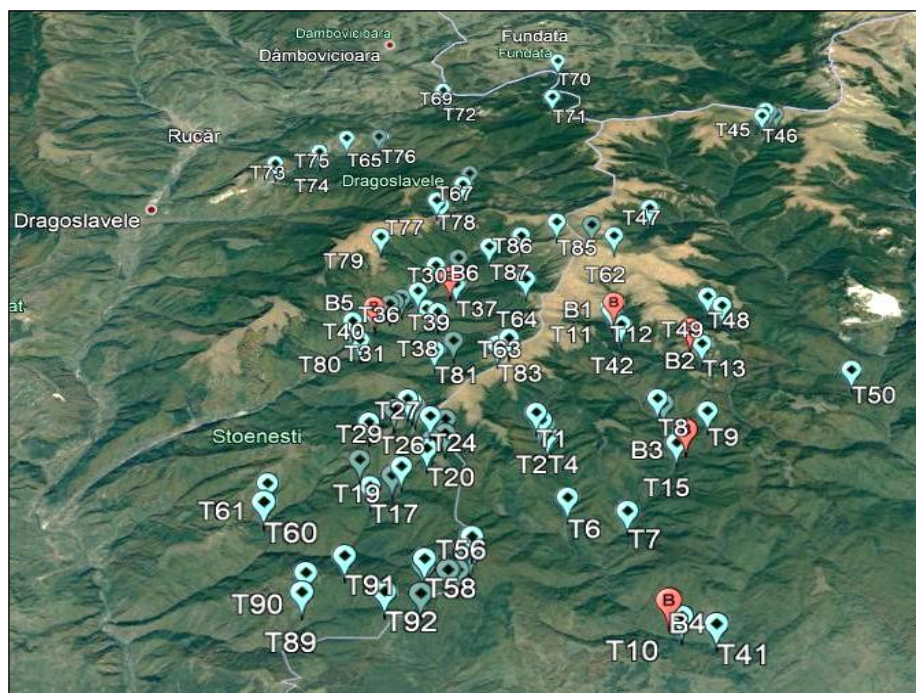


Figure 2 - The location of the transects (T) and pitfalls traps (B) in Leaota Mountains (adapted from https://upload.wikimedia.org/wikipedia/commons/1/19/Romania_location_map_Topographic.png and Google Earth 2016).

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In the period May to September, traps were installed in six locations in the following types of habitats: spruce forest, spruce plantation, mixed forest (spruce and beech) - in two locations, beech forest, riparian - the edge of mixed forest (selvage), spruce and beech (Fig. 2). The altitude of transects varied: between 655 m and 2,066 m and of pitfalls between: 731 m and 1,445 m.

The coleopterans classification was adopted after Bouchard (Bouchard et al., 2011). The distribution of species was based on their natural spreading only, using the data from Fauna Europaea, Coleoptera Poloniae, the researches made by Gorodkov (Gorodkov, 1984), Vigna-Taglianti and collaborators (Vigna-Taglianti et al., 1992, 1999).

RESULTS AND DISCUSSIONS

In the period May to September, 2016, in the Leaota Mountains, they were identified 157 species of coleopteran, grouped into 32 families (Tab. 1). They have been considered only adult specimens that have been determined up to species level.

Table 1 - List of the coleopteran species identified in the Leaota Mountains with their habitat specification and distribution.

No.	Taxon	S	SP	MSB	MD	EMF	EMF-Scree	BEF	R-EMF	R	M/P	NR	D	Distribution
	Class Insecta													
	Order Coleoptera													
	Suborder Adephaga													
	Family Carabidae													
	Subfamily Nebriinae													
1	<i>Nebria jockischii</i> Sturm, 1815								+					Eu.
	Subfamily Cicindelidae													
2	<i>Cicindela sylvatica</i> Linnaeus, 1758							+						Eu.
	Subfamily Carabinae													
3	<i>Carabus arvensis</i> Herbst, 1784	+				+		+						Eu.-Sib.
4	<i>Carabus auronitens escheri</i> Palliard, 1825	+		+	+			+	+					Carpath.

No.	Taxon	S	SP	MSB	MD	EMF	EMF-Sceee	BEF	R-EMF	R	M/P	NR	D	Distribution
5	<i>Carabus cancellatus</i> Illiger, 1798		+		+			+	+	+				Eu.-Sib.
6	<i>Carabus coriaceus</i> Linnaeus, 1758		+	+	+	+		+	+	+		+		Eu.
7	<i>Carabus intricatus</i> Linnaeus, 1761						+							Eu.
8	<i>Carabus linnei</i> Panzer, 1813	+	+	+	+	+		+						Cent.-East Eu.
9	<i>Carabus variolosus</i> Fabricius, 1787		+						+	+				Cent.- Southeast Eu.
10	<i>Carabus violaceus</i> Linnaeus, 1758	+	+	+	+	+		+	+	+		+		Eu.-Sib.
11	<i>Cychrus caraboides</i> (Linnaeus, 1758)	+		+				+	+					Eu.
	Subfamily Trechinae													
12	<i>Bembidion deletum</i> Audinet-Serville, 1821								+					WPal.
13	<i>Bembidion properans</i> (Stephens, 1828)								+		+			Eu.-Sib.
14	<i>Tachyta nana</i> (Gyllenhal, 1810)								+					Pal.
	Subfamily Harpalinae													
15	<i>Anisodactylus binotatus</i> (Fabricius, 1787)								+					WPal.*
16	<i>Cymindis humeralis</i> (Geoffroy in Fourcroy, 1785)										+			WPal.
17	<i>Pterostichus foveolatus</i> (Duftschmid, 1812)	+		+	+			+						Carpath.
18	<i>Pterostichus jurinei</i> (Panzer, 1803)	+	+	+		+			+					Eu.
19	<i>Pterostichus niger</i> (Schaller, 1783)		+	+	+	+			+					Eu.-As.*

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No.	Taxon	S	SP	MSB	MD	EMF	EMF-Scree	BEF	R-EMF	R	M/P	NR	D	Distribution
20	<i>Pterostichus oblongopunctatus</i> (Fabricius, 1787)	+		+	+			+	+		+			Eu.-As.
21	<i>Pterostichus pilosus</i> (Host, 1789)	+	+	+					+					Cent.-Eu.
22	<i>Pterostichus unctulatus</i> (Duftschmid, 1812)	+	+	+	+			+	+					Eu.
23	<i>Abax parallelepipedus</i> (Piller & Mitterpacher, 1783)				+			+						Eu.
24	<i>Calathus micropterus</i> (Duftschmid, 1812)			+				+						Eu.-Sib.
25	<i>Synuchus vivalis</i> (Illiger, 1798)								+					Eu.-Sib.
26	<i>Amara eurynota</i> (Panzer, 1796)					+			+					Eu.-Sib.
27	<i>Amara similata</i> (Gyllenhal, 1810)		+											Pal.
Family Dytiscidae														
Subfamily Agabinae														
28	<i>Agabus bipustulatus</i> (Linnaeus, 1767)					+			+					Pal.
29	<i>Agabus guttatus</i> (Paykull, 1798)					+			+					WPal.
Suborder Polyphaga														Eu.
Family Hydrophilidae														
Subfamily Sphaeridiinae														
30	<i>Sphaeridium scarabaeoides</i> (Linnaeus, 1758)										+			Pal.*
Family Leiodidae														
Subfamily Leiodinae														
31	<i>Amphicyllis globus</i> (Fabricius, 1792)								+					Eu.
Subfamily Cholevinae														
32	<i>Sciodrepoides watsoni</i> (Spence, 1815)			+										Hol.

No.	Taxon	S	SP	MSB	MD	EMF	EMF-Sceee	BEF	R-EMF	R	M/P	NR	D	Distribution
	Family Silphidae													
	Subfamily Silphinae													
33	<i>Phosphuga atrata</i> (Linnaeus, 1758)							+						Eu.-As.
34	<i>Silpha carinata</i> Herbst, 1783							+			+			Eu.-Sib.
	Subfamily Nicrophorinae													
35	<i>Nicrophorus vespilloides</i> Herbst, 1783			+				+		+				Eu.-As.*
	Family Staphylinidae													
	Subfamily Aleocharinae													
36	<i>Aleochara bipustulata</i> (Linnaeus, 1761)		+								+			Pal.
	Subfamily Scaphidiinae													
37	<i>Scaphidium quadrimaculatum</i> Olivier, 1790			+				+						WPal.
	Subfamily Tachyporinae													
38	<i>Bolitobius cingulatus</i> Mannerheim, 1831							+						Eu.-As.*
39	<i>Tachinus pallipes</i> Gravenhorst, 1806	+												Hol.
	Subfamily Staphylininae													
40	<i>Othius punctulatus</i> (Goeze, 1777)							+						WPal.
41	<i>Philonthus laevicollis</i> (Lacordaire, 1835)								+					Eu.
42	<i>Philonthus decorus</i> (Gravenhorst, 1802)								+					Eu.-Sib.
43	<i>Philonthus marginatus</i> (Müller, 1764)								+					Eu.
44	<i>Hesperus rufipennis</i> (Gravenhorst, 1802)									+				Eu.

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No.	Taxon	S	SP	MSB	MD	EMF	EMF-Scree	BEF	R-EMF	R	M/P	NR	D	Distribution
45	<i>Ocypus macrocephalus</i> (Gravenhorst, 1802)	+												Cent.-Eu.
46	<i>Ontholestes murinus</i> (Linnaeus, 1758)	+												Pal.
47	<i>Platydracus fulvipes</i> (Scopoli, 1763)								+					Eu.-Sib.
Family Geotrupidae														
Subfamily Geotrupinae														
48	<i>Anoplotrupes stercorosus</i> (Hartmann, 1791)	+	+	+	+	+		+	+	+	+	+		Eu.-Sib.
49	<i>Geotrupes stercorarius</i> (Linnaeus, 1758)										+			Eu.-Sib.*
Family Lucanidae														
Subfamily Syndesinae														
50	<i>Sinodendron cylindricum</i> (Linnaeus, 1758)				+			+						Eu.-As.
Subfamily Lucaninae														
51	<i>Lucanus cervus</i> (Linnaeus, 1758)											+		Eu.-Ca.
52	<i>Dorcus parallelipipedus</i> (Linnaeus, 1785)				+			+						WPal.
53	<i>Platycerus caraboides</i> (Linnaeus, 1758)				+			+						Pal.
Family Scarabaeidae														
Subfamily Aphodiinae														
54	<i>Acrossus depressus</i> (Kugelann, 1792)			+							+			Eu.-As.*
55	<i>Acrossus rufipes</i> (Linnaeus, 1758)										+			Pal.*
56	<i>Aphodius fimetarius</i> (Linnaeus, 1758)										+			Pal.****
57	<i>Aphodius (Teuchestes) fossor</i> (Linnaeus, 1758)										+			Pal.*

No.	Taxon	S	SP	MSB	MD	EMF	EMF-Sce	BEF	R-EMF	R	M/P	NR	D	Distribution
	Subfamily Scarabaeinae													
58	<i>Caccobius schreberi</i> (Linnaeus, 1767)										+			WPal.
59	<i>Euoniticellus fulvus</i> (Goeze, 1777)										+			Pal.**
60	<i>Onthophagus fracticornis</i> (Preyssler, 1790)							+						WPal.
61	<i>Onthophagus ovatus</i> (Linnaeus, 1767)							+			+			Eu.-CAs.
62	<i>Onthophagus taurus</i> (Schreber, 1759)										+			Med.***
	Subfamily Rutelinae													
63	<i>Phyllopertha horticola</i> (Linnaeus, 1758)								+	+				Eu.-Sib.
	Subfamily Cetoniinae													
64	<i>Cetonia aurata</i> (Linnaeus, 1761)					+			+	+		+		Eu.-As.
65	<i>Oxythyrea funesta</i> (Poda, 1761)									+				WPal.
66	<i>Gnorimus nobilis</i> (Linnaeus, 1758)											+		Eu.
67	<i>Trichius fasciatus</i> (Linnaeus, 1758)					+			+	+				Eu.-Sib.
	Family Buprestidae													
	Subfamily Buprestinae													
68	<i>Anthaxia quadripunctata</i> Linnaeus, 1758								+					Pal.
69	<i>Dicerca alni</i> (Fischer, 1824)								+	+		+		WPal.
	Family Elateridae													
	Subfamily Agrypninae													
70	<i>Agrypnus murinus</i> (Linnaeus, 1758)										+			Eu.-Sib.*

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No.	Taxon	S	SP	MSB	MD	EMF	EMF-Scree	BEF	R-EMF	R	M/P	NR	D	Distribution
	Subfamily Dendrometrinae													
71	<i>Athous subfuscus</i> (Müller O. F., 1764)								+	+				Eu.-Sib.
72	<i>Hemicrepidius niger</i> (Linnaeus, 1758)	+							+		+			Eu.-As.*
73	<i>Selatosomus aeneus</i> (Linnaeus, 1758)	+												Eu.-Sib.
	Subfamily Negastrinae													
74	<i>Zorochros dermestoides</i> (Herbst, 1806)								+					Eu.
	Subfamily Elaterinae													
75	<i>Ectinus aterrimus</i> (Linnaeus, 1761)								+		+			Eu.
76	<i>Ampedus pomonae</i> (Stephens, 1830)					+			+					Eu.-Sib.
77	<i>Ampedus pomorum</i> (Herbst, 1784)			+										Eu.-Sib.
78	<i>Ampedus sanguinolentus</i> (Schränk, 1776)					+								Eu.-Sib.
79	<i>Melanotus castanipes</i> (Paykull, 1800)	+		+		+			+					Pal.*
80	<i>Stenagostus rhombeus</i> (Olivier, 1790)			+							+			Eu.
	Family Lycidae													
	Subfamily Dictyopterinae													
81	<i>Dictyoptera aurora</i> Herbst, 1784	+												Hol.
	Subfamily Lycinae													
82	<i>Lygistopterus sanguineus</i> (Linnaeus, 1758)			+	+	+								Pal.
83	<i>Pyropterus nigroruber</i> (Degeer, 1774)			+		+								Eu.-Sib.
	Family Cantharidae													

No.	Taxon	S	SP	MSB	MD	EMF	EMF-Sceee	BEF	R-EMF	R	M/P	NR	D	Distribution
	Subfamily Cantharinae													
84	<i>Cantharis nigricans</i> (Müller, 1776)								+	+				Eu.-As.*
85	<i>Cantharis pellucida</i> Fabricius, 1792							+						Eu.-Sib.
86	<i>Cantharis rustica</i> Fallén, 1807	+				+			+	+	+			Eu.-Sib.
87	<i>Rhagonycha fulva</i> (Scopoli, 1763)					+								Pal.*
88	<i>Rhagonycha lignosa</i> (Müller, 1764)					+		+			+			Eu.
	Family Ptinidae													
	Subfamily Ptininae													
89	<i>Ptinus subpilosus</i> Sturm, 1837							+						Eu.-Ca.
	Family Trogossitidae													
	Subfamily Peltinae													
90	<i>Peltis grossa</i> (Linnaeus, 1758)									+				Eu.-Sib.
91	<i>Thymalus limbatus</i> (Fabricius, 1787)			+										Eu.
	Subfamily Trogossitinae													
92	<i>Tenebroides fuscus</i> (Goeze, 1777)								+					Eu.
	Family Melyridae													
	Subfamily Dasytinae													
93	<i>Dasytes cyaneus</i> (Fabricius, 1775)					+						+		Eu.
	Family Erotylidae													
	Subfamily Erotylinae													
94	<i>Triplax russica</i> (Linnaeus, 1758)			+										Eu.

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No.	Taxon	S	SP	MSB	MD	EMF	EMF-Sceee	BEF	R-EMF	R	M/P	NR	D	Distribution
	Family Monotomidae													
	Subfamily Rhizophaginae													
95	<i>Rhizophagus depressus</i> (Fabricius, 1792)								+					Pal.
	Family Cryptophagidae													
	Subfamily Cryptophaginae													
96	<i>Micrambe abietis</i> (Paykull, 1798)	+												Pal.
	Family Silvanidae													
	Subfamily Brontinae													
97	<i>Uleiota planata</i> (Linnaeus, 1761)	+		+					+					Eu.
	Family Nitidulidae													
	Subfamily Nitidulinae													
98	<i>Ipidia binotata</i> Reitter, 1875			+										Eu.-Sib.
	Family Cerylonidae													
	Subfamily Ceryloninae													
99	<i>Cerylon histeroides</i> (Fabricius, 1792)								+					Eu.-Sib.
	Family Endomychidae													
	Subfamily Mycetaeinae													
100	<i>Mycetina cruciata</i> (Schaller, 1783)	+				+								Eu.-Ca.
	Subfamily Endomychinae													
101	<i>Endomychus coccineus</i> (Linnaeus, 1758)			+		+								Eu.
102	<i>Endomychus thoracicus</i> Charpentier, 1825	+		+		+								Cent.- Southeast
	Family Coccinellidae													
	Subfamily Coccinellinae													

No.	Taxon	S	SP	MSB	MD	EMF	EMF-Sceee	BEF	R-EMF	R	M/P	NR	D	Distribution
103	<i>Adalia bipunctata</i> (Linnaeus, 1758)					+						+		Hol.*****
104	<i>Anatis ocellata</i> (Linnaeus, 1758)										+			Eu.-As.*
105	<i>Coccinella quinquepunctata</i> Linnaeus, 1758							+	+	+				Pal.
106	<i>Coccinella septempunctata</i> (Linnaeus, 1758)					+			+		+	+		Pal.*
	Family Zopheridae													
	Subfamily Colydiinae													
107	<i>Nosodomes tuberculatus</i> (Germar, 1831)							+						Cent.-East Eu.
	Family Tenebrionidae													
	Subfamily Lagriinae													
108	<i>Lagria hirta</i> (Linnaeus, 1758)							+	+					Pal.
	Subfamily Tenebrioninae													
109	<i>Cryphaeus cornutus</i> (Fischer de Waldheim, 1823)								+					Eu.-Ca.
	Subfamily Diaperinae													
110	<i>Hypophloeus unicolor</i> (Piller & Mitterpacher, 1783)							+	+					Eu.
	Family Pyrochroidae													
	Subfamily Pyrochroinae													
111	<i>Pyrochroa coccinea</i> Linnaeus, 1762						+							Eu.
112	<i>Schizotus pectinicornis</i> (Linnaeus, 1758)				+		+		+					Eu.
	Family Cerambycidae													
	Subfamily Prioninae													
113	<i>Prionus coriarius</i> (Linnaeus, 1758)			+										WPal.

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No.	Taxon	S	SP	MSB	MD	EMF	EMF-Sceee	BEF	R-EMF	R	M/P	NR	D	Distribution
	Subfamily Lepturinae													
114	<i>Anastrangalia dubia</i> (Scopoli, 1763)					+								WPal.
115	<i>Gaurotes virginea</i> (Linnaeus, 1758)		+			+			+					Eu.-Sib.
116	<i>Oxymirus cursor</i> Linnaeus, 1758	+		+				+						Eu.-Sib.
117	<i>Pachytodes cerambyciformis</i> (Schrank, 1781)					+								Eu.-Ca.
118	<i>Pidonia lurida</i> (Fabricius, 1792)	+				+								Eu.
119	<i>Rhagium inquisitor</i> (Linnaeus, 1758)	+		+										Pal.*
120	<i>Rutpela maculata</i> (Poda, 1761)					+			+					Eu.-CAs.
121	<i>Stictoleptura rubra</i> (Linnaeus, 1758)					+			+					WPal.*
	Subfamily Cerambycinae													
122	<i>Rosalia alpina</i> (Linnaeus, 1758)											+		Eu.-Ca.
	Subfamily Lamiinae													
123	<i>Morimus asper funereus</i> (Mulsant) Sama, 1991							+						Southeast Eu.
	Family Chrysomelidae													
	Subfamily Donaciinae													
124	<i>Plateumaris consimilis</i> (Schrank, 1781)								+					Eu.-Sib.
	Subfamily Chrysomelinae													
125	<i>Chrysolina coerulans</i> (Scriba, 1791)					+			+	+				Eu.-CAs.
126	<i>Chrysolina fastuosa</i> (Scopoli, 1763)					+			+	+				Eu.-Sib.*

No.	Taxon	S	SP	MSB	MD	EMF	EMF-Sceee	BEF	R-EMF	R	M/P	NR	D	Distribution
127	<i>Chrysolina herbacea</i> (Duftschmid, 1825)								+					Eu.-CAs.
128	<i>Chrysolina polita</i> (Linnaeus, 1758)								+	+				Eu.-As.
129	<i>Chrysomela collaris</i> Linnaeus, 1758							+						Eu.-Sib.
130	<i>Gastrophysa viridula</i> (De Geer, 1775)								+					Eu.-As.
131	<i>Gonioctena pallida</i> (Linnaeus, 1758)									+				Eu.-Sib.
132	<i>Linaeidea aenea</i> (Linnaeus, 1758)	+				+			+	+	+			Eu.-Sib.
133	<i>Oreina alpestris</i> (Schummel, 1844)								+					Eu.
134	<i>Timarcha goettingensis</i> (Linnaeus, 1758)									+				Cent.- Southeast Eu.
	Subfamily Galerucinae													
135	<i>Lochmaea caprea</i> (Linnaeus, 1758)								+	+				Eu.-As.*
136	<i>Phyllotreta ochripes</i> (Curtis, 1837)										+			Eu.-Sib.
	Subfamily Cryptocephalinae													
137	<i>Cryptocephalus octopunctatus</i> (Scopoli, 1763)										+			Eu.-Sib.
138	<i>Smaragdina salicina</i> (Scopoli, 1763)					+			+	+				Eu.-Sib.
	Family Anthribidae													
	Subfamily Anthribinae													
139	<i>Platyrhinus resinosus</i> (Scopoli, 1763)								+					Pal.
	Family Attelabidae													
	Subfamily Attelabinae													

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140	<i>Apoderus coryli</i> (Linnaeus, 1758)					+			+					Eu.-As.
	Family Curculionidae													
	Subfamily Curculioninae													
141	<i>Orchestes fagi</i> (Linnaeus, 1758)			+				+						Eu.
	Subfamily Cossoninae													
142	<i>Rhyncolus ater</i> (Linnaeus, 1758)	+		+										Eu.-Sib.
	Subfamily Entiminae													
143	<i>Otiorhynchus coecus</i> Germar, 1824 syn. <i>Ot. niger</i> (Fabricius, 1775)	+				+			+		+		+	Cent.-Eu.
144	<i>Otiorhynchus pauxillus</i> Rosenhauer, 1847	+		+										Eu.
145	<i>Otiorhynchus scaber</i> (Linnaeus, 1758)	+		+										Eu.*
146	<i>Phyllobius argentatus</i> (Linnaeus, 1758)	+		+	+	+								Eu.-Sib.
147	<i>Phyllobius betulinus</i> (Bechstein & Scharfenberg, 1805)			+	+	+		+				+		Eu.-Ca.
148	<i>Phyllobius maculicornis</i> Germar, 1824			+										Eu.-Sib.
149	<i>Phyllobius viridicollis</i> (Fabricius, 1792)							+		+				Eu.-Sib.
150	<i>Polydrusus amoenus</i> (Germar, 1824)	+												Eu.-Sib.
	Subfamily Lixinae													
151	<i>Larinus sturnus</i> (Schaller, 1783)							+						Pal.
	Subfamily Molytinae													
152	<i>Liparus glabrirostris</i> Kuster, 1849								+	+				Eu.

No.	Taxon	S	SP	MSB	MD	EMF	EMF-Scree	BEF	R-EMF	R	M/P	NR	D	Distribution
153	<i>Plinthus tischeri</i> Germar, 1824	+	+											Cent.-Eu.
	Subfamily Scolytinae													
154	<i>Ips amitinus</i> (Eichhoff, 1872)			+		+								Eu.
155	<i>Ips typographus</i> (Linnaeus, 1758)	+		+		+			+					Eu.-Sib.
156	<i>Pityogenes chalcographus</i> (Linnaeus, 1761)	+		+									+	Eu.-Sib.
157	<i>Trypodendron lineatum</i> (Olivier, 1795)			+										Pal.*
	Species	36	14	42	18	42	3	39	67	27	28	12	2	

Legend: S – spruce forest, SP – spruce plantation, MSB – mixed forest (spruce and beech), MD – mixed deciduous forest (beech, birch, poplar and very rarely fir and spruce), EMF – the edge of the mixed forest (spruce and beech), EMF-Scree – the edge of the mixed forest (spruce and beech) - scree, BEF – beech forest and the edge of the beech forest, R-EMF – riparian area - the edge of the mixed forest (spruce and beech), R – riparian area (rare alder and beech), M/P – meadow/pasture, NR – natural regeneration (birch and beech), D – deforestation (spruce forest); Hol – Holarctic, Pal – Palearctic, Eu.-As. – European-Asian (Palearctic zone), WPal. – West Palearctic, Eu.-Sib. – European-Siberian, Eu.-CAs. – European-Central Asian, Eu.-Ca. – European-Caucasian, Eu. – European, Cent.-East Eu. – Central-East European, Cent.-Southeast Eu. – Central-Southeast European, Cent.-Eu. – Central-European, Southeast Eu. – Southeast European, Med. – Mediterranean, Carpath. – Carpathian; * - introduced in Neartic Region; ** - introduced in Australian Region; *** - introduced in Neartic and Australian Regions; **** - introduced in Neartic, Neotropical, Australian and Oriental Regions; ***** - introduced in Neotropical and Oriental Regions.

Most species were identified in the ecotone zone represented by the riparian area and the edge of the mixed forest (spruce and beech) (approx. 43% of the total species identified). Lower values, nearly half, were obtained for species from: mixed forest (spruce and beech) - the edge of the mixed forest spruce and beech (approx. 27% for each habitat); beech forest and the edge of the beech forest (approx. 25%) and spruce forest (approx. 23%). If we exclude the areas represented by the deforestation (spruce forest) and the one formed at the edge of the mixed forest (spruce and beech) - scree, where a single transect was analyzed, the lowest represented habitats were the spruce plantation and natural regeneration (birch and beech), where only approx. 9%, respectively approx. 8%, species were identified.

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From all identified species, the highest values of numerical abundance (approx. 22%) and frequency were recorded by the *Anoplotrupes stercorosus* (Hartmann, 1791). It is a predominantly coprophagous species that reaches high densities in overgrazed areas. High abundance values of this species indicate degraded pastures due to overgrazing. Much lower values of abundance were recorded for some species from Carabidae family: *Carabus linnei* Panzer, 1813 (approx. 5%) and *Carabus auronitens escheri* Palliardi, 1825 (approx. 3%), characteristic species for forests from mountain and subalpine areas. The rest of the coleopteran species recorded abundance values less than 3%.

From the conservative point of view, the coleopteran fauna from Leaota Mountains, so far, includes four protected species at national and European level. In the study period were identified: *Carabus variolosus* Fabricius, 1787, *Lucanus cervus* (Linnaeus, 1758), *Morimus funereus* Mulsant, 1863 and *Rosalia alpina* (Linnaeus, 1758). These species are included in annexes of the OUG 57/2007 and those of the Habitats Directive 92/43/EEC, documents defining the legislative framework necessary for their protection, at national and European level.

Likewise, it was identified a relatively rare species, *Carabus intricatus* Linnaeus, 1761, classified, by the IUCN, in the category of near threatened species (NT). This species prefers deciduous and mixed forests from the mountainous region, being found especially in the forest edge areas, along the valleys, with rare vegetation and thin litter. The species disappeared or was considered disappeared from some European countries. Where it was rediscovered, the species was represented by very small populations, requiring strict protection (IUCN Red List, Turner, 2008, Boyce & Walters, 2015). In Romania, this species is not included in the protected species category, but its status may change in the future, in a negative way, due to the disappearance of the natural habitats, where it lives.

Carabus intricatus Linnaeus, 1761 was identified a single exemplary in the contact area between the scree from the Colții Ghimbavului and the edge of the mixed forest, an ecotone area with a small surface, but where several species of conservative interest, from other taxonomical groups, have been identified: *Mastus venerabilis* (L. Pfeiffer, 1855) - Gastropoda, *Pholidoptera transsylvanica* (Fischer von Waldheim, 1853) - Orthoptera and nearby *Euplagia (Callimorpha) quadripunctaria* (Poda, 1761) - Lepidoptera. This area, despite its anthropic impact, must be maintained at least in the current state of preservation, for the protection of the species listed above.

At the above mentioned species can be added another four, quite rarely (according to the literature), which can be considered relatively rare for Romania's fauna: *Peltis grossa* (Linnaeus, 1758), *Thymalus limbatus* (Fabricius 1787), *Nosodomodes tuberculatus* (Germar, 1831) and *Cryphaeus cornutus* (Fischer de Waldheim 1823).

There are species related to forest ecosystems, especially *Peltis grossa* (Fabricius 1787) and *Thymalus limbatus* (Fabricius 1787). Both species are considered to be indicators for mature/old, well-preserved forests.

Peltis grossa (Linnaeus 1758) is a rare species, considered a “relict of the primary forests” (Bussler, 2005; Valladares et al., 2017). It was identified in deciduous, coniferous and mixed forests, characterized by the presence of old trees, with decomposing wood, necessary to carry out the biological cycle of the species. In many European countries, the species is included in the category of protected species (Nieto & Alexander, 2010, Valainis et al., 2014). It was identified a single exemplar, on Fiașului Valley, in a riparian area of a beech forest, without obvious signs of human impact.

Thymalus limbatus (Fabricius 1787) is another species of coleopteran closely linked to mature/old forest, not disturbed by human activities. Adults feed on fungi that break down the wood, and the larvae live in rotten wood of old trees. The species was identified in a beech forest without visible traces of impact, adjacent to the Fiașului Valley. In this context, we must mention that in the beech forest on the Fiașului Valley were identified two species of coleopteran, considered indicators for undisturbed forest ecosystems. This habitat, as well as the adjacent areas should be preserved at least in the current conservation form. They can be the core of a future protected area.

Cryphaeus cornutus (Fischer de Waldheim 1823) is a mycethophagous coleopteran and was found in rotting wood, infested with fungi, of the deciduous softwood species, as: cherry, poplar, alder, birch (Fig. 3). It is considered a very rare species. 4 specimens, 1 male and 3 females were identified under the bark of an alder, at the boundary between a riparian area and a mixed forest (beech and spruce), on Cetățuia Valley. In Romania, the species was identified in Bacău County, without further specification (www.entomologiitaliani.net/forum).



Figure 3 - *Cryphaeus cornutus* (Fischer de Waldheim 1823) (male).

Nosodomodes tuberculatus (Germar, 1831) is a mycetophagous species that lives under the bark of trees (beech, pine, spruce). A single specimen was identified in a mixed forest (beech and spruce) located on a slope of the Tâncava

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Mountain, Leaota Massif. In Romania, the species also was been reported in Măcinului Mountains, in Valea Fagilor reservation.

Grouping the coleopteran species identified in the Leaota Mountains, according to their current distribution, we highlighted the dominance of the Euro-Siberian elements (26.7%), followed by the European (21.6%) and Palearctic (15.2%) elements. The other elements represented less than 10% (Fig. 4).

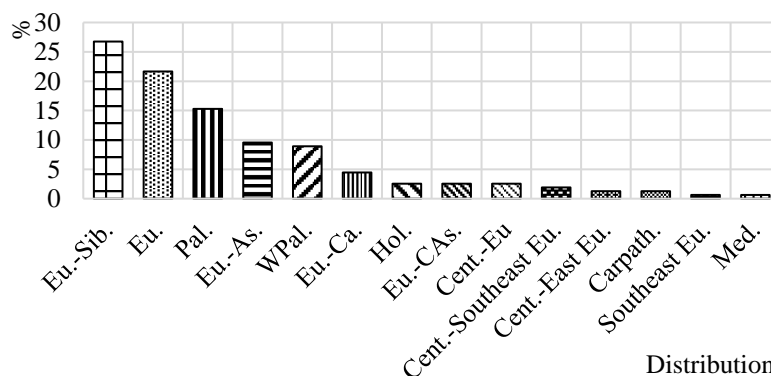


Figure 4 - Distribution of the identified species on zoogeographical groups: Hol – Holarctic, Pal – Palearctic, Eu.-As. – European-Asian (Palearctic zone), WPal. – West Palearctic, Eu.-Sib. – European-Siberian, Eu.-CAs. – European-Central Asian, Eu.-Ca. – European-Caucasian, Eu. – European, Cent.-East Eu. – Central- East European, Cent.-Southeast Eu. – Central-Southeast European, Cent.-Eu. – Central-European, Southeast Eu. – Southeast European, Med. – Mediterranean, Carpath. – Carpathian.

Among the 157 species, 26 species (approx. 16%) were introduced to other zoogeographical regions due to human activities.

CONCLUSIONS

During the study 157 species of beetles, belonging to 32 families, were identified. Of these, 4 species are protected by European and national legislation: *Carabus variolosus* Fabricius, 1787, *Lucanus cervus* (Linnaeus, 1758), *Morimus funereus* Mulsant, 1863 and *Rosalia alpina* (Linnaeus, 1758). To these species can be added *Carabus intricatus* Linnaeus, 1761, species included in the category near threatened (NT), according to IUCN Red List.

Two rare species are considered as “relicts of the primary forests”: *Peltis grossa* (Linnaeus 1758) and *Thymalus limbatus* (Fabricius 1787), a precious bioindicators of the quality of forests.

Two other species: *Cryphaeus cornutus* (Fischer de Waldheim 1823) and *Nosodomodes tuberculatus* (Germar, 1831) can be considered rare for Romanian fauna, due to the very small number of citations in the specialty literature.

From the coleopteran faunistic point of view, the conservative value of some investigated ecosystems was evidenced by the presence of protected, rare and the bioindicator species. In this context, we must mention the beech forest from the Fiașului Valley, where were identified two species of coleopteran, indicators for the undisturbed forest ecosystems and the contact area between the scree and the mixed forest, from Colții Ghimbavului. Both habitats should be preserved at least in the current state of preservation. They should be included in the ROSCI0102 Leaota Community Site.

We believe that the present study was a preliminary one, and it is necessary to continue the research in the Leaota Mountains, in order to complete the list of species provided by this research. It is possible to identify other species of conservative interest, especially in the southern part of the Leaota Mountains.

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REFERENCES

- BOUCHARD P., BOUSQUET Y., DAVIES A. E., ALONSO-ZARAZAGA M. A., LAWRENCE J. F., LYAL C. H. C., NEWTON A. F., REID C. A. M., SCHMITT M., ŚLIPYŃSKI S. A., SMITH A. B. T., 2011 - *Family-group names in Coleoptera (Insecta)*. ZooKeys **88**: 972 p. Online to: <https://zookeys.pensoft.net/article/4001/> (accessed: September 2017).
- BOYCE D. C., WALTERS J. M., 2015 - *Survey for the Blue Ground Beetle Carabus intricatus in Coed Maesmelin, Glamorgan*. Natural Resources Wales Evidence Report No. 45. 16 p. Online to: www.naturalresourceswales.gov.uk (accessed: September, 2017).
- BUSSLER H., MÜLLER J., DORKA V., 2005 - *European natural heritage: the saproxylic beetles in the proposed National Park Defileul Jiului*. Analele ICAS. Ed. Silvică. Voluntari. Ilfov. **48 (1)**: 55-71.
- DOROBĂȚ M. L., 2016 - *Cercetări asupra mediului subteran superficial din sectorul nord-vestic al munților Leaota*. Teză de doctorat. Rezumat. Universitatea din Pitești. Facultatea de Biologie. 41 p.
- GIURGINCĂ A., BABA C. Ș., DOROBĂȚ L. M., POPA I., 2015 - *The Diplopoda and Chilopoda of the Leaota Mountains (Southern Carpathians, Romania)*. Conference: International Zoological Congress of "Grigore Antipa" Museum, Bucharest.
- GORODKOV K. B., 1984 - *Ranges types of insects of tundra and forest zones of European part of U.S.S.R.* 3-221. In: Scarlato O. A., Gorodkov K. B. (Eds). Provisional atlas of the insects of the European part of U. S. S. R. Nauka, Leningrad [In Russian].
- MURĂTOREANU G., 2009 - *Munții Leaota. Studiu de geomorfologie*. Ed. Transversal. București. 180 p.

DATA ON THE COLEOPTERAN (INSECTA: COLEOPTERA) FAUNA FROM THE
LEAOTA MOUNTAINS (ROMANIA)

- NAE A., DOROBĂȚ L., 2015 - *Date privind fauna de aranee din Masivul Leaota (Argeș, Romania)*. Sesiunea de Comunicări Științifice a Muzeului Județean Argeș, Ecosinteze și etnosinteze carpatine, 29-30 octombrie 2015, ediția XLVI. Pitești.
- NIETO A., ALEXANDER K. N. A., 2010 - *European Red List of Saproxyllic Beetles*. Luxembourg: Publications Office of the European Union. Online to: http://ec.europa.eu/environment/nature/conservation/species/redlist/downloads/European_saproxyllic_beetles.pdf (accessed: September 2017).
- OLENICI N., DUDUMAN M. L., TOMESCU R., 2015 - *Xylosandrus germanus (Coleoptera, Curculionidae, Scolytinae) - un potențial dăunător al pădurilor, livezilor și viilor din România*. Bucovina forestieră. **15 (2)**: 207-216.
- POPA I., DOROBĂȚ L., 2015 - *New records and rare species of Collembola for the Romanian fauna (Leaota Massif, Southern Carpathians)*. Trav. Inst. Spéol. "Émile Racovitza". **LIV**: 41-46.
- POPA I., NAE A., GIURGINCĂ A., DOROBĂȚ L., 2015 - *New records of Collembola and Araneae species for the Romanian fauna (Leaota Massif, Southern Carpathians)*. The Seventh Annual Zoological Congress of "Grigore Antipa" Museum, 18-20 November. Bucharest. Romania.
- TURNER C. R., 2008 - *The History of Carabus intricatus Linnaeus (Carabidae) in Britain prior to 1995*. The Coleopterist. **17 (3)**: 161-169.
- VALAINIS U., BARŠEVSKIS A., BALALAIKINS M., CIBUĻSKIS R., AVGIN S. S., 2014 - *A review of Latvian saproxyllic beetles from the European Red List*. Acta Biologica Universitatis Daugavpiliensis. **14 (2)**: 217-227.
- VALLADARES L., GOUIX N., VAN-MEER C., CALMONT B., BRUSTEL H., 2017 - *Distribution de Peltis grossa (Linnaeus, 1758) en France (Coleoptera, Trogossitidae)*. Naturae. **4**: 1-9. Online to: <https://www.researchgate.net/publication/314288023> (accessed: September 2017).
- VIGNA TAGLIANTI A., AUDISIO P. A., BELFIORE C., BIONDI M., BOLOGNA A. M., CARPANETO G. M., BIASE A. DE, FELICI S. DE, PIATTELLA E., RACHELI T., ZAPPAROLI M., ZOLA S., 1992 - *Riflessioni di gruppo sui corotipi fondamentali della fauna W-Palearctica ed in particolare Italiana*. Biogeographia. **16**: 159-179.
- VIGNA TAGLIANTI A., AUDISIO P. A., MAURICIO B., BOLOGNA M. A., CARPANETO M. G., BIASE A. DE, FATTORINI S., PIATTELLA E., SINDACO R., VENCHI A., ZAPPAROLI M., 1999 - *A proposal for a chorotype classification of the Near East fauna, in Framework of the Western Palearctic region*. Biogeographia. **20**: 31-59.
- Agenția Națională pentru Protecția Mediului. *Planul de Management al sitului Natura 2000 ROSCI0102 Leaota*. Online to: http://www.mmediu.ro/app/webroot/uploads/files/2016-02-25Plan_management_ROSCI0102_Leaota_revizuit.pdf. 142 p (accessed: September 2017).
- Coleoptera Poloniae. *Coleoptera Poloniae: KFP Base - archival page*. Online to: <http://coleoptera.ksib.pl/kfp.php?l=en> (accessed: September 2017).
- European Environment Agency. *European Environment Agency: References: Revised Annex I of Resolution 6 (1998) of the Bern Convention on species requiring specific habitat conservation measures*. Online to: <http://eunis.eea.europa.eu/references/2443/species> (accessed: September 2017).

- Fauna Europaea. *Fauna Europaea: Coleoptera*. Online to: https://fauna-eu.org/cdm_dataportal/taxon/3cf53a59-439c-4e58-90e0-88fd23e92e49 (accessed: September 2017).
- Forum Entomologi Italiani. *Cryphaeus cornutus* (Fischer von Waldheim, 1823) - *Tenebrionidae Tenebrioninae Toxicini*. Online to: <http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=178&t=13815> (accessed: September, 2017).
- World Conservation Monitoring Centre. *Carabus intricatus*. *The IUCN Red List of Threatened Species*. 2017-3. Online to: <http://www.iucnredlist.org/details/3845/0> (accessed: September 2017).
- ***https://upload.wikimedia.org/wikipedia/commons/1/19/Romania_location_map_Topographic.png and Google Earth 2016 (accessed: September 2017).
- ***https://upload.wikimedia.org/wikipedia/commons/1/19/Romania_location_map_Topographic.png and Google Earth 2016 (accessed: September 2017).