INVERTEBRATE COMMUNITIES FROM THE MESOVOID SHALLOW SUBSTRATUM OF THE CARPATHO-EUXINIC AREA: ECO-FAUNISTIC AND ZOOGEOGRAPHIC ANALYSIS

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Abstract. Between 1998 and 2008, the authors analyzed from a faunistic and zoogeographic point of view, 5 sites with different types of mesovoid shallow subtratum (MSS) from the karst areas of Dobrogea and the Carpathians. These sites are: the cleitric MSS from the Movile area (South Dobrogea) – from the karst of Dobrogea and the nude and covered colluvial MSS from the Vârghişului Gorges (600–660 m.), the colluvial and cleitric MSS from the Motru Basin (370–407 m.), the nude (Marele Grohotiş – 1650 m., Cerdacul Stanciului 1571 m.) and covered colluvial (Valea Seacă – 1000m.) MSS from Piatra Craiului – from the karst areas of the Carpathians.
On the whole, the authors have identified 265 invertebrate species frequently found in the various MSS types (19 species of Isopoda, 13 species of Diplopoda, 71 species of Collembola, 38 of Araneae and 124 species of Coleoptera), all presented in a comparative way. Among them, 25 species are endemic for the Carpatho-Euxinic space. The specific diversity, the degree of endemicity, the preferential and characteristic species are highlighted. The role of the MSS from the analyzed sites in the *edaphic – subterranean transfer* at a faunal level and in the conservation of the local populations is discussed.

Key words: M.S.S., mesovoid shallow substratum / superficial subterranean environment, sampling methodology, Araneae, Coleoptera, Collembola, Diplopoda, Oniscidea, Carpatho-Euxinic area, characteristic species, zoogeography.

1. INTRODUCTION

Following the literature review (BLEAHU & coll., 1976, DONIȚĂ & coll., 2005), the total surface of the limestone from Romania is evaluated at 4373 km^2. Up to the present, there is no evaluation of the surface of the mesovoid shallow substratum (also called superficial subterranean environment) (MSS) developed on limestone, excepting the approx. 15 km^2 representing the part of the calcareous MSS included in the Natura 2000 habitat type (8120: Calcareous and calchist screes of the montane to alpine levels), estimation based on the vegetal associations. Beside the importance of the scree in the conservation of some saxicolous calciphilous vegetal associations (which led to its inclusion in the habitat types protected by the Natura 2000 network), the subterranean superficial environment from the calcareous scree deposits represents the preferential habitat for a rich invertebrate fauna, including glacial relicts and endemic species, insufficiently known up to now.

Shortly after the description of the superficial subterranean environment by JUBERTHIE, DELAY and BOUILLON in 1980, researches on the role of this environment in the conservation and the onthogenetic evolution of the subterranean species, have also began in Romania (JUBERTHIE et coll., 1981). Subsequent studies by RACOVIȚĂ and ŞERBAN (1982) targeted the seasonal dynamics of some taxonomic groups from the mesovoid shallow substratum from the Iadului Valley and Ordâncuşa Valley (RACOVIȚĂ, 1984), but only at a macrotaxonomic level (only at the generic level). NITZU (1997, 2001), analyzing comparatively the coleopteran fauna of the deep subterranean environment with that of the superficial subterranean environment and the edaphic environment from Dobrogea, underlines, on a zoogeographic basis, the role of refuge and micro-refuge of the karst area of Dobrogea in the conservation and evolution of some endemic subterranean but also soil species. These studies have argued, among other things, the role of the MSS in the functioning of the Euxinic subrefugium, a distinct component of the glacial Mediterranean macrorefugium (NITZU, 2001). In 2004, NITZU and ILIE have carried out a preliminary faunistic analysis of the coleopteran associations from the superficial, deep subterranean and the edaphic environment from the Motru Basin, followed by studies in the same area on the Araneae (NAE and ILIE, 2004), Chilopoda (ILIE, 2007). DECU and coll. (2006) note, among other things, the affinity of some Collembola species for the MSS, but punctual records of the Collembola fauna from the MSS are given only by GRUIA (2000) and GRUIA and ILIE (2000–2001), while on the Chilopoda fauna by ILIE (2003, 2007). A first study about the micro-refugial role of the deep and the superficial subterranean environment was carried on by NITZU and coll. (2007) in the Vârghişului Gorges.

All these studies represent only punctual approaches regarding the functions and the features of the mesovoid shallow substratum, but, as LOVETT and coll. (2005) had emphasized, the great challenge of the present-day ecology is to identify the role of an ecosystem type within a heterogeneous landscape.

The first step toward a thorough understanding of the functioning and the role of the MSS within the framework of the heterogeneity of the Carpatho-Euxinic area, is represented by the development of a conceptual framework and by the identification of the problems to be solved.

MONICA TURNER and TERRY CHAPIN (2005) have introduced the concepts of *punctual process* and *lateral transfer* in order to describe the situations in which the accumulation rates and the horizontal transfers between the components of habitat mosaic are or are not important in a complex study of ecology. These concepts form the basis of a framework allowing the ecologists to distinguish under what conditions the heterogeneity is an important factor to be taken into consideration and at what scale.

Applying the concept of the compositional heterogeneity correlated with the configurational heterogeneity in the study of the superficial subterranean environment

from the Carpatho-Euxinic space, we shall be able to establish not only its role in the structural and functional shaping of the local epigeous and subterranean ecosystems, but also the possible horizontal interaction of the types of MSS from a heterogeneous landscape. As LOVETT and coll. (2005) underlined: *"Fundamentally, the problem of scaling up from individual ecosystems to larger spatial scales depends on how we conceptualize heterogeneity in a landscape composed of multiple, potentially interacting ecosystems"*. This underlining is particularly important for the MSS as it represents an ecotonal compartment interacting both with the edaphic and the deep subterranean environment.

In our study we aim to (1) evaluate, based on our data and on literature data, the level of knowledge of the superficial subterranean environment from Romania at the level of the Carpatho-Euxinic area; (2) comparatively analyze the faunistic and zoogeographic structure of the invertebrate associations from the MSS with an emphasis of the *in situ* particularities (species diversity, degree of endemicity); (3) identify the role of the MSS from the analyzed sites in the *edaphic-subterranean* transfer at a faunistic level and in the conservation of the local populations; (4) identify the problems to be solved and the methods of approach in the development of a conceptual framework for the ecologic study of the MSS at the level of high heterogeneity landscapes.

2. MATERIAL AND METHODS

From 1998 to 2008, the authors have carried out a faunistic and zoogeographic analysis of 5 sites with different types of MSS from the karst areas of Dobrogea and the Carpathians. The types of MSS are:

In the karst of Dobrogea:

– the cleitric MSS from the Movile area (South Dobrogea)

In the karst areas of the Carpathians:

– the nude and covered colluvial MSS from the Vârghişului Gorges (600–660 m.)

– the colluvial and cleitric MSS from the Motru Basin (370–407 m.)

– the nude (Marele Grohotiş – 1650 m. and Cerdacul Stanciului, 1672 m.) and covered colluvial (Valea Seacă – 1000 m.) MSS from Piatra Craiului.

The fifth type of sampled MSS is the nude and covered cleitro-colluvial MSS from the Banat Mountains (Caraş Gorges, Comarnic and Doman Valleys) (600–660 m). The sampling was carried out by ILIE VICTORIA within the framework of her Ph.D. thesis. The analysis of the obtained data has pointed to a low sampling effort within this zone, insufficient to allow a faunistic comparison with the above-mentioned sites. However, the data can be used for a list of significant species for the edaphic and subterranean environment from this zone without offering a zoogeographic and faunistic survey comparable with the other sites.

For the sampling of the fauna, Barber (pitfall) traps were placed at various depths and using methods proper to each MSS type studied (Table 1). The traps have been baited with olfactive attractant; ethylic alcohol was used as a preservative. In order to position the traps at the desired depth without limiting the access of the fauna at the traps, we used the allready *classic methodology* developed by C. JUBERTHIE (1983), improved by GERS for the MSS (1992), by CAMACHO (1992) for interstitial fauna (hyporheic) and adapted by us (NITZU and DECU, 1998, NITZU, 2000). It consists in placing bored plastic pipes in the scree deposits, inside them being positioned the collecting recipients. The holes in the plastic pipes correspond to the intended depths to be sampled. After emplacement, the bored plastic pipes were closed at the surface opening with a plastic lid and covered by the initial rock layer, permanently taking into account not to obturate the access hole for the fauna, following the *drilling methodology* (NAE IOANA & NAE A, 2009, NAE IOANA, 2010) (Fig. 1 A, B).

Table 1

Fauna sampling types used in the MSS of each site (ARH% – average relative humidity, AT°C – average temperatures for the sampling period in Celsius degrees, BB – Barber traps, MCV – micro-cavern)

Zone	Alt. (m a.s.l.)	MSS type	Sample type/no.	Depth (m)	ARH%	A T°C	Sampling Period
Movile	21	Cleitric	7 BB	0,3–0,5	82,87		May–Oct. 1998
			1 MCV	3	86	14,3	Oct. 1997–Oct. 1998
Motru Mare	370–401	Covered Colluvial	3 BB	0,5–0,7	78,4	12,57	October 1999–April 2002
		Nude Colluvial	2 BB	0,3–0,5	73,8	11,5	
		Covered Cleitric	2 MCV	1–3	77,2	10,4	April–November 2001
Vârghişului Gorges	660	Covered Colluvial	4 BB	0,15–0,30	85	6,5	May 2002–September 2004
Piatra Craiului	1000	Covered Colluvial (V. Seaca)	2 BB	0,5	90,77	12,9	April–October 2008
	1571 1610	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	4 BB	0,5–0,75	88,9	10,8	

For the cleitric superficial subterranean environment from the Movile area and the cleitro-colluvial from Canaraua Fetei, the pits dug in the limestone were as a preliminary moistened with carbonic acid in order to clear the fissures and then the Barber traps were placed.

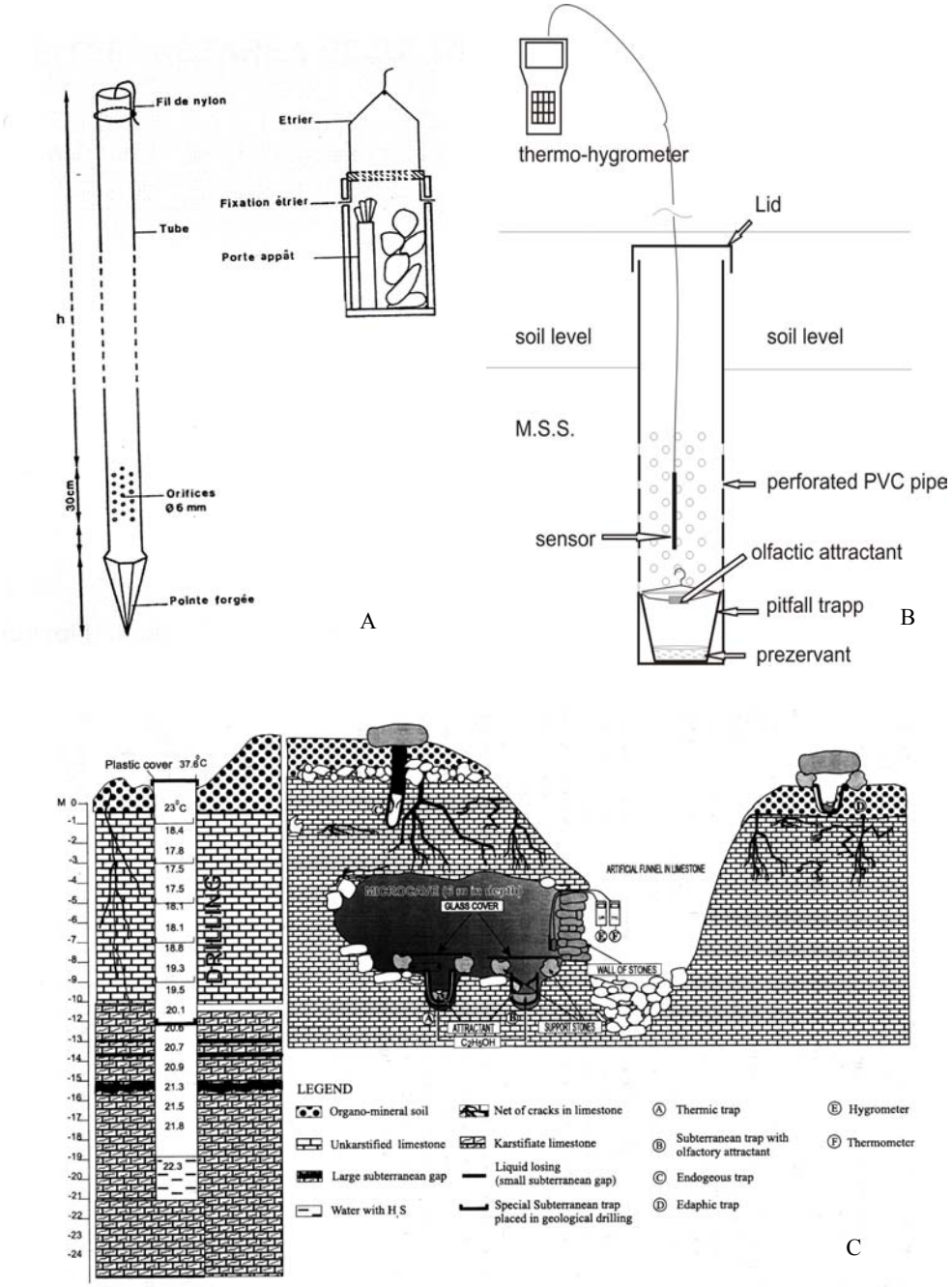

Fig. 1 – Sampling methods for the MSS fauna: A – after GERS CH. (1992); B – the same, modified and used by us in Piatra Craiului, Motru (2004, 2008–2009); C – other methodology used for sampling (NITZU E., 2000).

In the cleitric MSS from Dobrogea, Motru Mare, Caraş Gorges, beside the Barber traps placed in the way described above, we have dug micro-caverns in the limestone of 0.8 to 2 m in depth (Cloşani area) and 1.2 m respectively (Movile), in which Barber traps with attractant and preservative were placed, afterwards the entrance was obturated. The details of the original collecting methods were described in previous papers (E. NITZU, 2000) (Fig. 1, C).

In each studied site, for comparison, the edaphic fauna was sampled in parallel with Barber traps and also the cave fauna.

2. RESULTS AND DISCUSSIONS

By summing up the known data it shows that the highest percent of the calcareous MSS is distributed in the montane level between 380 to 1600 m altitudes (Figs. 2, 3).

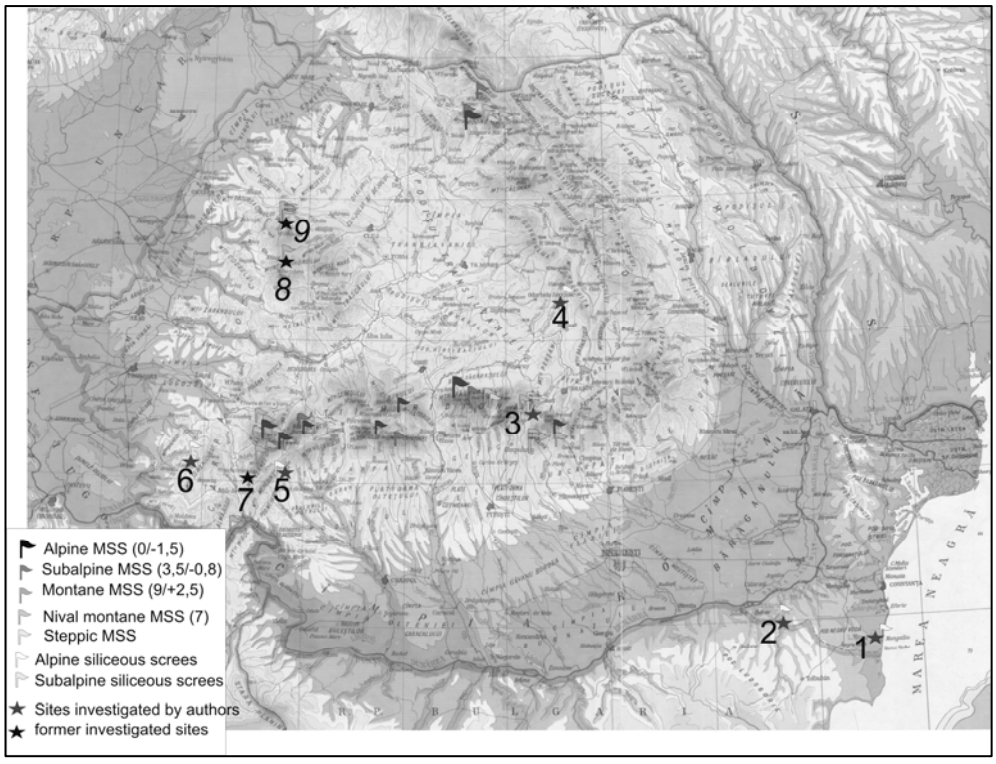

Fig. 2 – Schematic representation of the distribution of the main types of MSS from Roumania (in brackets – the minimum and maximum multiannual temperature values). 1 – Movile, 2 – Canaraua Fetei, 3 – Piatra Craiului, 4 – Vârghişului Gorges, 5 – Motru Mare, 6 – Banat Mountains, 7 – Cerna Mountains, 8 – Bihor Mountains, 9 – Pădurea Craiului Mountains.

Taking into account the altitude and the average multi annual temperature (T) (DONIȚĂ and coll., 2005), we could identify 6 major types of MSS, presented in Fig. 3. Out of these, we sampled 4 types: subalpine – Piatra Craiului at Cerdacul Stanciului and Marele Grohotiş; montane T9/2.5 – Piatra Craiului Valea Seacă, the Motru Mare basin and Banat Mountains; montane T7/5 – Vârghişului Gorges and steppic – Movile, Canaraua Fetei.

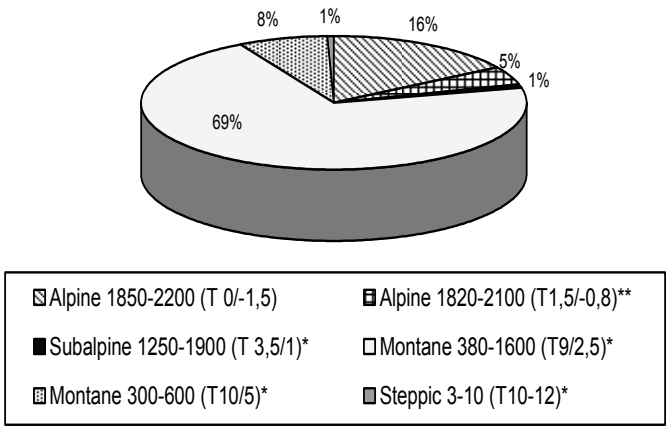

Fig. 3 – Distribution of the calcareous MSS on altitudinal levels (T = average multi annual temperature).

Even if we analyze the correlated structural characteristics of the annual average relative humidity and temperature, following the general classification presented in the previous table, we can note the significant differences in the MSS from one zone to another.

The cleitric superficial subterranean environment from the Movile area is individualized by its highly cleitric character, covered by a thin organomineral layer (15 to 30 cm thick), the net of fissures from the oolithic and lumachellic limestone penetrating in places down to the deep subterranean environment. It is totally different from the other analyzed superficial environments, not by its structure (there are cleitro-colluvial environments in the Motru Mare zone and in the Banat Mountains, too), but by its geographic position in the littoral-steppic zone of Dobrogea and by its connections with a high thermalism (due to the thermo-sulphurous springs of Sarmatian origin). This fact leads to a high average annual temperature of around 12.5°C in its upper part (20–50 cm deep), while it does not decrease under 2°C in winter and a relatively constant temperature of around 14–15°C in all seasons, in its deep part. The relative humidity varies between 81% and 86%.

At the opposite end is the **colluvial subterranean environment found in the nival niches from the Vârghişului Gorges**. The voids between the limestone fragments forming the scree are filled up in greater part with snow in the upper part of the MSS (15–35 cm deep) until the middle of May, when the temperature does not exceed 1°C. This leads to a very low average annual temperature of 4–5°C (6.5°C in the May–September sampling period), even lower than that of some types of alpine or subalpine MSS and with relatively high seasonal variations for this type of environment.

The superficial subterranean environment from Piatra Craiului covers three of the six great classes previously mentioned: the mobile (non-stabilized) MSS with average multi annual temperatures between –0.8°C and 1.5°C (not sampled by us) – in the upper part of the Marele Grohotiş (DONIȚĂ and coll., 2005), the subalpine (mobile or low-mobile) MSS with average multi annual temperatures between 1°C and 3.5°C (the drillings located at Cerdacul Stanciului at 1672 and 1637 m altitude and those from Marele Grohotiş from 1579 and 1578 m altitude) and the stabilized MSS from the montane level with average multi annual temperatures up to 9°C (drillings at 1000 m altitude from Valea Seacă)

All these MSS belong to the colluvial type, those from the Marele Grohotiş and the Cerdacul Stanciului lacking vegetation, while that from Valea Seacă is covered by forest. During the April–October sampling period, the values of the temperatures and the relative humidity from the drillings placed at the Cerdacul Stanciului and the Marele Grohotiş are comparable and vary between 5°C and 80% RH in spring and 15°C and 90–91% RH in summer and 8°C and 86–88% RH in autumn. The values of the temperatures and relative humidity from the Valea Seacă covered MSS are higher in the vernal season (around 11°C), but with the RH% comparable with those from the Marele Grohotiş.

The MSS from the Motru Mare-Cloşani area belong to the low altitude montane type (370–401 m altitude) with average multiannual temperatures between 10°C and 5°C. They belong to the colluvial and nude and covered cleitric types; during the sampling period the temperatures varied between 10–11°C (April, October) and 14–14,6°C (July, August) and RH% = 74–80% (NITZU and ILIE, 2004, DECU and coll., 2006).

We have identified 265 species (19 species of Isopoda, 13 species of Diplopoda, 71 species of Collembola, 38 species of Araneae and 124 species of Coleoptera) (*Annex 1*). The Isopoda were recorded mainly from the MSS of Dobrogea and the low montane areas (only two species were recorded from the Piatra Craiului MSS). On the contrary, the Diplopoda are better represented in the montane MSS from Piatra Craiului and seem to be absent from the MSS of Dobrogea and the Motru Basin MSS. The Araneae are a constant presence in all the studied types of MSS, but their best record is in Piatra Craiului and the Motru Basin. The Collembola and the Coleoptera have the greatest importance among the

MSS invertebrates. Between these latter taxonomic groups is noted a reversal of the species ratio in Piatra Craiului. If the Coleoptera are dominant for all the other types of MSS, in Piatra Craiului, the taxonomic group with the most species is the Collembola (Fig. 4).

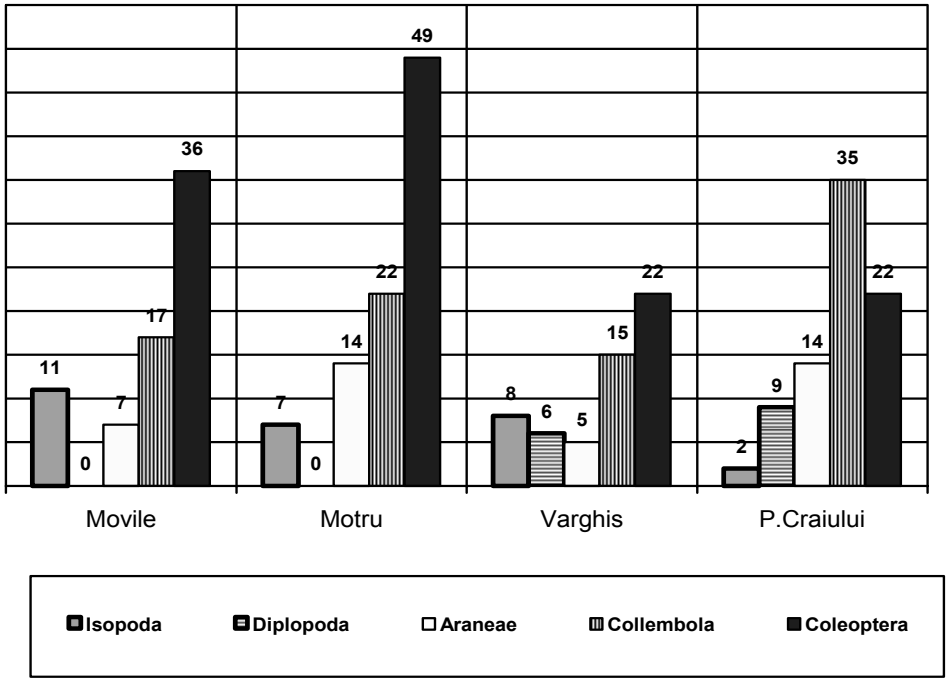

Fig. 4 – Number of species belonging to the studied taxonomic groups in the 4 different MSS types.

Some taxa have a high constancy in the different types of MSS. There are genera kown from this environment by various species. Among the Isopoda, the genus *Trachelipus* is represented by *Trachelipus arcuatus* (Budde-Lund, 1885) (with a Balkano-Central European areal) from the Movile area and the Motru Basin (1, 5 – Fig. 2), by the Carpathian endemite *Trachelipus difficilis* (Radu, 1950) in the Vârghişului Gorges MSS (4 – Fig. 2), while *Trachelipus nodulosus* (C.L. Koch, 1838) (a Balkano-Central European element) was recorded by us both from the Movile area and the Vârghişului Gorges (1, 4 – Fig. 2). Among the Araneae, we note the genus *Palliduphantes*. It is represented by the species *Palliduphantes byzantinus* Fage, 1931, *Palliduphantes insignis* (O.P. – Cambridge, 1913) and *Palliduphantes istrianus* (Kulczynski, 1914), all recorded from the MSS of Dobrogea, while the genus *Lepthyphantes* is represented by the species *Leptyphantes leprosus* (Ohlert, 1865) in the MSS from Dobrogea and from the

Motru Basin (1, 2, 5 – Fig. 2) and by *Leptyphantes notabilis* Kulczynski, 1887 from the Piatra Craiului MSS (3 – Fig. 2).

Among the Coleptera, the genus *Catops* is constantly represented in the MSS by several species. *Catops picipes* (Fabricius, 1792) and *Catops subfuscus* Kellner, 1846 were recorded in the MSS from both the Motru Basin and the Vârghişului Gorges (5, 4 – Fig. 2). In the MSS from the Motru Basin, was recorded *Catops grandicollis* Erichson, 1837, while *Catops fuscus* (Panzer, 1794) was recorded from the Vârghişului Gorges MSS (4 – Fig. 2). In the MSS from the Piatra Craiului, the genus *Catops* is represented by the species *Catops tristis* (Panzer, 1794). The genus *Choleva* is represented in the warmer MSS from the Motru Basin by *Choleva spadicea* (Sturm, 1839), while in the cold MSS from the Vârghişului Gorges we have found the cryophylous species *Choleva nivalis* (Kraatz, 1856). A similar situation is noted for the genus *Medon* – represented by *M. fusculus* (Mannerheim, 1830) in the MSS from Dobrogea (1, 2 – Fig. 2), by *Medon ferrugineus* (Erichson, 1840) in the Motru Basin MSS (5 – Fig. 2) and by *Medon brunneus* (Erichson, 1839) in the MSS from the Vârghişului Gorges (4 – Fig. 2). These genera which are constantly represented in the MSS were also recorded from the MSS from Czech Republic (Ruzicka, 2000). A coleopteran species constantly found in all types of MSS is the Carpathian endemite *Cryptophagus deubeli* Ganglbauer, 1897. In the MSS from the karst areas of Dobrogea, it is replaced by the species *Cryptophagus schmidti* Sturm, 1845.

Some species proved to be constant in a certain type of MSS. Thus, the Carpathian endemite *Platynus glacialis* is a constant (F = 73, 3%) and dominant (rel. abund. = 69, 21%) in the colluvial MSS from Marele Grohotiş. The constant and characteristic species for the cleitric MSS from Movile are *Laemosteuns euxinicus* Nitzu, 1998, *Trechus austriacus* and *Medon fusculus* Mannerheim, 1830. For the MSS from the Vârghişului Gorges, the cryophilous *Choleva nivalis* is the characteristic species. For the MSS from the Motru Basin, is characteristic the association of the species *Catops picipes, Catops subfuscus* and *Catops grandicollis* (Coleoptera, Catopidae) and *Annomatus oltenicus* (endemic) + *Anommatus duodecimstriatus* (Coleoptera, Bothryderidae). After JUBERTHIE and coll. (1981), *Sophrochaeta globosa* is characteristic for the MSS from the Basarabi Valley – Tismana, *Sophrochaeta mihoki* for the MSS from the Cerna Valley (7 – Fig. 2), while *Duvalius (Duvaliotes) redtenbacheri* (9 – Fig. 2) is characteristic for the MSS from the Pădurea Craiului Mountains (Iada Valley).

From a zoogeographic point of view, in the fauna identified in the various types of MSS studied, the Palearctic (including the West-Palearctic ones) and the European elements prevail (Figs. 5 a, b, c, d, e).

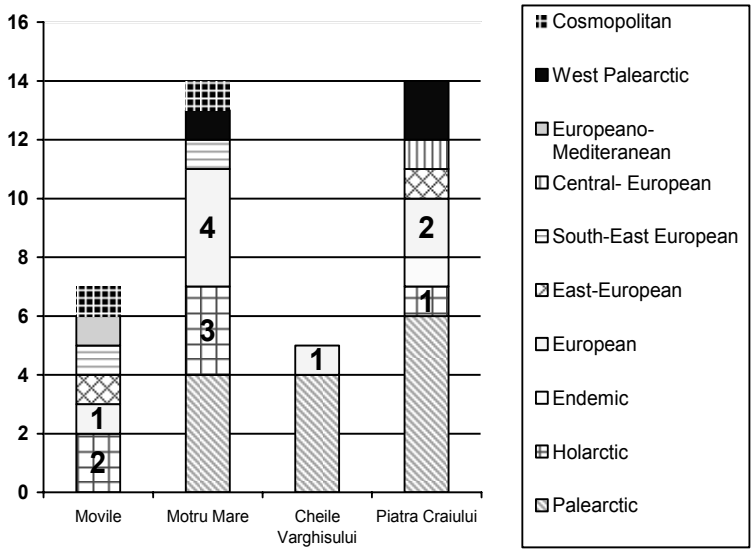

Fig. 5a – Types of zoogeographic elements for the Araneae from MSS.

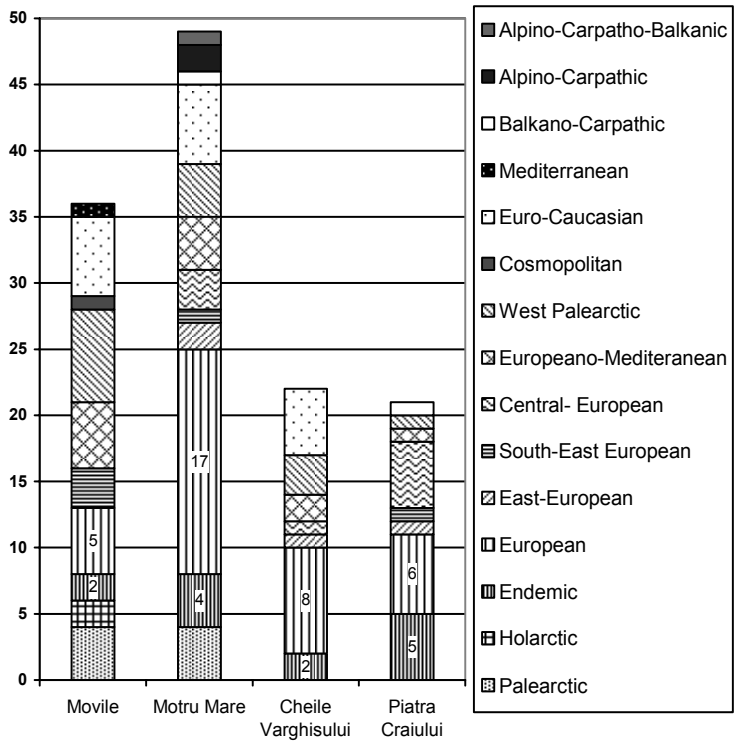

Fig. 5b – Types of zoogeographic elements for the Coleoptera from MSS.

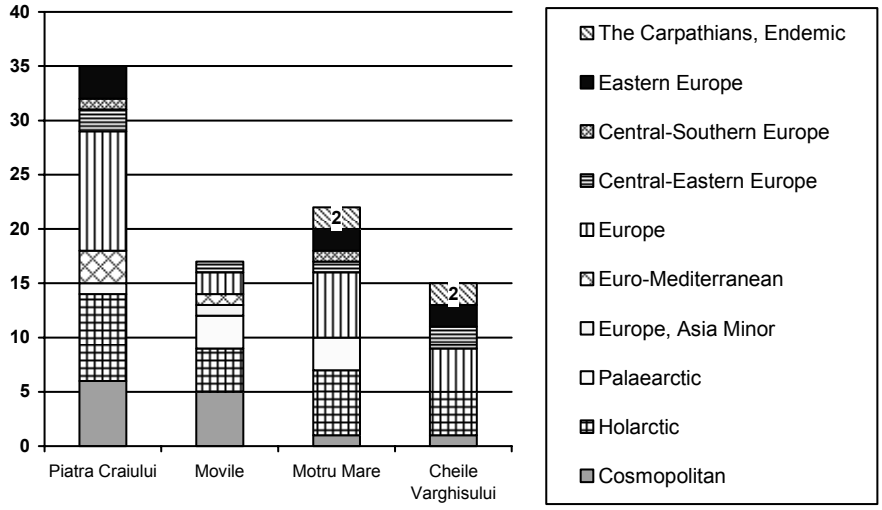

Fig. 5c – Types of zoogeographic elements for the Collembola from MSS.

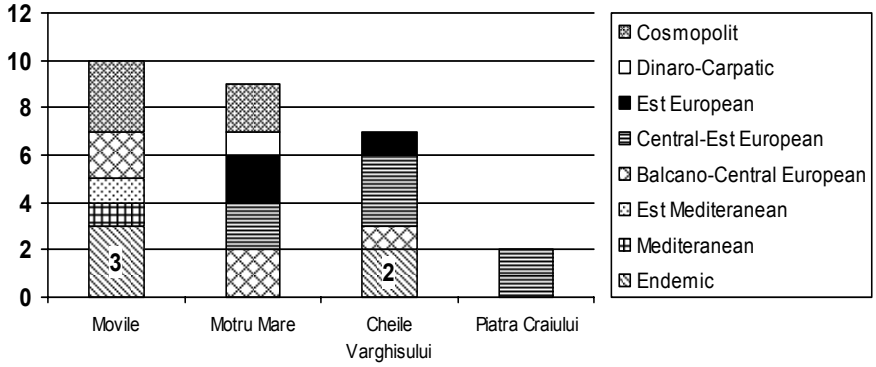

Fig. 5d – Types of zoogeographic elements for the Isopoda (Oniscidea) from MSS.

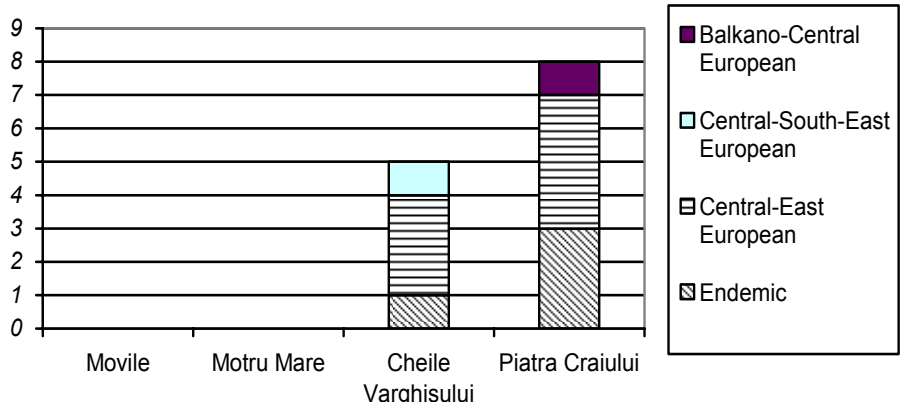

Fig. 5e – Types of zoogeographic elements for the Diplopoda from MSS.

From a total of 265 species, 25 are endemites for the Carpatho-Euxinic space (*Annex 1*); that is an endemicity percentage of 7% for Movile, 6.5% for the Motru Mare Basin, 12.5% for Vârghişului Gorges and 10.9% for Piatra Craiului (Table 2).

Table 2

Number of endemic species identified in the studied MSS types

Species	Movile	Motru	Vârghşului Gorges	Piatra Craiului
Ord. Isopoda Subord. Oniscidaea	3		2	
Diplopoda			1	3
Cls. Arachnida Ord. Araneae				1
Cls. Collembola		2	2	
Cls. Insecta Ord. Coleoptera	2	4	2	5
No. endemic species / total no. of recorded species	5/71	6/92	7/56	9/82
Endemicity percentage	7%	6,5%	12,5%	10,9%

The analysis of the results obtained from the first studies concerning the superficial subterranean environment from Romania up to now, renders evident the existence of characteristic and constant species in this habitat, many of them being endemites (*Sophrochaeta globosa, Duvalius (Duvaliotes) redtenbacheri, Annomatus oltenicus, Laemostenus euxinicus, Platynus glacialis*). Although, among the nine sites where the MSS was faunistically investigated (Fig. 2) only four MSS sites from those known until now, have been well studied from the point of view of the sampling effort, sampling periods (seasonal sampling) and the identification of the collected material up to the specific level (*Table 2*). The high number of identified species (71 in the MSS from Movile, 92 in the Motru Mare Valley, 56 in the Vârghişului Gorges and 82 for the Piatra Craiului MSS) argues for the importance of this type of habitat not only in the sheltering of the populations of some species adapted to the subterranean environment, but also in the survival of some edaphic species using this environment as an aestival ecologic microrefuge (during the sultry, low humidity periods), such as *Pterostichus pilosus* collected in a high number of individuals from a depth of 50–75 cm in the Piatra Craiului MSS, or as a hibernal refuge (during the winter inactivity period), such as *Calathus fuscipes* which winters in the Movile MSS. Regarding the study of the *punctual processes* and the *lateral transfer* used to describe the rates of accumulation and the horizontal transfers between the components of a habitat mosaic (MONICA TURNER and TERRY CHAPIN, 2005), only the data monthly obtained by our colleague Nae Augustin from the Piatra Craiului MSS allow this up to now and will be analyzed in a subsequent paper.

3. CONCLUSIONS

- We have identified 6 categories of MSS from calcareous zones (15 km^2)
- We have identified 265 invertebrate species frequently using the MSS as an aestival or hibernal micro-refuge.
- 26 species are preferential and characteristic for four of the six identified great categories of MSS.
- The main zoogeographic elements found in the MSS of the Carpatho-Euxinic space are the Palearctic and European ones.
- 25 species identified in the MSS are endemic for the Carpatho-Euxinic space, the highest percentage of endemicity being recorded for the montane MSS.
- Up to the present, the data available are insufficient for the analysis of the punctual processes (excepting the data from the Piatra Craiului).

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Annex 1

Species of Collembola collected from four seasonally sampled MSS sites (det. Popa I.).

Taxon	Movile	Motru Mare			Cheile Varghisului	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Ord. Poduromorpha **Fam. Neanuridae** *1. Morulina verrucosa* (Borner, 1903)					X			Europe
2. Pseudachorutes dubius Krausbauer, 1898							X	Palaearctic
Fam. Odontellidae *3. Superodontella empodialis* (Stach, 1934)							X	Europe
Fam. Hypogastruridae *4. Ceratophysella armata* (Nicolet, 1842)							X	Cosmopolitan
5. Ceratophysella denticulata (Bagnall, 1941)		X	X					Palaearctic
6. Ceratophysella sigillata (Uzel, 1891)							X	Holarctic
7. Hypogastrura burkilli (Bagnall, 1940)					X			Europe
8. Hypogastrura cf. monticola Stach, 1946							X	Europe
9. Hypogastrura sahlbergi (Reuter, 1895)							X	Cosmopolitan
10. Hypogastrura tullbergi (Schaffer, 1900)							X	Holarctic

Taxon	Movile	Motru Mare			Cheile Varghisului	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
11. Pseudacherontides spelaeus (Ionescu, 1922)		X	X					Europe
12. Triacanthella perfecta Denis, 1926							X	Europe
13. Willemia anophthalma Borner, 1901	X	X	X	X				Cosmopolitan
Fam. Onychiuridae *14. Deharvengiurus denisi* (Stach, 1934)							X	Eastern Europe
15. Deuteraphorura closanica (Gruia, 1965)		X	X					**Romanian Carpathians, Endemic**
16. Deuteraphorura ghidinii (Denis, 1938)	X							Central and Eastern Europe
17. Deuteraphorura silvaria (Gisin, 1952)						X		Europe
18. Heteraphorura carpatica (Stach, 1938)			X	X				Eastern Europe
19. Kalaphorura tuberculata (Moniez, 1890)		X	X	X		X	X	Europe
20. Onychiuroides subgranulosus (Gama, 1964)					X			Europe
21. Orthonychiurus rectopapillatus (Stach, 1933)			X		X			Central and Eastern Europe
22. Protaphorura armata (Tullberg, 1869)					X			Cosmopolitan

Taxon	Movile	Motru Mare			Cheile Varghisului	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
23. Protaphorura cancellata (Gisin, 1956)	X							Europe
24. Protaphorura quadriocellata (Gisin, 1947)			X	X	X		X	Europe
25. Tetrodontophora bielanensis (Waga, 1842)					X	X	X	Central and Eastern Europe
Fam. Tullbergiidae *26. Metaphorura affinis* (Borner, 1902)	X							Palaearctic
Ord. Entomobryomorpha Fam. Oncopoduridae *27. Oncopodura crassicornis* Shoebotham, 1911		X						Europe
Fam. Tomoceridae *28. Plutomurus carpaticus* Rusek et Weiner, 1978							X	Central and Eastern Europe
29. Pogonognathellus flavescens (Tullberg, 1871)		X	X	X	X	X	X	Holarctic
30. Tomocerus baudoti Denis, 1932		X	X	X				Europe
31. Tomocerus minor (Lubbock, 1862)						X	X	Holarctic
32. Tomocerus vulgaris (Tullberg, 1871)						X	X	Holarctic
33. Cryptopygus ponticus (Stach, 1947)	X							Palaearctic

Taxon	Movile	Motru Mare			Cheile Varghisului	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
34. Desoria olivacea (Tullberg, 1871)		X	X				X	Europe
35. Folsomia inoculata Stach, 1946		X						Palaearctic
36. Folsomia quadrioculata (Tullberg, 1871)		X	X		X			Holarctic
37. Folsomia spinosa Kseneman, 1936	X							Palaearctic
38. Folsomides parvulus Stach, 1922	X							Cosmopolitan
39. Hemisotoma thermophyla Axelson, 1900	X							Cosmopolitan
40. Isotomiella minor (Schaffer, 1896)						X		Cosmopolitan
41. Isotomurus palustris (Muller, 1776)		X						Holarctic
42. Parisotoma notabilis (Schaffer, 1896)	X							Cosmopolitan
43. Proisotoma minuta (Tullberg, 1871)	X							Cosmopolitan
Fam. Entomobryidae *44. Entomobrya multifasciata* (Tullberg, 1871)							X	Cosmopolitan
45. Entomobrya muscorum (Nicolet, 1841)		X						Palaearctic
46. Heteromurus major (Moniez, 1889)							X	Southern and Central Europe

Taxon	Movile	Motru Mare			Cheile Varghisului	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
47. Heteromurus nitidus (Templeton, 1835)	X	X	X	X				Holarctic
48. Heteromurus noseki Mutt et Stomp, 1980		X	X					**Romanian Carpathians, Endemic**
49. Heteromurus sexoculatus Brown, 1926	X							Europe, Asia Minor
50. Lepidocyrtus cyaneus Tullberg, 1871						X	X	Cosmopolitan
51. Lepidocyrtus lignorum (Fabricius, 1775)	X	X	X	X		X	X	Holarctic
52. Lepidocyrtus paradoxus Uzel, 1891	X					X	X	Holarctic
53. Lepidocyrtus serbicus Denis, 1933				X			X	Eastern Europe
54. Orchesella alticola (Uzel, 1891)							X	Europe
55. Orchesella carpatica Ionesco, 1915					X			**The Carpathians, Endemic**
56. Orchesella pontica Ionesco, 1915					X		X	Eastern Europe
57. Pseudosinella sandelsorum Gruia, 1977					X			**Romanian Carpathians, Endemic**
58. Pseudosinella sexoculata Schott, 1902	X							Holarctic

Taxon	Movile	Motru Mare			Cheile Varghisului	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Fam. Paronellidae *59. Cyphoderus assimilis* Borner, 1906	X							Europe
60. Cyphoderus bidenticulatus (Parona, 1888)	X							Euro-Mediterranean
Ord. Neelipleona **Fam. Neelidae** *61. Neelus murinus* Folsom, 1896						X		Cosmopolitan
Ord. Symphypleona **Fam. Arrhopalitidae** *62. Arrhopalites bifidus* (Stach, 1945)						X		Europe
63. Arrhopalites ornatus Stach, 1945						X		Europe
64. Arrhopalites principalis Stach, 1945					X			Holarctic
65. Arrhopalites pygmaeus (Wankel, 1860)		X	X		X			Holarctic
66. Arrhopalites sericus Gisin, 1947						X	X	Euro-Mediterranean
67. Arrhopalites terricola Gisin, 1958							X	Europe
Fam. Sminthuridae *68. Allacma fusca*						X		Euro-Mediterranean

Taxon	Movile	Motru Mare			Cheile Varghisului	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
69. Caprainea marginata (Schott, 1893)						X		Euro-Mediterranean
70. Spatulosminthurus flaviceps (Tullberg, 1871)		X	X					Southern and Central Europe
Fam. Dicyrtomidae *71. Dicyrtoma fusca* (Lubbock, 1873)						X	X	Holarctic

Species of Araneae collected from four seasonally sampled MSS sites (det. Nae A.)

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Fam. Dysderidae 1. *Dysdera crocata* C.L. Koch, 1838	X		X	X				Cosmopolitan
Fam. Nesticidae 2. *Nesticus constantinescui* Dumitrescu, 1979						X		Romania, endemite Piatra Craiului
Fam. Theridiidae 3. *Rugathodes bellicosus* (Simon, 1873)							X	European
Fam. Linyphiidae 4. *Asthenargus cf. paganus* (Simon, 1884)							X	Palearctic
5. *Centromerus arcanus* (O.P. Cambridge, 1873)					X			Palearctic
6. *Centromerus silvicola* (Kulczynski, 1887)							X	East-European
7. *Diplocephalus latifrons* (O. P. Cabridge, 1863)					X			European
8. *Diplostyla concolor* (Wider, 1834)		X	X					Holarctic
9. *Entelecara acuminata* (Wider, 1834)							X	Holarctic
10. *Lepthyphantes leprosus* (Ohlert, 1865)	X	X						Holarctic
11. *Lepthyphantes notabilis* Kulczynski, 1887							X	Central-European

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
12. *Micrargus herbigradus* (Blackwall, 1854)					X			Palearctic
13. *Palliduphantes byzantinus* Fage, 1931	X							South-East European
14. *Palliduphantes insignis* (O.P. – Cambridge, 1913)	X							European
15. *Palliduphantes istrianus* (Kulczynski, 1914)	X							East-European
16. *Pelecopsis radicicola* (L.Koch, 1872)							X	Palearctic
17. *Tenuiphantes alacris* (Blackwall, 1853)					X		X	Palearctic
18. *Tenuiphantes tenuis* (Blackwall, 1854)	X							Europeano - Mediterranean
19. *Sintula corniger* (Blackwall, 1856)								European
Fam. Tetragnathidae 20. *Metellina segmentata* (Clerck, 1757)					X			Palearctic (introduced in Canada)
Fam. Lycosidae 21. *Pardosa lugubris* (Walckenaer, 1802)		X	X					Palearctic
22. *Pardosa morosa* (L. Koch, 1870)							X	West Palearctic
23. *Pardosa nigra* (C.L. Koch, 1834)							X	Palearctic
24. *Pardosa nigriceps* (Thorell, 1856)			X					European

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Fam. Agelenidae 25. *Tegenaris silvestris* L. Koch, 1872		X						European
Fam. Cybaeidae 26. *Cybaeus angustiarun* L.Koch, 1868						X	X	European
Fam. Hahniidae 27. *Cryphoeca silvicola* (C.L. Koch, 1834)							X	Palearctic
Fam. Dyctinidae 28. *Cicurina cicur* (Fabricius, 1793)							X	West Palearctic
Fam. Amaurobiidae 29. *Amaurobius pallidus* L. Koch, 1868			X					SE European
Fam. Clubionidae 30. *Clubiona frutetorum* L. Koch, 1867			X					European
31. *Clubiona neglecta* O.P.Cambridge, 1862				X				Palearctic
Fam.Gnaphosidae 32. *Drassodes lapidosus* (Walckenaer, 1802)							X	Palearctic
33. *Drassodex hypocrita* (Simon, 1878)			X					European
34. *Haplodrassus signifier* (C.L. Koch, 1839)			X					Holarctic

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
35. *Micaria pulicaria* (Sundevall, 1832)	X							Holarctic
36. *Zelotes apricorum* (L. Koch, 1876)			X					West Palearctic
Fam. Thomisidae 37. *Ozyptila blackwalli* Simon, 1875		X						Palearctic
Fam. Salticidae 38. *Euophrys frontalis* (Walckenaer, 1802)			X					Palearctic

Isopoda-Oniscidea, Diplopoda species collected from four seasonally sampled MSS sites (det. Giurginca A.)

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
ISOPODA. Fam. Ligiidae 1. *Ligidium germanicum* Verhoeff, 1901					X	X		Central-East European
Fam. Trichoniscidae 2. *Hyloniscus riparius* (C. L. Koch, 1838)		X	X		X	X		Central-East European
3. *Hyloniscus transsilvanicus* (Verhoeff, 1901)		X	X					East European
Fam. Mesoniscidae 4. *Mesoniscus graniger* (Frivaldsky, 1865)		X						Dinaro-Carpathic
Fam. Platyarthridae 5. *Platyarthrus coronatus* Radu, 1959	X							Endemic in South Dobrogea
Fam. Philosciidae 6. *Chaetophiloscia hastata* Verhoeff, 1929	X							East-Mediterranean
7. *Chaetophiloscia sicula* Verhoeff, 1908	X							Mediterranean
Fam. Cylisticidae 8. *Cylisticus transsylvanicus* (Verhoeff, 1908)					X			Endemic in Transylvania, between Somesul Rece and Muntele Rece; also found in Bucharest
9. *Cylisticus convexus* (De Geer, 1778)	X		X	X				Cosmopolitan

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Fam. Porcellionidae 10. *Porcellionides nitidus* Radu, 1951	X							Endemic in South Dobrogea
11. *Leptotricus pilosus dobrogicus* Radu, 1973	X							Endemic in Dobrogea
12. *Porcellio laevis* Latreille, 1804	X							Cosmopolitan
Fam. Trachelipididae 13. *Protracheoniscus politus politus* (C. L. Koch, 1841)		X	X		X			Central-East European
14. *Trachelipus arcuatus* (Budde-Lund, 1885)	X	X	X	X				Balkano-Central European
15. *Trachelipus difficilis* (Radu, 1950)					X			Endemic in the Romanian Carpathians (Hunedoara, Varghis)
16. *Trachelipus nodulosus* (C. L. Koch, 1838)	X				X			Balkano-Central European
Fam. Armadillidiidae 17. *Armadillidium vulgare* (Latreille, 1804)	X	X	X					Cosmopolitan
18. *Armadillidium versicolor quinqueseriatum* Stein, 1859		X	X	X	X			East European
Fam. Scleropactidae *19. Kithironiscus dobrogicus* Tabacaru & Giurginca, 2003	X							Endemic in South Dobrogea
DIPLOPODA. Fam. Polyxenidae 1. *Polyxenus* cf. *trivittatus*					X			

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Fam. Trachysphaeridae 2. *Trachysphaera costata* (Waga, 1858)					X			Central-East European
Fam. Julidae 3. *Allajulus boleti* (C.L. Koch, 1847)							X	Balkano-Central European
4. *Leptoiulus trilobatus* (Verhoeff, 1894)						X	X	Central-East European
5. *Megaphyllum projectum* Verhoeff, 1894							X	Central-East European
6. *Megaphyllum unilineatum* C.L. Koch, 1838							X	Central-Est European
Fam. Paradoxosomatidae 7. *Strongylosoma stigmatosum* (Eichwald, 1830)					X	X		Central-East European
Fam. Polydesmidae 8. *Polydesmus montanus* Daday, 1889					X	X	X	Carpathian Endemit
9. *Polydesmus complanatus* Linnaeus, 1761					X			Central-South-East European
10. *Polydesmus burzenlandicus* Verhoeff, 1925						X	X	Carpathian endemite
Fam. Mastigophorophyllidae 11. *Mastigophorophyllon saxonicum* Verhoeff, 1910					X			Central-East European
12. *Heterobraueria scopifera* Verhoeff, 1898							X	Endemic in Romania

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Fam. Glomeridae 13. *Glomeris hexasticha* Brandt, 1833							X	Central-East European

Coleoptera species collected from four seasonally sampled MSS sites (det. Nitzu E.)

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered/Nude Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Fam. Carabidae								
1. *Carabus coriaceus dobrudjensis* Born	X							Endemic in Dobrogea
2. *Carabus linnei* Panzer, 1812							X	
3. *Cychrus caraboides* L. 1758							X	European
4. *Duvalius deubelianus* (Csiki, 1903)							X	Endemic in Piatra Craiului
5. *Trechus quadristriatus* Schrank, 1781 (iarna)	X							Palearctic
6. Trechus austriacus	X							European
7. *Limnastis galilaeus* Brulle, 1875	X							Mediterranean
8. *Bembidion properans* Stephens, 1829	X							Holarctic
9. *Paratachis bistriatus* (Duftscmid, 1812)					X/-			West Palearctic
10. *Perigona nigriceps* (Dejean, 1831)	X							Holarctic
11. *Acinopus picipes* (Olivier, 1795) (iarna)	X							South Europeo-Ponto-Caucasian
12. *Parophonus mendax* (Rossi, 1790)	X							Europeo-centrasiatic
13. *Pseudophonus rufipes* (De Geer, 1774)	X							Palearctic
14. *Stomis pumicatus* (Panzer, 1796)		X						Euro-Caucasian

Taxa	Movile	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
	Cleitric	Covered Colluvial	Nude Colluvial	Cleitric	Covered/Nude Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
15. *Abax parallelepipedus* (Piller et Mitterpacher, 1783)		X		X	X	X		European
16. *Abax carinatus* (Duftschmid, 1812)								Europeo-Balkano-Pontic
17. *Abax paralleus* (Duftschmid, 1812)				X	X			European
18. *Pterostichus piosus wellensii* (Drapiez, 1819)							X	Carpathian Endemite
19. *Pterostichus findeli* Dejean, 1828							X	South-East Carpathian Endemite
20. *Molops piceus orthogonius* Chaudoir, 1868					-/X			ro
21. *Platynus glacialis* Reitter, 1877						X	X	Carpathian Endemite (Romania, Ukraine)
22. *Calathus fuscipes* (Goeze, 1777)	X							West Palearctic
23. *Calathus melanocephalus* (Linnaeus, 1758)	X							Palearctic
24. *Dolichus halensis* (Schaller, 1783)-vara	X							South-Europeo-Asiatic
25. *Laemostenus euxinicus* Nitzu, 1998	X							Endemit dobrogean
26. *Laemostenus terricola punctatus* (Dejean, 1828)								South-East. Europeo-Balkano-Pontic (PO-MED)
27. *Myas chalibaeus* Palliardi, 1825								Balkano-Pontic Endemite

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28. *Parazuphium chevrolati* Castelnau, 1833	X							Mediterranean-Caucasian
29. *Philorizus notatus* (Stephens, 1827)					-/X			Wast Palearctic
30. *Brachinus explodens* Duftschmid, 1812	X							
Fam. Staphylinidae								
31. *Micropeplus porcatus* (Paykull, 1789)				X				Euro-Mediteranean
32. *Proteinus brachypterus* (Fabricius, 1792)		X						Euro-Siberian
33. *Proteinus crenulatus* Pandelle, 1867					X			Euro-Caucasian
34. *Proteinus longicornis* Dodero, 1923							X	Central-East Europe
35. *Anthophagus caraboides* (Linneus, 1758)					X			European
36. *Omalium rivulare* (Paykull, 1792)		X						Euro-Mediterranean
37. *Deliphrosoma prolongatum* (Rottenberg, 1873)							X	C-E European
38. *Oxytelus sculpturatus* Gravenhorst, 1806	X	X		X				Palearctic
39. *Trogophloeus augustae* Bernheim, 1901	X							Central and South European
40. *Stilicus orbiculatus* (Paykull, 1789)	X							Euro-Mediterranean
41. *Medon ferrugineus* (Erichson, 1840)				X				

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42. *Medon fusculus* (Mannerheim, 1830	XX							Euro-Mediterranean
43. *Medon brunneus* (Erichson, 1839)					X			
44. *Xantholinus relucens* (Gravenhorst, 1806) in winter	X							Central and South European
45. *Philonthus coruscus* (Gravenhorst, 1802)	X X							Euro-Mediterranean
46. *Philonthus scribai* Fauvel, 1867	X							South and Central European
47. *Ocypus olens* (Muller, 1764)	X							Euro-Mediterranean
48. *Ocypus ater* (Gravenhorst, 1802)								European
49. *Ocypus* (Goerius) megacephalus (Nordm. 1837)							X	East European
50. *Astrapeus ulmi* (Rossi, 1790)	X/-							
51. *Quedius collaris* (Erichson, 1840)						X	X	S-E -Eur
52. *Quedius fumatus* (Stephens, 1833)						X		Europa
53. *Quedius fuliginosus* (Gravenhorst, 1802)	X							Euro-Siberian
54. *Quedius fulgidus* (Fabricius, 1787)	X X							Euro-Siberian
55. *Quedius mesomelinus* (Marsham, 1802)			X	X			X	European

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56. *Quedius puncticollis* (Thomson, 1867)		X						European
57. *Othius punctulatus* (Goeze, 1777)					X			West Palearctic
58. *Atheta spelaea* Erichson 1839								Euro-Mediterranean
59. *Atheta incognita* (Sharp, 1869)					X			Euro-Mediterranean
60. *Geostiba circellaris* (Gravenhorst, 1806)					X			Euro-Caucasian
61. *Dexiogya forticornis* A. Strand, 1939					-/X			European
62. *Philhygra rugulosa* Heer, 1839			X	X				Alpino-Carpathic
63. *Pycnota paradoxa* Mulsant et Rey, 1861	XX							European
64. *Nehemitropia sordida* (Marsham, 1802)	X							Palearctic
65. *Corodalia obscura* (Gravenhorst, 1802)		X						Euro-Mediterranean
66. *Falagria thoracica* Curt.		X						European
67. *Ischnoglosa prolixa* (Gravenhorst, 1802)		X						Euro-Caucasian
68. *Oxypoda rufa* Kraatz, 1856		X						Euro-Caucasian
69. *Oxypoda opaca* (Gravenhorst, 1802)			X					Euro-Siberian
70. *Besobia occulata* (Erichson, 1837)		X						Balkano-European
71. *Leptusa ruficornis* (Erichson, 1839)					X			Euro-Caucasian

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72. *Leptusa globulicollis* (Mulsant & Rey, 1853)							X	Alpino-Carp
73. *Aleochara curtula* (Goeze, 1777)				X				Palearctic
74. *Bolitochara obliqua* Erichson, 1837		X						Central-East European
75. *Drusilla canaliculata* (Fabricius, 1787)	X							Euro-Siberian
76. *Bryaxis reitteri* (Saulcy, 1875)			X		X			East European
77. *Bryaxis simplex* Baudi de Selve, 1869 (=*glabricollis* (Schm-G, 1838)]			X		X			European
78. *Bryaxis nodicornis* (Aube, 1833)		X	X				X	European
79. *Bryaxis nigripennis* (Aube, 1844)							X	Central-East European
Fam. Scydmaenidae								
80. *Euconnus* (*Tetramelus*) *oblongus* (Sturm, 1838)		X						Alpino-Carpatho-Illyric
81. *Cladoconnus motschulskyi* (Sturm)		X						Alpino-Carpatho-Balkanic
Fam. Histeridae								
82. *Gnathoncus nanus* (Scriba, 1790)	X X							Cosmopolitan
Fam. Agyrtidae								
83. *Necrophilus subterraneus* (Dahl, 1807)							X	Central-East European
Fam. Silphidae								
84. *Phosphuga atrata* Linnaeus, 1785				X			X	Euro-Siberian

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Fam. Catopidae								
85. *Ptomaphagus subvillosus* (Goeze, 1777)		X						Central-East European
86. *Apocatops nigrita* Erichson, 1837					X			Euro-Caucasian
87. *Catops picipes* (Fabricius, 1792)		X			X		X	Euro-Mediterranean
88. *Catops longulus* Kellner, 1846					X			European
89. *Catops subfuscus* Kellner, 1846				X	X			Central European
90. *Catops grandicollis* Erichson, 1837				X				European
91. *Catops fuscus* (Panzer, 1794)					X			Euro-Caucasian
92. *Catops tristis* (Panzer, 1794)							X	European
93. *Sciodrepoides watsoni* (Spence, 1815)				X				European
94. *Choleva spadicea* (Sturm, 1839)		X						European
95. *Choleva nivalis* (Kraatz, 1856)					X			European
Fam. Leptinidae								
96. *Leptinus testaceus* Muller, 1817 * Banat		X						Euro-Caucasian
Fam. Corylopidae								
97. *Sericoderus lateralis* Gyllenhal, 1827		X						Palearctic
Fam. Nitidulidae 98. *Epurea melanocephala* (Marsham)		X						Euro-Siberian
Fam. Scarabaeidae								
99. *Onthophagus vitulus* Fabricius, 1776	X							Ponto-Mediteranean
100. *Pleurophorus caesus* Creutzer, 1796	X							Euro-Mediterraneo-Caucasian

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Fam. Cucujidae								
101. *Monotoma longicollis* Gyllenhal, 1827	X							Mediteraneo-Caucasian
Fam. Cryptophagidae								
102. *Cryptophagus schmidti* Sturm, 1845	X							Euro-Caucasian
103. *Cryptophagus deubeli* Ganglbauer, 1897		X		X	X	X	X	Carpathian Endemite
104. *Cr. nitidulus* Milliere, 1852		X						East European
105. *Cr. cellaris* (Scopoli, 1763)			X					European
106. *Cr. dentatus* (Herbst, 1793)			X					Palearctic
Fam. Alexiidae 107. *Sphaerosoma laevicolle* Reitter, 1883						**X**		Carpatho-Balkanic
Fam. Rhizophagidae								
108. *Rhizophagus ferrugineus* (Paykull, 1800)		X						European
109. *Rhizophagus parallelicollis* Gyllenhal, 1827				X				European
Fam. Lathridiidae								
110. *Migneauxia inflata* Rosenhauer, 1856	X							Euro-Mediterranean
111. *Metophthalmus hungaricus* Reitter, 1908 *Banat		X						Banat-Motru Endemite
Fam. Colydiidae								
112. *Corticus diabolicus* Schaufuss, 1862		X						Balkano-Carpathic

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Fam. Bothrideridae								
113. *Anommatus duodecimstriatus* (Muller, 1821)		X						Euro-Caucasian
114. *Anommatus oltenicus* Nitzu 2003		X						Motru Endemite
Fam. Endomychidae								
115. *Hylaia rubricollis* (Germar, 1817) *Banat		X						Banat Endemite
116. *Mycetaea hirta* (Marsham, 1802) *Banat			X					Euro-Caucasian
Fam. Elateridae 117. *Dima elateroides* Charpentier, 1825		X						European
Fam. Tenebrionidae								
118. *Blaps mortisaga* Linnaeus 1758	X							West Palearctic
119. Blaps nucronata								European
120. *Blaps lethifera* Marsham, 1802								West Palearctic
Fam. Chrysomelidae 121. *Timarcha tenebricosa* (Fabricius, 1775)				X				European
Fam. Curculionidae								
122. *Acalles echinatus* Germar, 1824		X	X					European
123. *Otiorhynchus* (*Arammichus*) *velutinus* Germar, 1824	X							West Palearctic