

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 substratum (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 Vârghișului Gorges (600–660 m.), the colluvial and cleitric MSS from the Motru Basin (370–407 m.), the nude (Marele Grohotiș – 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 endemism, 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 km². 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 km² 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.

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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 ontogenetic evolution of the subterranean species, have also began in Romania (JUBERTHIE et coll., 1981). Subsequent studies by RACOVIȚĂ and ȘERBAN (1982) targeted the seasonal dynamics of some taxonomic groups from the mesovoid shallow substratum from the Iadului Valley and Ordâncușa 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 Vârghișului 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 endemism); (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 already *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	Cleitic	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 Cleitic	2 MCV	1–3	77,2	10,4	April–November 2001
Vârghișului 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 cleitic 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.

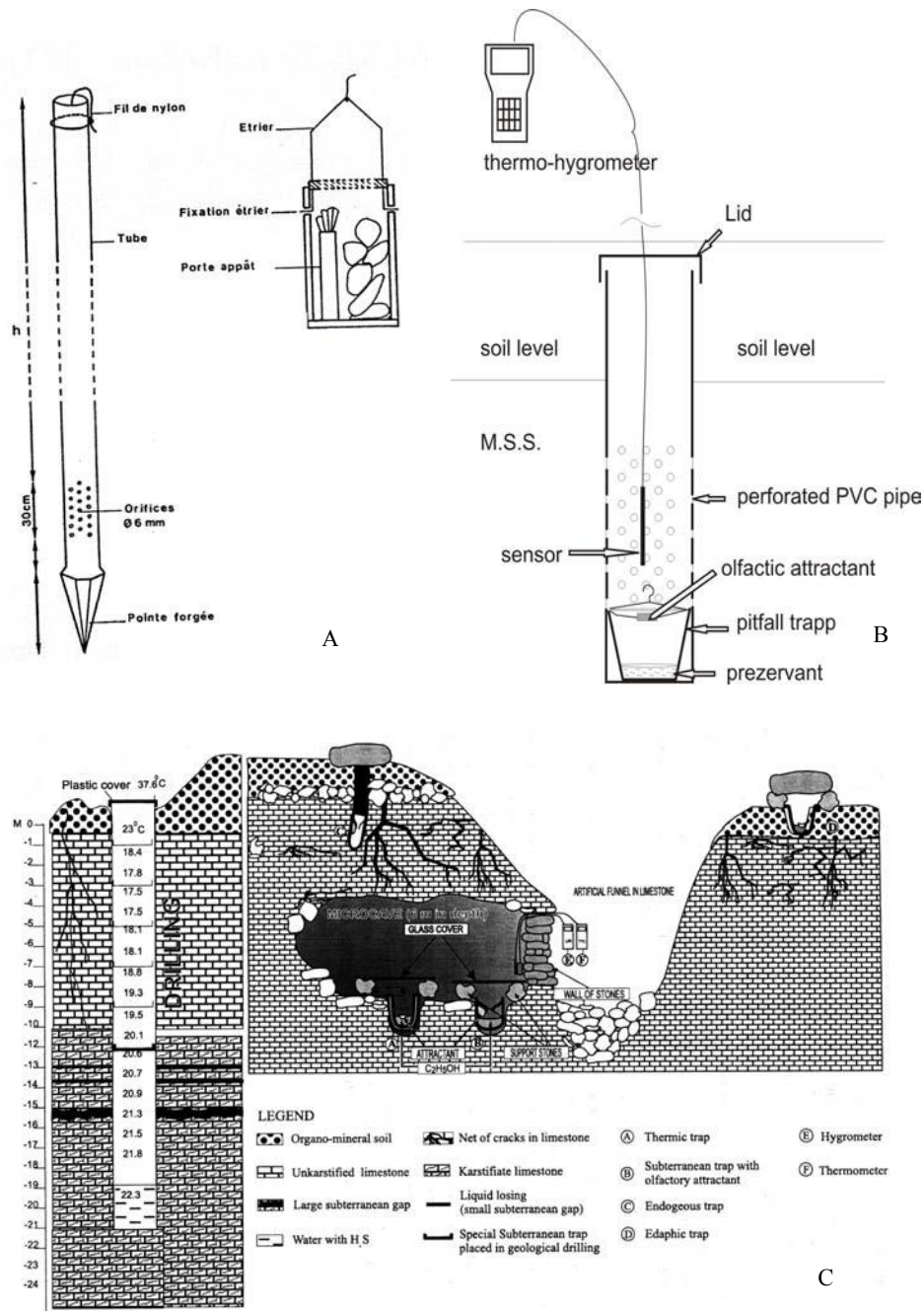


Fig. 1 – Sampling methods for the MSS fauna: A – after GERS CH. (1992); B – the same, modified and used by us in Piatra Craiului, Motru (2004, 2008–2009); C – other methodology used for sampling (NITZU E., 2000).

In the cleitric MSS from Dobrogea, Motru Mare, Caraș 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 (Cloșani 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).

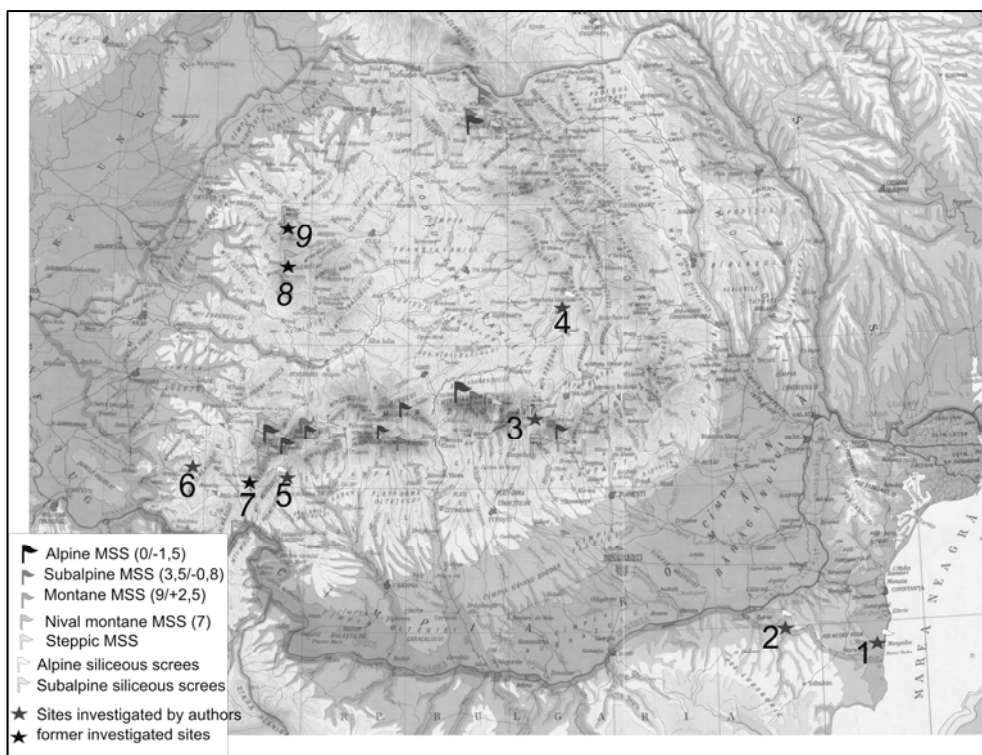


Fig. 2 – Schematic representation of the distribution of the main types of MSS from Roumania (in brackets – the minimum and maximum multiannual temperature values). 1 – Movile, 2 – Canarua Fetei, 3 – Pietra Craiului, 4 – Vârghișului Gorges, 5 – Motru Mare, 6 – Banat Mountains, 7 – Cerna Mountains, 8 – 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 Grohotiș; montane T9/2.5 – Piatra Craiului Valea Seacă, the Motru Mare basin and Banat Mountains; montane T7/5 – Vârghișului Gorges and steppic – Movile, Canaraua Fetei.

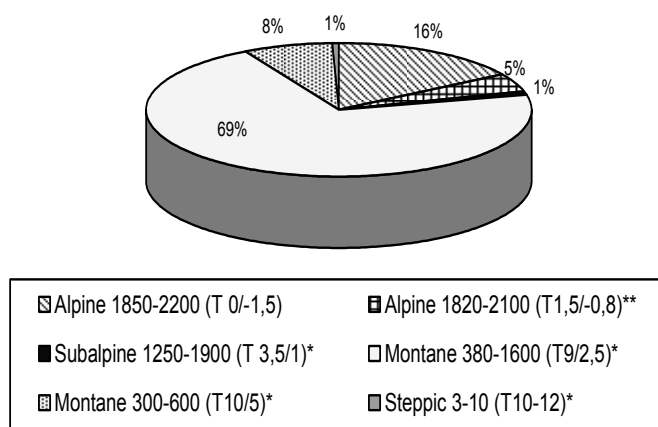


Fig. 3 – Distribution of the calcareous MSS on altitudinal levels (T = average multi annual temperature).

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 oolitic 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 Vârghișului 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 Grohotiș (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 Grohotiș 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 Grohotiș 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 Grohotiș 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 Grohotiș.

The MSS from the Motru Mare-Cloșani 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).

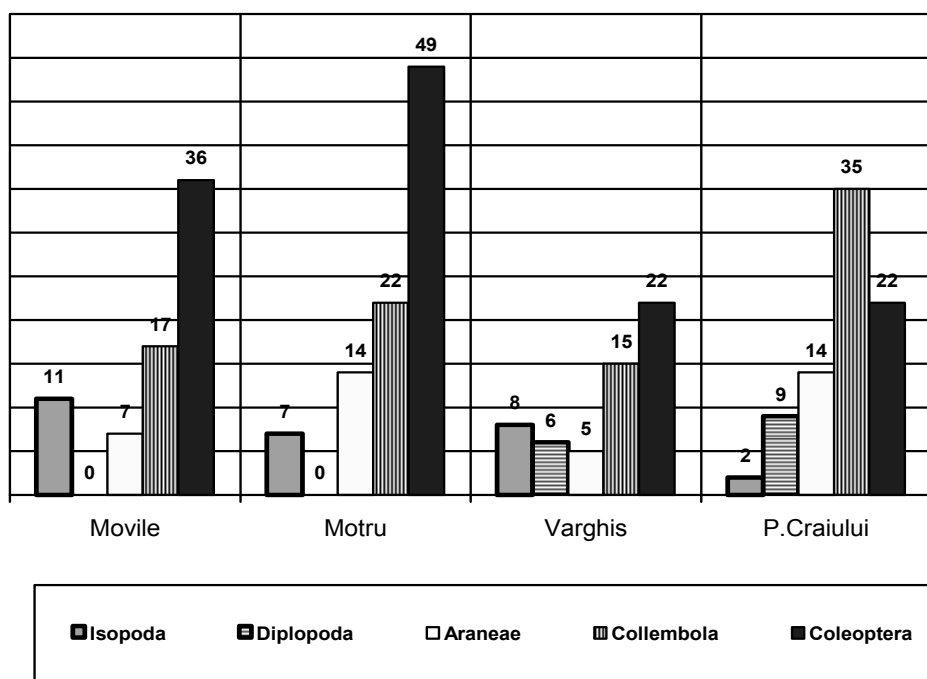


Fig. 4 – Number of species belonging to the studied taxonomic groups in the 4 different MSS types.

Some taxa have a high constancy in the different types of MSS. There are genera known 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 area) 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 *Leptyphantes* 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 Coleoptera, 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 Vârghișului 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 Vârghișului 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 Vârghișului Gorges we have found the cryophilous species *Choleva nivalis* (Kraatz, 1856). A similar situation is noted for the genus *Medon* – represented by *M. fuscus* (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 Vârghișului 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 schmidtii* 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 Grohotiș. The constant and characteristic species for the cleitric MSS from Movile are *Laemosteus euxinicus* Nitzu, 1998, *Trechus austriacus* and *Medon fuscus* Mannerheim, 1830. For the MSS from the Vârghișului 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 *Anommatus oltenicus* (endemite) + *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).

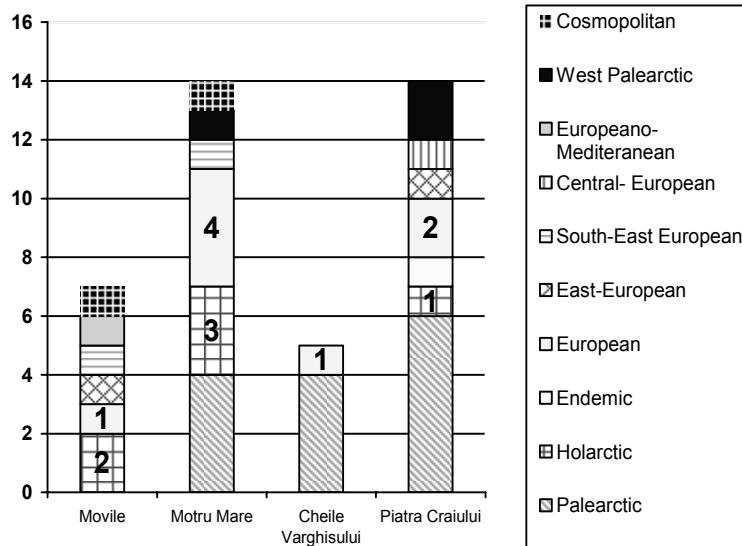


Fig. 5a – Types of zoogeographic elements for the Araneae from MSS.

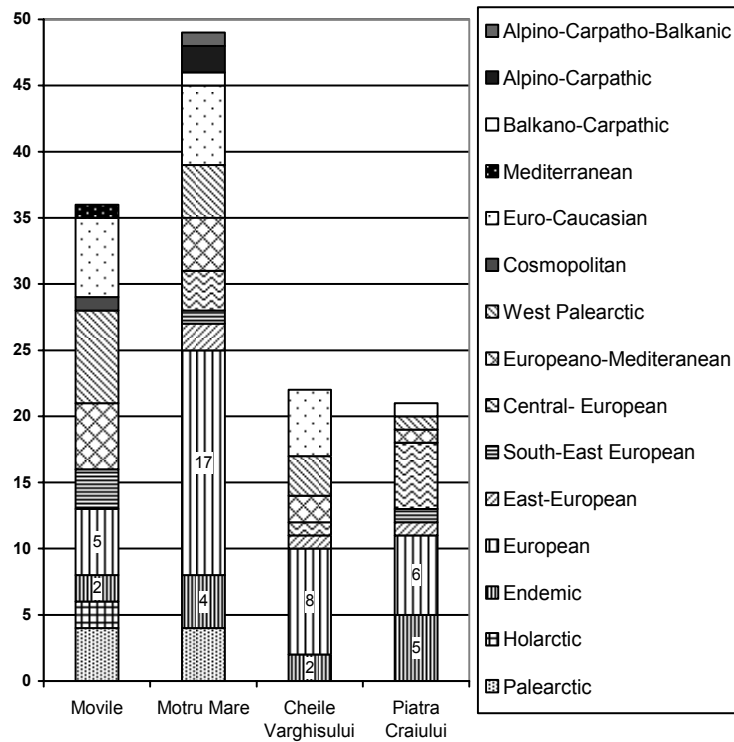


Fig. 5b – Types of zoogeographic elements for the Coleoptera from MSS.

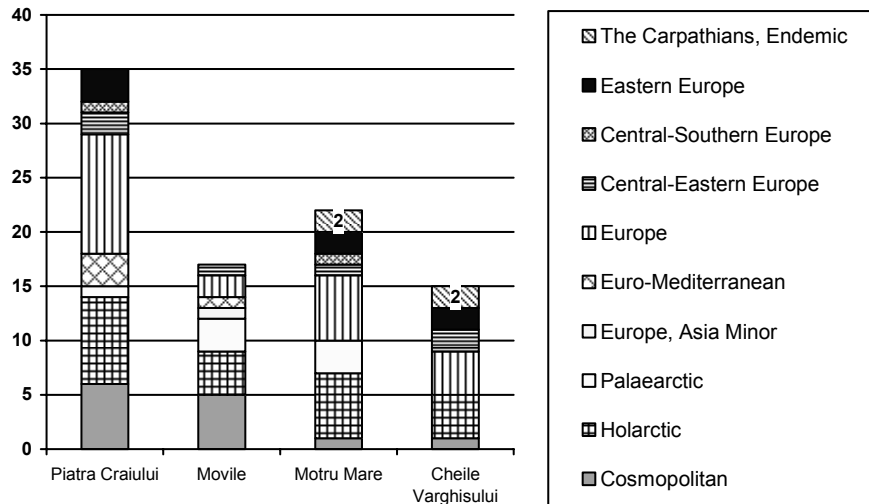


Fig. 5c – Types of zoogeographic elements for the Collembola from MSS.

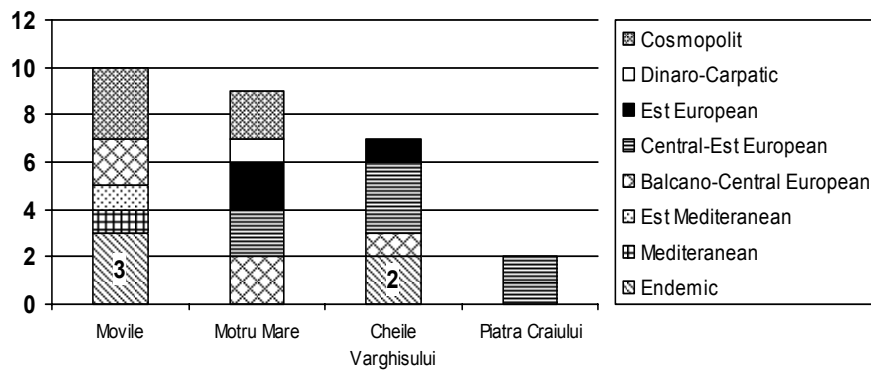


Fig. 5d – Types of zoogeographic elements for the Isopoda (Oniscidea) from MSS.

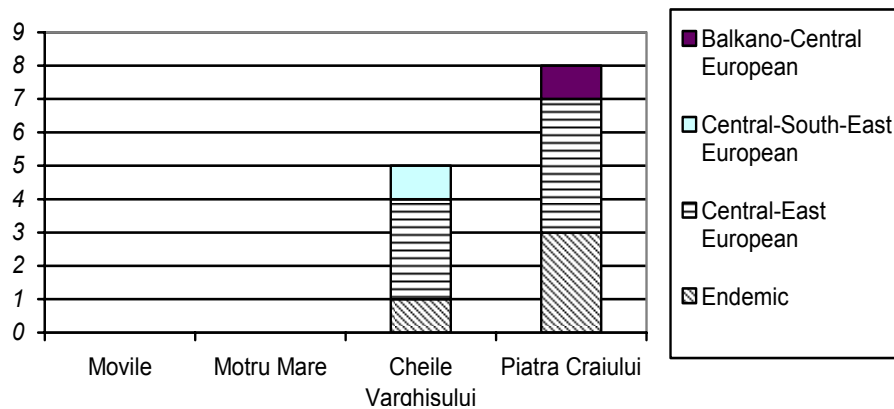


Fig. 5e – Types of zoogeographic elements for the Diplopoda from MSS.

From a total of 265 species, 25 are endemites for the Carpatho-Euxinic space (*Annex 1*); that is an endemity 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	Vârghişului 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
<i>No. endemic species / total no. of recorded species</i>	5/71	6/92	7/56	9/82
<i>Endemity percentage</i>	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 km²)
- 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 endemism 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 I

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	Covered Colluvial	Nude Colluvial	Cleitric	Covered Colluvial	Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdaicul Stanciului)		
Ord. Poduromorpha							X		Europe	
Fam. Neanuridae										
1. <i>Morulina verrucosa</i> (Borner, 1903)										
2. <i>Pseudachorutes dubius</i> Krausbauer, 1898								X	Palearctic	
Fam. Odontellidae										
3. <i>Superodontella empodialis</i> (Stach, 1934)								X	Europe	
Fam. Hypogastruridae										
4. <i>Ceratophysella armata</i> (Nicolet, 1842)								X	Cosmopolitan	
5. <i>Ceratophysella denticulata</i> (Bagnall, 1941)		X		X					Palearctic	
6. <i>Ceratophysella sigillata</i> (Uzel, 1891)								X	Holarctic	
7. <i>Hypogastrura burkilli</i> (Bagnall, 1940)							X		Europe	
8. <i>Hypogastrura cf. monticola</i> Stach, 1946								X	Europe	
9. <i>Hypogastrura sahlbergi</i> (Reuter, 1895)								X	Cosmopolitan	
10. <i>Hypogastrura tullbergi</i> (Schaffer, 1900)								X	Holarctic	

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

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

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

Taxon	Movile	Motru Mare			Cheile Varghisului	Piatra Craiului		Distribution
		Covered Colluvial	Nude Colluvial	Cleitic		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
69. <i>Caprainea marginata</i> (Schott, 1893)	Cleitic					X		Euro-Mediterranean
70. <i>Spatulosmynthurus flaviceps</i> (Tullberg, 1871)		X	X					Southern and Central Europe
Fam. Dicyrtomidae 71. <i>Dicyrtoma fusca</i> (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
		Covered Colluvial	Nude Colluvial	Cleitric		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
Fam. Dysderidae 1. <i>Dysdera crocata</i> C.L. Koch, 1838	X		X	X				Cosmopolitan
Fam. Nesticidae 2. <i>Nesticus constantinescui</i> Dumitrescu, 1979					X			Romania, endemite Piatra Craiului
Fam. Theridiidae 3. <i>Rugathodes bellicosus</i> (Simon, 1873)							X	European
Fam. Linyphiidae 4. <i>Asthenargus cf. paganus</i> (Simon, 1884)							X	Palaearctic
5. <i>Centromerus arcanus</i> (O.P. Cambridge, 1873)					X			Palaearctic
6. <i>Centromerus sibiricola</i> (Kulczynski, 1887)							X	East-European
7. <i>Diplocephalus latifrons</i> (O. P. Cabridge, 1863)					X			European
8. <i>Diplostyla concolor</i> (Wider, 1834)		X	X					Holarctic
9. <i>Entelecara acuminata</i> (Wider, 1834)							X	Holarctic
10. <i>Leptiphantes leprosus</i> (Ohlert, 1865)	X	X						Holarctic
11. <i>Leptiphantes notabilis</i> Kulczynski, 1887							X	Central-European

Taxa	Movable	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
		Covered Colluvial	Nude Colluvial	Cleitic		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stanciului)	
12. <i>Micragus herbigradus</i> (Blackwall, 1854)					X			Palaearctic
13. <i>Pallidaphantes byzantinus</i> Fage, 1931	X							South-East European
14. <i>Pallidaphantes insignis</i> (O.P. – Cambridge, 1913)	X							European
15. <i>Pallidaphantes istranus</i> (Kulczynski, 1914)	X							East-European
16. <i>Pelecopsis raditicola</i> (L.Koch, 1872)							X	Palaearctic
17. <i>Tenuiphantes alacris</i> (Blackwall, 1853)					X		X	Palaearctic
18. <i>Tenuiphantes tenuis</i> (Blackwall, 1854)	X							European - Mediterranean
19. <i>Sintula corniger</i> (Blackwall, 1856)								European
Fam. Tetragnathidae								
20. <i>Metellina segmentata</i> (Clerck, 1757)					X			Palaearctic (introduced in Canada)
Fam. Lycosidae								
21. <i>Pardosa lugubris</i> (Walekenaer, 1802)		X	X					Palaearctic
22. <i>Pardosa morosa</i> (L. Koch, 1870)							X	West Palaearctic
23. <i>Pardosa nigra</i> (C.L. Koch, 1834)							X	Palaearctic
24. <i>Pardosa nigriceps</i> (Thorell, 1856)			X					European

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

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

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

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

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

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

Taxa	Movable	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
		Covered Colluvial	Nude Colluvial	Cletric		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stancului)	
Fam. Glomeridae 13. <i>Glomeris hexasticha</i> Brandt, 1833	Cletric				Covered Colluvial		X	Central-East European

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

Taxa	Movable	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
		Covered Colluvial	Nude Colluvial	Cleitic		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stancului)	
42. <i>Medon fuscus</i> (Mannerheim, 1830)	XX							Euro-Mediterranean
43. <i>Medon brunneus</i> (Erichson, 1839)					X			
44. <i>Xantholinus relucens</i> (Gravenhorst, 1806) in winter	X							Central and South European
45. <i>Philonthus coruscus</i> (Gravenhorst, 1802)	X							Euro-Mediterranean
46. <i>Philonthus scribati</i> Fauvel, 1867	X							South and Central European
47. <i>Ocypus olens</i> (Muller, 1764)	X							Euro-Mediterranean
48. <i>Ocypus ater</i> (Gravenhorst, 1802)								European
49. <i>Ocypus</i> (Goerius) megacephalus (Nordm. 1837)							X	East European
50. <i>Astrapeus ulmi</i> (Rossi, 1790)	X/-							
51. <i>Quedius collaris</i> (Erichson, 1840)							X	S-E -Eur
52. <i>Quedius fumatus</i> (Stephens, 1833)							X	Europa
53. <i>Quedius fuliginosus</i> (Gravenhorst, 1802)	X							Euro-Siberian
54. <i>Quedius fulgidus</i> (Fabricius, 1787)	X							Euro-Siberian
55. <i>Quedius mesomelinus</i> (Marshall, 1802)	X		X				X	European

Taxa	Movable	Motru Mare			Varghisululii Gorges	Piatra Craiului		Distribution
		Covered Colluvial	Nude Colluvial	Cleitic		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stancului)	
56. <i>Quedius puncticollis</i> (Thomson, 1867)		X					European	
57. <i>Othius punctulatus</i> (Goeze, 1777)					X		West Palearctic	
58. <i>Atheta spelaea</i> Erichson 1839							Euro-Mediterranean	
59. <i>Atheta incognita</i> (Sharp, 1869)					X		Euro-Mediterranean	
60. <i>Geostiba circellaris</i> (Gravenhorst, 1806)					X		Euro-Caucasian	
61. <i>Dexiogyia forficornis</i> A. Strand, 1939					-/X		European	
62. <i>Philhygra rugulosa</i> Heer, 1839			X	X			Alpino-Carpathic	
63. <i>Pycnota paradoxa</i> Mulsant et Rey, 1861	XX						European	
64. <i>Nehemitropia sordida</i> (Marsham, 1802)	X						Palearctic	
65. <i>Corodalia obscura</i> (Gravenhorst, 1802)		X					Euro-Mediterranean	
66. <i>Falagria thoracica</i> Curt.		X					European	
67. <i>Ischnoglossa proluxa</i> (Gravenhorst, 1802)		X					Euro-Caucasian	
68. <i>Oxyopoda rufa</i> Kraatz, 1856		X					Euro-Caucasian	
69. <i>Oxyopoda opaca</i> (Gravenhorst, 1802)			X				Euro-Siberian	
70. <i>Besobia oculata</i> (Erichson, 1837)		X					Balkano-European	
71. <i>Leptusa ruficornis</i> (Erichson, 1839)					X		Euro-Caucasian	

Taxa	Movable	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
		Cleitic	Covered Colluvial	Nude Colluvial		Cleitic	Covered Colluvial (V. Seaca)	
72. <i>Leptusa globulicollis</i> (Mulsant & Rey, 1853)							X	Alpino-Carp
73. <i>Aleochara curta</i> (Goeze, 1777)					X			Palearctic
74. <i>Bolitochara obliqua</i> Erichson, 1837			X					Central-East European
75. <i>Drusilla canaliculata</i> (Fabricius, 1787)	X							Euro-Siberian
76. <i>Bryaxis reitteri</i> (Saulcy, 1875)				X				East European
77. <i>Bryaxis simplex</i> Baudi de Selve, 1869 (= <i>glabricollis</i> (Schm-G, 1838))				X				European
78. <i>Bryaxis nodicornis</i> (Aube, 1833)			X				X	European
79. <i>Bryaxis nigripennis</i> (Aube, 1844)							X	Central-East European
Fam. Scydmaenidae								
80. <i>Euconus (Tetramelus) oblongus</i> (Sturm, 1838)			X					Alpino-Carpatho-Ilyric
81. <i>Cladococcus matschulskyi</i> (Sturm)			X					Alpino-Carpatho-Balkan
Fam. Histeridae								
82. <i>Gnathonus nanus</i> (Scriba, 1790)	X							Cosmopolitan
Fam. Agyrtidae	X							
83. <i>Necrophilus subterraneus</i> (Dahl, 1807)							X	Central-East European
Fam. Silphidae								
84. <i>Phosphuga atrata</i> Linnaeus, 1785							X	Euro-Siberian

Taxa	Movable	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
		Covered Colluvial	Nude Colluvial	Cleitic		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stancului)	
Fam. Catopidae								
85. <i>Ptomaphagus subvillosus</i> (Goeze, 1777)		X						Central-East European
86. <i>Apocatops nigrita</i> Erichson, 1837					X			Euro-Caucasian
87. <i>Catops picipes</i> (Fabricius, 1792)		X			X		X	Euro-Mediterranean
88. <i>Catops longulus</i> Kellner, 1846					X			European
89. <i>Catops subfuscus</i> Kellner, 1846				X	X			Central European
90. <i>Catops grandicollis</i> Erichson, 1837				X				European
91. <i>Catops fuscus</i> (Panzer, 1794)					X			Euro-Caucasian
92. <i>Catops tristis</i> (Panzer, 1794)							X	European
93. <i>Sciodrepanoides watsoni</i> (Spence, 1815)				X				European
94. <i>Choleva spadicea</i> (Sturm, 1839)		X						European
95. <i>Choleva nivalis</i> (Kraatz, 1856)					X			European
Fam. Leptinidae								
96. <i>Leptinus testaceus</i> Muller, 1817		X						Euro-Caucasian
* Banat								
Fam. Corylopidae								
97. <i>Sericoderus lateralis</i> Gyllenhal, 1827		X						Palearctic
Fam. Nitidulidae								
98. <i>Epurea melanocephala</i> (Marsham)		X						Euro-Siberian
Fam. Scarabaecidae								
99. <i>Onthophagus vitulus</i> Fabricius, 1776	X							Ponto-Mediterranean
100. <i>Pleurophorus caesus</i> Creutzer, 1796	X							Euro-Mediterranean-Caucasian

Taxa	Movable	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
		Covered Colluvial	Nude Colluvial	Cleitic		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stancului)	
Fam. Cucujidae								
101. <i>Monotoma longicollis</i> Gyllenhal, 1827	X							Mediterraneo-Caucasian
Fam. Cryptophagidae								
102. <i>Cryptophagus schmidti</i> Sturm, 1845	X							Euro-Caucasian
103. <i>Cryptophagus deubeli</i> Ganglbauer, 1897		X		X	X		X	Carpathian Endemite
104. <i>Cr. nitidulus</i> Milliere, 1852		X						East European
105. <i>Cr. cellaris</i> (Scopoli, 1763)			X					European
106. <i>Cr. dentatus</i> (Herbst, 1793)			X					Palaearctic
Fam. Alexiidae							X	Carpatho-Balkanica
107. <i>Sphaerosoma laevicolle</i> Reitter, 1883								
Fam. Rhizophagidae								
108. <i>Rhizophagus ferrugineus</i> (Paykull, 1800)		X						European
109. <i>Rhizophagus parallelcolis</i> Gyllenhal, 1827				X				European
Fam. Lathridiidae								
110. <i>Migneauxia inflata</i> Rosenhauer, 1856	X							Euro-Mediterranean
111. <i>Metophtalmus hungaricus</i> Reitter, 1908 *Banat		X						Banat-Motru Endemite
Fam. Colydiidae								
112. <i>Coriticus diabolicus</i> Schaufuss, 1862		X						Balkano-Carpathic

Taxa	Movable	Motru Mare			Varghisului Gorges	Piatra Craiului		Distribution
		Covered Colluvial	Nude Colluvial	Cleitic		Covered Colluvial (V. Seaca)	Nude Colluvial (Marele Grohotis, Cerdacul Stancului)	
Fam. Bothriideridae								
113. <i>Anommatus duodecimstriatus</i> (Muller, 1821)		X						Euro-Caucasian
114. <i>Anommatus oltenicus</i> Nitzu 2003		X						Motru Endemite
Fam. Endomychidae								
115. <i>Hylaia rubricollis</i> (Germar, 1817) *Banat		X						Banat Endemite
116. <i>Mycetaea hirta</i> (Marsham, 1802) *Banat			X					Euro-Caucasian
Fam. Elateridae								
117. <i>Dima elateroides</i> Charpentier, 1825		X						European
Fam. Tenebrionidae								
118. <i>Blaps mortisaga</i> Linnaeus 1758	X							West Palearctic
119. <i>Blaps mucronata</i>								European
120. <i>Blaps lethifera</i> Marsham, 1802								West Palearctic
Fam. Chrysomelidae								
121. <i>Timarcha tenebricosa</i> (Fabricius, 1775)				X				European
Fam. Curculionidae								
122. <i>Acalles echinatus</i> Germar, 1824		X	X					European
123. <i>Otiorynchus (Arammichus) velutinus</i> Germar, 1824	X							West Palearctic