DATA CONCERNING THE ARANEAE FAUNA FROM THE ANINEI MOUNTAINS KARSTIC AREA (BANAT, ROMANIA)

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Abstract. The author presents data about the species of spiders collected from the Aninei Mountains karstic area. Among the 64 species identified from the material sampled from the edaphic and subterranean environments (caves and mesovoid shallow substratum), 21 species are new for the area. The chorological composition of the fauna is presented, followed by some statistical ecology analyses.

Key words: Araneae, Aninei Mountains, Banat, Romania.

1. INTRODUCTION

Lying from north-east to south-west, the Aninei Mountains appear as a lower chain near by the Semenicului Mountains, being separated by them by Bârzava Valley in the north and Locvei Mountains and the Nera Valley in the south. The eastern limit is represented by the Bârzava and Poneasca Valleys, and in the western part, an abrupt limestone and a tear slope devise them from the Lupacului and Reşiţa Depressions.

The main geomorphological particularity of the region resides in the low mountains aspect; the Aninei Mountains basement comprises crystalline schists, overlaid by Paleozoic and Mesozoic sedimentary formations.

The Aninei Mountains relief consists of a series of peaks and a limestone plateau separated by deep valleys, the main rivers forming spectacular gorges like the Caraşului Gorges (19 km), Nerei Gorges (18 km), Minişului Gorges (14 km), Gârliştei Gorges (9 km) and Buhuiului Gorges (8 km). A lot of karstic dry and blind valleys complete the landscape, pointing the advanced karstification of the limestone and the disorganisation of the hydrographic network.

From the total of 908 caves recorded in the Banatului Mountains, 655 are mapped (70 caves of these being active).

The fauna from this area was investigated by a team of researchers from the "Emil Racoviţă" Speleological Institute, Bucharest, including L. Botoşeneanu, Alexandrina and Şt. Negrea which carried out at the same time biospeleological research and the mapping of 121 caves and potholes from the Banatului Mountains, Poiana Ruscă Mountains and Herculane area, between 1960–1967 (BOTOŞENEANU & NEGREA, 1976).

This paper represents a contribution to the knowledge of the diversity fauna of Araneae from the Aninei Mountain karstic area.

Trav. Inst. Spéol. «Émile Racovitza», t. XLVII, p. 53–63, Bucarest, 2008

2. MATERIAL AND METHODS

Between July 2001 and August 2005, in the Reşiţa – Moldova Nouă karstic area a study concerning the arthropod fauna from the edaphic and subterranean environments (superficial and profound) was made. The material was collected by a team formed by: Victoria Ilie, Ciprian Ilie, Cristian Ţencuşe, Romulus Vuia.

The material from the edaphic environment was sampled using a Winkler sieve, soil samples and Barber traps and direct catching with tweezers. The samples from the mesovoid shallow substratum (M.S.S.) were obtained using 19 drillings varying between –0.50 m and –1 m in depth and a microcave. At the bottom of each drilling, a Barber trap with olfactory attractant was placed. The traps were verified and sampled monthly.

The three locations of the drillings are presented in Fig. 1.

Station 1 – Caraşului Gorges

Liliecilor Cave – Caraşova sector. Seven drillings were placed in this sector with N-W exposure. It is characterised by a limestone substratum placed on scree covered with soil at the superior part. Five of the drillings had 0.5 m in depth, one 0.7 m and one 0.8 m. in depth.

The sector near Peştera de după Cârşă. The station has a N-W exposure. The limestone substratum is covered with moss and presents a high relative humidity due to the short daily sun exposure (few hours per day). In this sector the fauna was sampled from two drillings of –0.8 m and –0.7 m depth and from a microcave.

Station 2 – Comarnicului Valley consists of 5 drillings placed as follows: four on the left side of Comarnicului Valley – two having –0.5 m in depth, one –0.7 m. and other of –1m), and one by –1 meter in depth, placed on the right side of the valley.

Station 3 – Domanului Valley. The station lies on both sides of Doman River Valley. A drill by –0.5 m was made on the left side of the river, in a wooded area with western exposure; one by –0.8 m on the left side of the river, on scree covered soil in a sun bathed area, also with western exposure and the last one of –0.8 m. – on the right side of the river with eastern exposition, on nude scree in a shaded area.

Beside these drillings, edaphic material was sampled from the following locations situated in: the Caraş Area (Caraşului Valley, Comarnicului Valley, Toplița Valley and Caraşului Source); the Nermet Basin, Doman Basin (Doman Valley and Stârnic Valley); the Bârzava Basin (Bârzava Valley and Sohodolul Mare Valley); the Miniş Basin (Golumbu Valley). Additional material was collected from the caves: The Cave No. 2 from Cârneală Hill, the Popovăţ Cave, the Comarnic Cave, Peştera din Valea Seacă, Avenul cel Nou from Minişului Valley, Avenul cel Nou from Golumbu Valley, Peştera din Valea Topliței, Peştera cu Gheaţă, the Drăgoina Cave, the Ciopbaia Cave, Peştera Exploratorii, the Brădet Cave and Peştera cu Oase din Dealul Cârşiei.

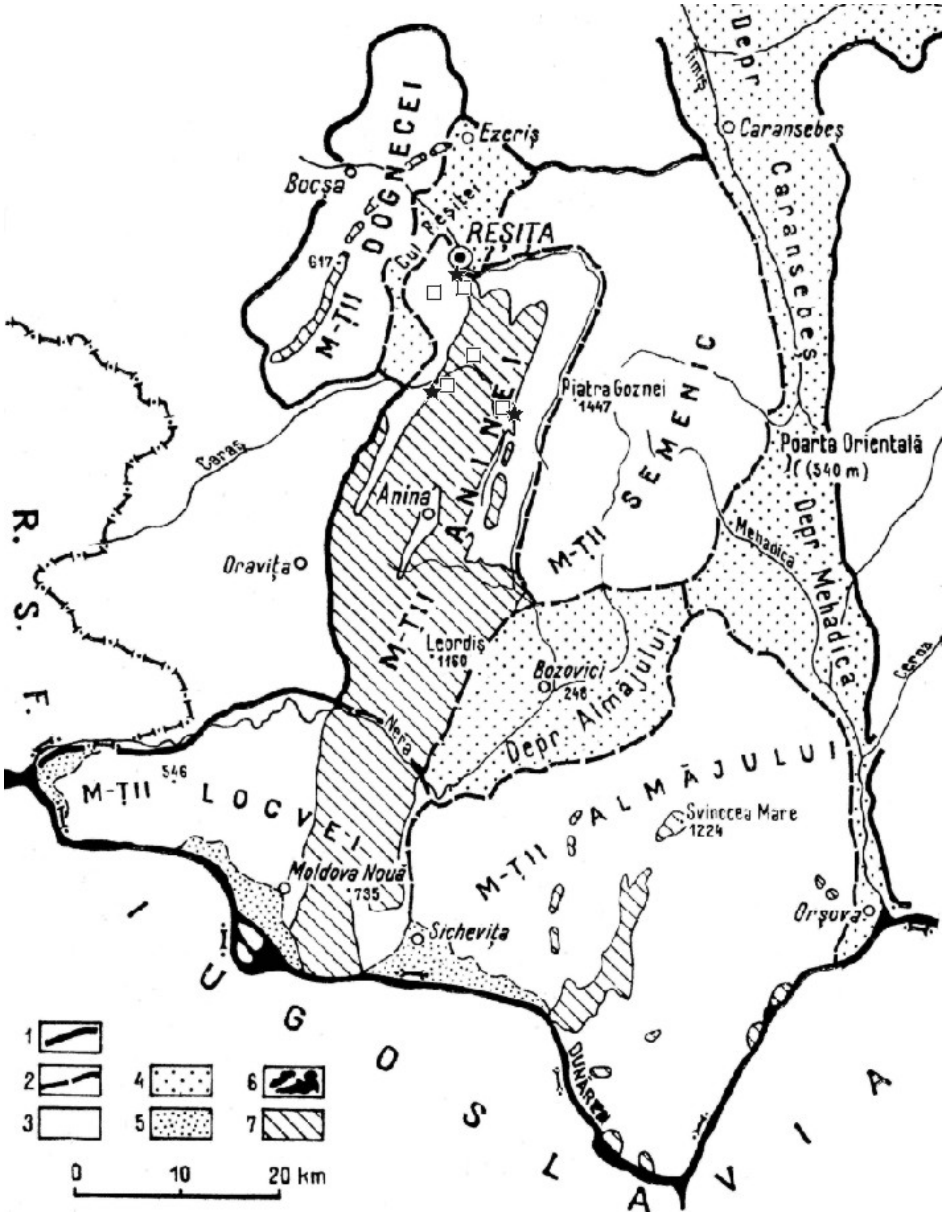

Fig. 1. – The delimitation of the Reşiţa-Moldova Nouă Synclinorium (after V. SENCU *et al.,* 1987) and positions of the sampling stations from mesovoid shallow substratum and edaphic environment.

- ★ positions of the sampling stations from mesovoid shallow substratum;
- □ positions of the sampling stations from edaphic environment.

For Caraşului Gorges station we had enough data to calculate the relative abundance, frequency and the *Shannon* biodiversity index.

3. RESULTS

The species of Araneae (64 species belonging to 18 families) identified in the presented stations are listed in Table 1.

The species distribution per families shows that the Family *Linyphiidae* is the best represented (31.24%) with 20 species, followed by *Gnaphosidae* (9.37%) with 6 species and *Dysderidae*, *Agelenidae* and *Liocranidae* each one with 5 species, representing 7.81% (see Fig. 2).

As for the distribution of the species per habitat types, 26 species were collected from the edaphic environment, 44 from the mesovoid shallow substratum and 6 from caves. Among these, 21 species (Table 1) are for the first time recorded for the Aninei Mountains area. *Palliduphantes istrianus* found by us in M.S.S., was known up to present only in Dobrogea (DUMITRESCU & GEORGESCU, 1981) from Peştera cu Nisip, Peştera de la Casian and Peştera de la Moară, Taslaburum Forest, Făureni Forest) and Ceagău Forest (Mihai Bravu – Giurgiu County).

From the zoogeographical viewpoint, the Palaearctic species are predominant (37.5%). They are followed by European species representing 21.87% and Holarctic species with 12.5% (see Fig. 3). The Central Asian–European species and the Cosmopolitan ones are represented by 7.81% and respectively 6.25% from the total of identified species.

Table 1

The occurrence of the Araneae species per investigated habitat and their distribution

Taxa	Distribution	Edaphic	M.S.S.	Caves
Fam. Pholcidae *Pholcus opilionoides* (Schranck, 1871)	Holarctic		x	
Fam. Dysderidae *Dasumia canestrinii* (L. Koch, 1876)	Southern Europe	x		
Dysdera crocata C.L. Koch, 1833	Cosmopolitan	X		
Dysdera longirostris Doblika, 1853	Eastern Europe to Ukraine		X	
**Dysdera ninnii* Canestrini, 1868	Southern Europe to Ukraine		X	
Harpactea saeva Herman, 1879	Eastern Europe	X	X	
Fam. Nesticidae *Nesticus celullanus* (Clerck, 1757)	Holarctic		X	
Fam. Teridiidae *Episinus truncatus* Latreille, 1809	Palaerarctic		X	
**Pholcomma gibbum* (Westring, 1851)	Europe, Ukraine, Russia, North Africa		X	
Steatoda grossa (C.L. Koch, 1838)	Cosmopolitan	X		
Steatoda triangulosa (Walckenaer, 1805)	Cosmopolitan		X	

Taxa	Distribution	Edaphic	M.S.S.	Caves
Fam. Linyphiidae **Centromerus incilium* (L. Koch, 1881)	Palaearctic		X	
Diplocephalus latifrons (O.P. Cambridge, 1875)	Europe	X		
Dyplostila concolor (Wider, 1834)	Holarctic	X	X	
Gonatium rubellum (Blackwall, 1841)	Palaearctic	X		
Leptyphantes leprosus (Ohlert, 1865)	Holarctic, Chile	X	X	
Leptyphantes minutus (Blackwall, 1854)	Holarctic	X	X	
**Macrargus rufus* (Wider, 1834)	Palaearctic	X		
**Maso gallicus* Simon, 1894	Europe to Azerbaigean	X		
Maso sundevalli (Westring, 1851)	Holarctic	X		
Micrargus herbigradus (Blackwall, 1854)	Palaearctic	X		
Microneta viaria (Blackwall, 1841)	Holarctic	X	X	
**Palliduphantes istrianus* (Kulczynski, 1914)	Eastern Europe		X	
Palliduphantes pallidus (O.P.-Cambridge, 1871)	Palaearctic		X	
Pelecopsis elongata (Wider, 1834)	Europe, Russia		X	
Pelecopsis radicicola (L. Koch, 1872)	Palaearctic		X	
**Porrhomma pallidum* Jackson, 1913	Palaearctic		X	
**Porrhomma pygmaeum* (Blackwall, 1834)	Palaearctic	X		X
Tenuiphantes flavipes (Blackwall, 1854)	Palaearctic	X		
Tenuiphantes tenebricola (Wider, 1834)	Palaearctic	X		
Troglohyphantes herculanus (Kulczynski, 1894)	Rumania			X
Fam. Tetragnathidae *Meta menardi* (Latreille, 1804)	Europe to Korea			X
Metellina merianae (Scopoli, 1763)	Europe to Georgia			X
Fam. Lycosidae *Pardosa agricola* (Thorell, 1856)	Europe to Kazachstan		X	
Pardosa lugubris (Walckenaer, 1870)	Palaearctic	X		
Pardosa morosa (L. Koch, 1870)	Europe to Central Asia		X	

Taxa	Distribution	Edaphic	M.S.S.	Caves
Fam. Agelenidae *Agelena labyrinthica* (Clerck, 1757)	Cosmopolitan	X		
Histopona torpida (C.L. Koch, 1834)	Europe, Russia	X	X	
Tegenaria domestica (Clerck, 1767)	Cosmopolitan	X		
**Tegenaria pagana* C.L. Koch, 1841	Europe to Central Asia, U.S.A. to Chile		X	
Tegenaria silvestris L. Koch, 1872	Europe, Russia		X	X
Fam. Cybaeidae **Cybaeus angustiarum* L. Koch, 1868	Europe to Azerbaijan	X	X	
Fam. Hahniidae **Hahnia pusilla* C.L. Koch, 1841	Europe, Russia	X		
Fam Dyctinidae **Lathys humilis* (Blakwall, 1855)	Palaearctic			X
Fam. Amaurobiidae *Callobius claustrarius* (Hahn, 1866)	Palaearctic	X		
Coelotes inermis (L. Koch, 1866)	Europe	X	X	
Fam. Liocranidae *Apostenus fuscus* (Westring, 1851)	Europe	X	X	
Fam. Clubionidae *Clubiona genevensis* L. Koch, 1866	Palaearctic		X	
Cluniona phragmithis C.L. Koch, 1843	Palaearctic		X	
Fam. Corinnidae **Phrurolithus festivus* (C.L. Koch, 1866)	Palaearctic		X	
**Phrurolithus minimus* (C.L. Koch, 1839)	Europe		X	
**Phrurolithus nigrinus* (Simon, 1878)	South-East Europe		X	
**Phrurolithus pullatus* Kulczynscgi, 1897	Europe		X	
Fam. Zodariidae *Zodarion germanicum* (C.L. Koch, 1837)	Europe		X	
Fam. Gnaphosidae *Drassodes lapidosus* (Walkenaer, 1804)	Palaearctic		X	

Taxa	Distribution	Edaphic	M.S.S.	Caves
**Drassyllus praeficus* (L. Koch, 1866)	Europe to Central Asia		X	
Drassyllus pusillus (C.L. Koch, 1833)	Europe to Central Asia		X	
Haplodrassus sylvestris (Blackwall, 1833)	Palaearctic	X		
Zelotes apricorum (L. Koch, 1876)	Europe to Kazakhstan		X	
**Zelotes subterraneus* (C.L. Koch, 1833)	Palaearctic		X	
**Fam. Thomisidae* **Ozyptila claveata* (Walckenaer, 1837)	Palaearctic		X	
**Fam. Salticidae* **Euophrys frontalis* (Walckenaer, 1802)	Palaearctic		X	
Neon reticulatus (Blackwall, 1853)	Holarctic		X	
**Sitticus floricola* (C.L. Koch, 1837)	Palaearctic		X	

* first recording for the Aninei Mountains Area.

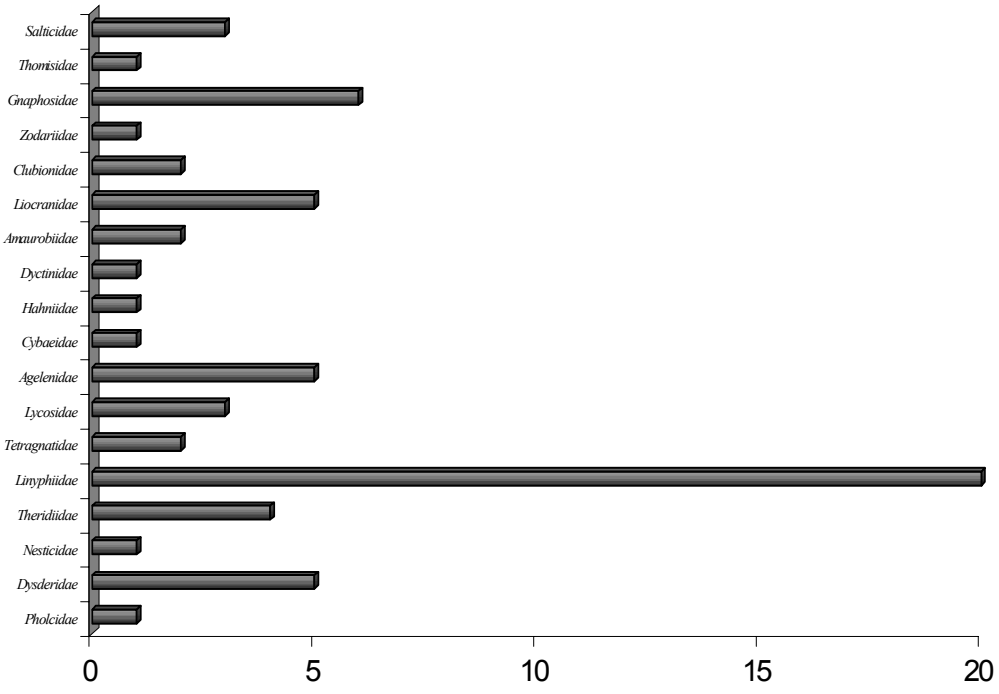

Fig. 2. – The distribution of species per families.

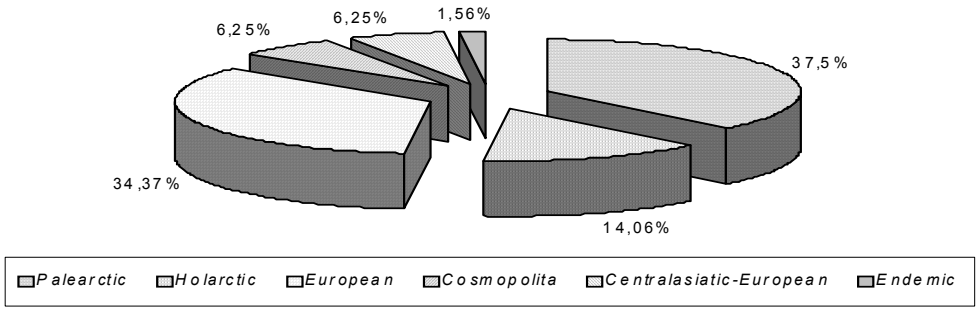

Fig. 3. – Percentages of chorological types (Spiders species) in the Aninei Mountains.

We identified one single endemic species (representing 1.56% from the total of species) *Troglohyphantes herculanum*, collected from the caves: Popovăț Cave, Comarnic Cave and Peştera din Valea Seacă Cave.

The value of the *Shannon* diversity index calculated for the Caraşului Gorges is ***H'= 2.2247*** (E = 0.264) (for 35 species and 317 individuals). This index was also calculated for every season (see Table 2).

Table 2

The value of Shannon–Wiener diversity index

Season	Shanon–Wiener (H')	Uniformity index (E)	Species number	Individuals number
Spring	2.2027	0.506	15	65
Summer	2.0481	0.287	27	200
Autumn	1.4781	0.626	7	45
Winter	1.3518	0.966	4	7
Total	2.2247	0.264	35	317

The relative abundance and the frequence calculated for every species (from Caraşului Gorges) are given in Table 3. The percentage of the relative abundances could be transposed in six relative classes illustrating the dominant species – *Apostenus fuscus* and co-dominant species *Leptyphantes leprosus* and *Dysdera crocata* (Fig. 4). The occurrence of species decreases with depth from –0.5 meters (29 species) to –1 meter (1 species) (Fig. 5).

Table 3

The relative abundance (A%) and frequence (F%) for 35 species of Araneae (Caraşului Gorges)

Caraşului Gorges	A%	F%
Pholcidae		
1. Pholcus opilionoides (Schranck, 1871)	0.315	0.709
Dysderidae		
2. Dysdera crocata C.L. Koch, 1833	16.088	12.056
3. Dysdera longirostris Doblika, 1853	0.315	0.709

Caraşului Gorges	A%	F%
4. Dysdera ninnii Canestrini, 1868	1.577	3.546
5. Harpactea saeva Herman, 1879	1.261	2.127
Nesticidae		
6. Nesticus celullanus (Clark, 1757)	9.148	13.475
Theridiidae		
7. Episinus truncatus Latreille, 1809	0.315	0.709
Linyphiidae		
8. Pholcomma gibbum (Westring, 1851)	0.946	2.127
9. Centromerus incilium (L.Koch, 1881)	0.315	0.709
10. Diplostyla concolor (Wider, 1834)	0.63	1.418
11. Leptyphantes leprosus (Ohlert, 1865)	14.826	17.021
12. Microneta viaria (Blackwall, 1841)	1.261	2.127
13. Palliduphantes istrianus (Kulczinski, 1914)	1.261	0.709
14. Pelecopsis elongata (Wider, 1834)	0.315	0.709
15. Pelecopsis radicicola (L.Koch, 1872)	0.315	0.709
16. Porrhomma pallidum Jackson, 1913	0.315	0.709
Lycosidae		
17. Pardosa agricola (Thorell, 1856)	0.315	0.709
18. Pardosa morosa (L.Koch, 1870)	0.63	0.709
Agelenidae		
19.Agelena labyrinthica (Clerck, 1757)	0.315	0.709
20.Tegenaria silvestris L.Koch, 1872	5.362	7.092
Liocranidae		
21. Apostenus fuscus (Westring, 1851)	35.962	15.602
Clubionidae		
22. Clubiona genevensis L. Koch, 1866	0.315	0.709
23. Clubiona phragmitis C.L. Koch, 1843	0.315	0.709
Corinnidae		
24. Phrurolithus festivus (C.L. Koch, 1866)	1.261	2.127
25. Phrurolithus minimus (C.L. Koch, 1839)	1.892	2.836
26. Phrurolithus nigrinus (Simon, 1878)	0.315	0.709
27. Phrurolithus pullatus Kulczynski, 1897	0.315	0.709
Zodariidae		
28. Zodarion germanicum (C.L. Koch, 1837)	0.63	0.709
Gnaphosidae		
29. Drassodes lapidosus (Walkenaer, 1802)	0.946	2.127
30. Drassyllus pusillus (C.L. Koch, 1833)	0.63	1.418
31. Zelotes apricorum (L. Koch, 1876)	0.315	0.709
32. Zelotes subterraneus (C.L. Koch, 1833)	0.315	0.709
Salticidae		
33. Euophrys frontalis (Walckenaer, 1802)	0.315	0.709
34. Neon reticulatus (Blackwall, 1853)	0.315	0.709
35. Sitticus floricola (C.L. Koch, 1837)	0.315	0.709

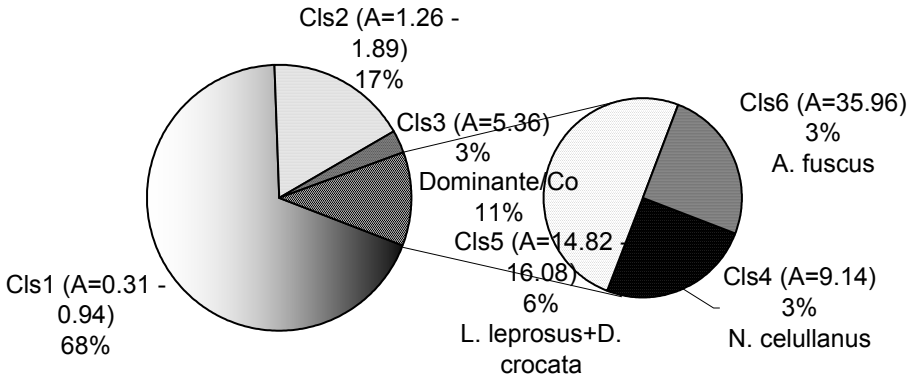

Fig. 4. – The relative abundance of 35 species of Aranea from Cheile Caraşului transposed on an estimated scale of 6 classes.

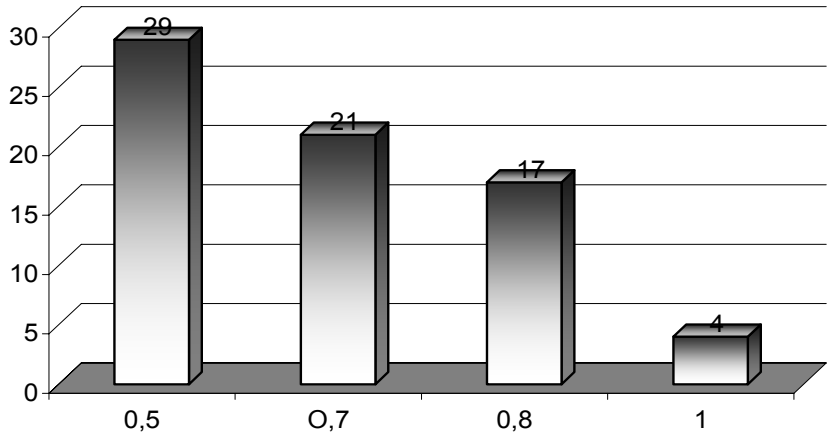

Fig. 5. – Distribution of the Araneae species in M.S.S. by depth.

4. CONCLUSIONS

We identified 64 species belonging to 18 families. Among them, 21 species are for the first time recorded in the studied area. The chorological analysis shows the dominance of the Palearctic species, followed by the European and Holarctic species.

The values of Relative Abundance (A%) and the Frequence (F%) indicate that the dominant/codominant species are represented by *Apostenus fuscus* (A = 35.96%, F = 15.6%), followed by *Dysdera crocata* (A = 16.08%, F = 12.5%), *Lepthyphantes leprosus* (A = 14.82%, f = 17.02%) and *Nesticus cellulanus* (A = 9.14%, F = 12.47%). We could also observe that the number of Araneae species decreases in depth.

It is worth mentioning that for the M.S.S. the values of the Shannon–Wiener diversity index decrease from spring to winter, while the uniformity index has the greatest values in the hibernal season. This could suggest that in the winter period only those species that use the M.S.S. as a hibernal shelter were found. The small value of the uniformity index during summer (E = 0.287) associated with smaller values of H' than in spring time could be a result of the epigaeic aestival activity of most species from the area.

ACKNOWLEDGEMENTS. The results were obtained with the financial support offered by C.N.C.S.I.S., Grant – Superficial Subterranean Environment Biodiversity from National Park Semenic – Caraşului Gorges; code CNCSIS 449, contracts 34–394/ 16 .07 .2003 and 33049/ 24.06.2004. We are grateful to Dr. Victoria Ilie for the description of the collecting localities, to Dr. Maria Georgescu for verifying the identification of spiders, and Dumitrache Ioana for the valuable suggestions.

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