

FAUNA OF ORIBATID MITES (ACARI, ORIBATIDA) FROM THE MOVILE CAVE AREA (DOBROGEA, ROMANIA)

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Abstract. The paper discusses the results of the investigations performed on the oribatid fauna collected from the Movile Cave area. 35 species, belonging to 25 genera and 17 families have been identified; among them 2 genera and 6 species are new for the Romanian fauna. The taxonomic and zoogeographical spectrum of the fauna was analyzed, as well as the occurrence of the species depending on depth.

Key words: fauna, oribatid mites, Movile Cave.

1. INTRODUCTION

In terrestrial ecosystems the oribatids represent one of the main groups of edaphic mesofauna, due to their species and individuals number, as well. Out of the soil, these mites populate varied other habitats, being actively involved in the decomposition processes of the organic matter.

The fauna of caves drew the attention of many acarologists; in Europe, a long series of studies (WILLMANN, 1935, 1941; KUNST, 1962; PÉREZ-IÑIGO, 1969, 1976; BERNINI, 1980; ARILLO *et al.*, 1994 etc.) should be mentioned in this field. Certain new taxa have been described from the caves, some of them being not found again up to now, in other places or habitats. That is just a reason of the topical interest for the cavernicolous fauna.

Comparatively, the oribatid fauna of Romanian caves was less investigated. Thus, COOREMAN (1951) described two new taxa (a species and a subspecies) collected from Transylvanian caves. In the next decade, two papers (DUMITRESCU *et al.*, 1967, 1969) include mentions regarding 39 oribatid species identified from caves, in lapidicolous habitats. No recent publications to be noticed, therefore the present paper could mean a new beginning in this particularly interesting research area.

2. MATERIAL AND METHODS

The faunistic material for this study was collected by the research team from the Institute of Speology in Bucharest, between 1992 and 2000, in the context of some ample researches developed in the Movile Cave area. This karstic region is situated in the Southern Plateau of Dobrogea, near Mangalia, few kilometers far from the Black Sea coast.

Most of the faunistic material was collected from two drillings, namely “doline drilling” (I), measuring 22.5 m in depth, and “cave drilling” (II) – of 24 m depth, this one penetrating a pillar of the cave. In these drillings were placed perforated tubes of 12 cm diameter and, at each 3 m in depth – traps with olfactory attractant. The samples were collected periodically. Other samples came from the depressions named “obane”, in this case fauna being extracted by washing the soil sample; these samples are noted as “other soil samples” (Table 1). More details regarding the sampling area and the drillings are given in other papers devoted to the Movile Cave (NITZU, 1997).

The faunistic synopsis includes the list of recorded taxa, world distribution of each species, the distribution on Romanian territory, and a brief autecological diagnosis, if possibly. The genera and species recorded for the first time in Romanian fauna are marked with*, while ** point out the new species (one of them being in press, other two – in preparation).

3. RESULTS

The faunistic material under analysis comprises 349 specimens (35 identified species, belonging to 25 genera and 17 families of the order Oribatida Dugès, 1834). On the whole fauna, the primitive oribatids represent 17.14%, the superior, picnonotic ones – 48.57%, and the poronotic oribatids – 34.28%. In the taxonomic spectrum the best represented families are: *Oppiidae* (5 genera, 8 species), *Ceratozetidae* (2 genera, 3 species), and *Schelorbitidae* (1 genus, 4 species) (see the faunistic synopsis).

The zoogeographical analysis shows that the European elements are the most numerous (40% of the total number of species), followed by the Palaearctic ones (28.6%), cosmopolitan and semi-cosmopolitan (20%) and by Holarctic species (2.9%). As far as concerns the ecological spectrum of the oribatid fauna, the important weight of the thermo-xerophilous species, and of the eurytopic ones, can be observed.

Faunistic synopsis of the oribatid mites (*Acari, Oribatida*)

Fam. *Epilohmanniidae* Oudemans, 1923

Epilohmannia Berlese, 1910

-*E. gigantea* Berlese, 1916*

World distribution: S Europe

Romanian distribution -

Fam. *Lohmanniidae* Berlese, 1916

Lohmannia (*Lohmannia*) Michael, 1898

-*L. (L.) turcmunica* Bulanova-Zachvatkina, 1960

World distribution: S Palaearctic, Argentina
Romanian distribution: Dobrogea; rare, thermo-xerophilous species
Papillacarus Kunst, 1959*
-*P. ondriasi* Mahunka, 1974*
World distribution: Greece, SE China
Romanian distribution -

Fam. Euphthiracaridae Jacot, 1930

Acrotritia Jacot, 1923
-*A. hyeroglyphica* (Berlese, 1916)*
World distribution: semi-cosmopolitan
Romanian distribution -

Fam. Nothridae Berlese, 1896

Nothrus Koch, 1836
-*N. anauniensis* Canestrini et Fanzago, 1876
World distribution: cosmopolitan
Romanian distribution: eurytopic, widely distributed species (recorded as *N. biciliatus* Koch, 1841)

Fam. Camisiidae Oudemans, 1900

Camisia (*Camisia*) Heyden, 1826
-*C. (C.) horrida* (Hermann, 1804)
World distribution: Holarctic
Romanian distribution: sylvicolous, widely distributed species

Fam. Hermanniellidae Grandjean, 1934

Hermanniella Berlese, 1908
-*H. multipora* Sitnikova, 1973*
World distribution: Palaearctic
Romanian distribution -
-*H. cf. dolosa* Grandjean, 1931
World distribution: Palaearctic
Romanian distribution: sylvicolous, widely distributed species

Fam. Damaeidae Berlese, 1896

Metabelba (*Metabelba*) Grandjean, 1936
-*M. (M.) pulverosa* Strenzke, 1953*
World distribution: Europe
Romanian distribution -

Metabelbella (Metabelbella) Bulanova-Zachvatkina, 1957

-*M. (M.) macerochaeta* Bulanova-Zachvatkina, 1965

World distribution: SE Europe

Romanian distribution: sylvicolous, not common species

Fam. Liacaridae Sellnick, 1928

Liacarus (Liacarus) Michael, 1898

-*L. (L.) coracinus* (Koch, 1841)

World distribution: Palaearctic

Romanian distribution: eurytopic, widely distributed species

Liacarus (Dorycranosus) Woolley, 1969

-*L. (D.) punctulatus* Mihelčič, 1956

World distribution: S Europe

Romanian distribution: lawn species, recorded in southern and eastern regions

Fam. Ctenobelbidae Grandjean, 1965

Ctenobelba Balogh, 1943

-*C. brevipilosa* Mahunka, 1964*

World distribution: Ponto-Mediterranean

Romanian distribution -

Fam. Amerobelbidae Grandjean, 1954

Amerobelba Berlese, 1908

-*A. decedens* Berlese, 1908

World distribution: Mediterranean

Romanian distribution: sylvicolous, not common species

Mongaillardia Grandjean, 1961

-*M. grandjeani* Calugar et Vasiliu, 1984

World distribution: Dobrogea (Romania)

Romanian distribution: Constanta county; rare species

Fam. Oppiidae Sellnick, 1937

Lasiobelba (Lasiobelba) Aoki, 1959*

-*Lasiobelba (L.)* sp.**

Oppia Koch, 1836

-*O. denticulata* (G. et R. Canestrini, 1882)

World distribution: Palaearctic, Antilles

Romanian distribution: relatively wide distribution, more frequent in the southern region; thermo-xerophilous species (recorded as *O. concolor* Koch, 1840)

Multioppia (Multioppia) Hammer, 1961

-*M. (M.) glabra* (Mihelčič, 1955)

World distribution: SE Europe, E Siberia

Romanian distribution: sylvicolous species, recorded mainly in the eastern region

-*M. (M.) callatisiana* Vasiliu et Ivan (in press)**

Romanian distribution: Movile Cave

Ramusella (Insculptoppia) Subias, 1980

-*R. (I.) anuncata* Subias et Rodriguez, 1986

World distribution: W Mediterranean

Romanian distribution: only one record (unpublished data)

Ramusella (Rectoppia) Subias, 1980

-*R. (R.) fasciata* (Paoli, 1908)

World distribution: semi-cosmopolitan

Romanian distribution: only two records (unpublished data)

Medioppia Subias et Minguez, 1985

-*M. obsoleta* (Paoli, 1908)

World distribution: Palaearctic, Greenland, New Zealand, Hawaii

Romanian distribution: eurytopic, widely distributed species

-*Medioppia* sp.**

Fam. Phenopelopidae Petrunkevitch, 1955

Eupelops Ewing, 1917

-*E. halophilus* Pérez-Iñigo, 1969

World distribution: S Europe

Romanian distribution: few records in DDBR (Tulcea county)

Fam. Ceratozetidae Jacot, 1925

Ceratozetes (Ceratozetes) Berlese, 1908

-*C. (C.) gracilis* (Michael, 1884)

World distribution: cosmopolitan

Romanian distribution: eurytopic (mostly recorded in forests), widely distributed species

-*C. (C.) ovidianus* Vasiliu et Calugar, 1981

World distribution: Dobrogea (Romania)

Romanian distribution: Constanta county

Zetomimus (Protozetomimus) Pérez-Iñigo, 1990

-*Z. (P.) acutirostris* (Mihelčič, 1957)

World distribution: S Europe

Romanian distribution: lawn species, recorded in the eastern region

Fam. *Punctoribatidae* Thor, 1937

Punctoribates Berlese, 1908

-*P. ghilarovi* Shaldybina, 1969*

World distribution: E Europe

Romanian distribution -

Fam. *Oribatulidae* Thor, 1929

Oribatula (Zygoribatula) Berlese, 1916

-*O. (Z.) exarata* Berlese, 1916

World distribution: S Palaearctic

Romanian distribution: rare species, few records in Dobrogea

Fam. *Scheloribatidae* Jacot, 1935

Scheloribates (Scheloribates) Berlese, 1908

-*S. (S.) barbatulus* Mihelčič, 1956

World distribution: S Palaearctic

Romanian distribution: few records in the north-eastern part of the country; probably, a thermo-xerophilous, lawn species

-*S. (S.) laevigatus* (Koch, 1835)

World distribution: semi-cosmopolitan

Romanian distribution: eurytopic, widely distributed species

-*S. (S.) labyrinthicus* Jeleva, 1962

World distribution: SE Europe

Romanian distribution: south and eastern regions; eurytopic, lawn species

-*S. (S.) xylobatoides* Mahunka, 1977

World distribution: Greece

Romanian distribution: very rare species; only one record, near Slatina (Olt county)

Fam. *Protoribatidae* J. et P. Balogh, 1984

Protoribates (Protoribates) Berlese, 1908

-*P. (P.) capucinus* Berlese, 1908

World distribution: cosmopolitan

Romanian distribution: eurytopic, widely distributed species

Protoribates (Triaungius) Kulijev, 1978

-*P. (T.) obtusus* (Mihelčič, 1956)

World distribution: S Palaearctic

Romanian distribution: few records in the south and eastern regions; thermo-xerophilous, lawn species.

Table 1

Abundance of the oribatid species in the main types of samples

Species	a/ r.a.	doline drilling (I)	cave drilling (II)	other soil samples	
				deep samples	surface samples
<i>Epilohmannia gigantea</i>	13/3.72	–	9	–	4
<i>Lohmannia (L.) turcmenica</i>	2/0.57	–	–	–	2
<i>Papillacarus ondriasi</i>	3/0.86	–	3	–	–
<i>Acrotritia hyeroglyphica</i>	57/16.33	–	49	1	7
<i>Nothrus anauniensis</i>	4/1.14	–	4	–	–
<i>Camisia (C.) horrida</i>	1/0.28	–	–	–	–
<i>Hermanniella multipora</i>	13/3.72	–	13	–	–
<i>Hermanniella cf. dolosa</i>	4/1.14	1	3	–	–
<i>Metabelba (M.) pulverosa</i>	5/1.43	–	5	–	–
<i>Metabelbella (M.) macerochaeta</i>	7/2	–	7	–	–
<i>Liacarus (L.) coracinus</i>	3/0.86	2	–	–	1
<i>Liacarus (D.) punctulatus</i>	5/1.43	2	1	–	2
<i>Ctenobelba brevopilosa</i>	1/0.28	–	–	–	1
<i>Amerobelba decedens</i>	5/1.43	1	4	–	–
<i>Mongaiillardia grandjeani</i>	4/1.14	1	–	–	3
<i>Lasiobelba (L.) sp.</i>	8/2.29	–	8	–	–
<i>Oppia denticulata</i>	21/6.02	–	10	–	11
<i>Multioppia (M.) glabra</i>	9/2.57	–	9	–	–
<i>Multioppia (M.) callatisiana</i>	10/2.86	–	10	–	–
<i>Ramusella (I.) anuncata</i>	1/0.28	–	1	–	–
<i>Ramusella (R.) fasciata</i>	1/0.28	–	–	1	–
<i>Medioppia obsoleta</i>	7/2	–	7	–	–
<i>Medioppia sp.</i>	44/12.6	–	18	25	1
<i>Eupelops halophilus</i>	1/0.28	–	–	–	1
<i>Ceratozetes (C.) gracilis</i>	92/26.36	27	65	–	–
<i>Ceratozetes (C.) ovidianus</i>	2/0.57	1	1	–	–
<i>Zetomimus (P.) acutirostris</i>	1/0.28	1	–	–	–
<i>Punctoribates ghilarovi</i>	1/0.28	–	1	–	–
<i>Oribatula (Z.) exarata</i>	1/0.28	–	–	1	–
<i>Scheloribates (S.) barbatulus</i>	1/0.28	1	–	–	–
<i>Scheloribates (S.) labyrinthicus</i>	6/1.72	3	–	–	3
<i>Scheloribates (S.) laevigatus</i>	1/0.28	–	1	–	–
<i>Scheloribates (S.) xylobatoides</i>	1/0.28	1	–	–	–
<i>Protoribates (P.) capucinus</i>	3/0.86	–	3	–	–
<i>Protoribates (T.) obtusus</i>	13/3.72	3	9	–	1

Legend: a–abundance (individuals); r.a.–relative abundance (%)

In the Table 1 is presented the abundance (as absolute value) of each species in the main types of samples, and also the relative abundance (percents). It can observe that the most specimens have been collected from the cave drilling, while the fauna collected in the doline drilling was comparatively scarce, both as individuals and species number.

Only a few species were found in both the drillings (*Ceratozetes gracilis*, *Protoribates (T.) obtusus*, *Liacarus (D.) punctulatus*, *Amerobelba decedens*), while most species came from the cave drilling. It is also remarkable that some species have been found both in drillings and in the surface samples (*Oppia denticulata*, *Scheloribates labyrinthicus*, *Liacarus (D.) punctulatus*, *Epilohmannia gigantea*, *Mongaillardia grandjeani*), other ones were identified only in the surface samples (*Lohmannia turcmenica*, *Eupelops halophilus*, *Ctenobelba brevopilosa*), and certain species – exclusively in drillings. Within the last group of species *Papillacarus ondriasi*, *Hermanniella multipora*, *Multioppia callatisiana*, *Lasiobelba* sp. should be mentioned.

The most abundant species are: *Ceratozetes gracilis*, *Acrotritia hyeroglyphica*, *Medioppia* sp., *Oppia denticulata*, *Protoribates (T.) obtusus*, *Epilohmannia gigantea*, *Hermanniella multipora*, *Multioppia callatisiana*, *Multioppia glabra*, *Lasiobelba* sp., whose relative abundance is over 2%.

As regards the occurrence of the oribatid species at different depths of the drillings (Table 2), it can observe that only one species has been collected constantly, namely *Acrotritia hyeroglyphica*, but it was more abundant at –1 –3m. Other species have been collected at different levels, including the depths of –16 or –18m, such as *Hermanniella multipora* or some oppiid species (*Multioppia glabra*, *Medioppia obsoleta*, *Lasiobelba* sp., *Medioppia* sp.). Finally, other species, as the large size oppiids (*Oppia denticulata*, *Multioppia callatisiana*), *Epilohmannia gigantea*, *Amerobelba decedens*, *Protoribates (T.) obtusus*, and even *Ceratozetes (C.) gracilis* (the most abundant species) were not found below –10m.

Table 2

Occurrence of the oribatid species according to depth (m)

Species	drillings	-1 -3	-4 -6	-8 -9	-10 -12	-14 -16	-18 -19
<i>Epilohmannia gigantea</i>	I	–	–	–	–	–	–
	II	++	–	+	–	–	–
<i>Papillacarus ondriasi</i>	I	–	–	–	–	–	–
	II	+	+	–	–	–	–
<i>Acrotritia hyeroglyphica</i>	I	–	–	–	–	–	–
	II	+++	+	+	+	+	+
<i>Nothrus anauniensis</i>	I	–	–	–	–	–	–
	II	+	–	–	+	+	–
<i>Camisia (C.) horrida</i>	I	–	–	–	–	–	–
	II	+	–	–	–	–	–
<i>Hermanniella multipora</i>	I	–	–	–	–	–	–
	II	+	–	–	+	++	–
<i>Hermanniella cf. dolosa</i>	I	–	–	–	+	–	–
	II	+	–	–	–	+	–

Table 2 (continued)

<i>Metabelba (M.) pulverosa</i>	I	-	-	-	-	-	-
	II	+	-	-	-	-	-
<i>Metabelbella (M.) macerochaeta</i>	I	-	-	-	-	-	-
	II	-	++	-	-	-	-
<i>Li acarus (L.) coracinus</i>	I	+	-	-	-	-	-
	II	-	-	-	-	-	-
<i>Li acarus (D.) punctulatus</i>	I	-	+	-	-	+	-
	II	-	-	-	-	+	-
<i>Amerobelba decedens</i>	I	+	-	-	-	-	-
	II	+	+	+	-	-	-
<i>Mongaillardia grandjeani</i>	I	+	-	-	-	-	-
	II	-	-	-	-	-	-
<i>Lasiobelba (L.) sp.</i>	I	-	-	-	-	-	-
	II	+	-	-	-	+	+
<i>Oppia denticulata</i>	I	-	-	-	-	-	-
	II	+	+	+	-	-	-
<i>Multioppia (M.) glabra</i>	I	-	-	-	-	-	-
	II	-	++	+	-	-	+
<i>Multioppia (M.) callatisiana</i>	I	-	-	-	-	-	-
	II	+	+	+	-	-	-
<i>Ramusella (I.) anuncata</i>	I	-	-	-	-	-	-
	II	+	-	-	-	-	-
<i>Medioppia obsoleta</i>	I	-	-	-	-	-	-
	II	+	+	-	-	+	-
<i>Medioppia sp.</i>	I	-	-	-	-	-	-
	II	++	+	-	-	-	+
<i>Ceratozetes (C.) gracilis</i>	I	+++	+	+	-	-	-
	II	+++	++	+	++	-	-
<i>Ceratozetes (C.) ovidianus</i>	I	+	-	-	-	-	-
	II	+	-	-	-	-	-
<i>Zetomimus (P.) acutirostris</i>	I	-	+	-	-	-	-
	II	-	-	-	-	-	-
<i>Punctoribates ghilarovi</i>	I	-	-	-	-	-	-
	II	-	-	-	-	+	-
<i>Scheloribates (S.) barbatulus</i>	I	-	-	-	-	-	-
	II	-	+	-	-	-	-
<i>Scheloribates (S.) labyrinthicus</i>	I	-	+	-	-	-	-
	II	-	-	-	-	-	-
<i>Scheloribates (S.) laevigatus</i>	I	-	-	-	-	-	-
	II	+	-	-	-	-	-
<i>Scheloribates (S.) xylobatoides</i>	I	+	-	-	-	-	-
	II	-	-	-	-	-	-
<i>Protoribates (P.) capucinus</i>	I	-	-	-	-	-	-
	II	+	+	-	-	-	-
<i>Protoribates (T.) obtusus</i>	I	+	-	-	-	-	-
	II	++	+	+	-	-	-

Legend: + 1–5 specimens; ++ 6–20 specimens; more than 20 specimens; I–doline drilling; II–cave drilling.

4. DISCUSSION

The oribatid fauna collected from the Movile Cave area comprises a relatively low number of taxa, if considering the long period to collect it, and also the large diversity of this group. Nevertheless, the analyzed material includes in a high proportion new recorded taxa in the Romanian fauna, namely the genera *Papillacarus* and *Lasiobelba*, and 6 species: *Epilohmannia gigantea*, *Papillacarus ondriasi*, *Acrotritia hyeroglyphica*, *Hermanniella multipora*, *Ctenobelba brevopilosa* and *Punctoribates ghilarovi* (VASILIU *et al.*, 1993). Beside them, 3 new species were identified and described, namely *Multioppia callatisiana*, *Lasiobelba* sp. and *Medioppia* sp.; the first species has been included already in a paper (VASILIU et IVAN, in press), the last ones being in preparation to be published.

The faunistic analysis points out that the picnonotic oribatids represent the dominant major group, both as species and individuals number; this fact is a characteristic of sylvicolous communities (AOKI, 1983). From zoogeographical point of view, is remarkable the high proportion of the species with southern areal (South and South-Eastern European, Mediterranean, Ponto-Mediterranean, Southern Palaearctic) (SUBIAS, 2004, MAHUNKA et MAHUNKA-PAPP, 2004, WEIGMANN, 2006), which represent almost 1/2 of the total number. If considering their distribution in Romania, 5 species in the list have been recorded only in Dobrogea, and other 5 – mostly in south and south-eastern parts of the country (VASILIU *et al.*, 1993, 1994, IVAN, 2006, IVAN et VASILIU, 2008). All these data point out the natural relation between the oribatid fauna from Movile Cave area and those of the Southern Dobrogea – as it has been investigated up to now.

It is difficult to specify what species of the faunistic list are troglobiontic or troglopyllic elements. Nevertheless, some of the species which have been collected only from the drillings (not in the surface samples), and have not been recorded already in this zone, should be considered in this respect; it is the case of *Papillacarus ondriasi*, *Hermanniella multipora*, *Multioppia callatisiana* and *Lasiobelba* sp. Also, is hard to consider that all the species really live at a certain depth, as mentioned in “Results”. Further intensive investigations of the edaphic oribatid fauna in the southern Dobrogea, and in Movile Cave, too, could elucidate some of these questions.

5. CONCLUSIONS

The oribatid fauna from the Movile Cave area is obviously related to the fauna of Southern Dobrogea, but it comprises some unrecorded taxa – 2 genera and 6 species new for the Romanian fauna, beside of 3 new species – already described or in preparation. Considering the results of this study, further detailed researches are needed, with a view to explain some ecological and zoogeographical aspects concerning certain species.

ACKNOWLEDGEMENTS. Special thanks of the authors are due to all the researchers from the “Emil Racovita” Institute of Speology in Bucharest – involved in the field investigations and fauna collecting in the Movile Cave area – and, especially to Dr. Vasilica Iavorschi and Dr. Vasile Decu, who gave us this valuable material.

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