MESONISCUS GRANIGER DRAGANI N. SSP. FROM THE CAVES OF VALEA SIGHIŞTELULUI AND VALEA CRĂIASA. THE GRANULATION AT *MESONISCUS GRANIGER*

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Jusqu'à present, on connaissait deux sous-espèces de *Mesoniscus graniger* en Roumanie: *Mesoniscus graniger graniger* (Frivaldsky, 1865) et *Mesoniscus graniger moldavicus* Radu, 1977. Notre travail présente une nouvelle sous-espèce, *Mesoniscus graniger dragani*, et les caractères de la granulation tergale dans le genre *Mesoniscus*.

1. INTRODUCTION

In their revision of the family Mesoniscidae, Gruner and Tabacaru (1963) argue that the genus *Mesoniscus* has only two species: *Mesoniscus alpicola* (Heller, 1858) and *Mesoniscus graniger* (Frivaldsky, 1865). All individuals collected in Romania belong to *M. graniger*. Also, untill now, there were only two subspecies of *Mesoniscus graniger* recorded in Romania: *Mesoniscus graniger graniger* (Frivaldsky, 1865) and *Mesoniscus graniger moldavicus* Radu, 1977. The two subspecies described by Chappuis (1944) from Romania, *M. alpicola vulgaris* and *M.alpicola meridionalis* are, in fact, synonymous with *Mesoniscus graniger graniger*.

In the same revision, Gruner şi Tabacaru show: "Verschiedene Exemplare aus dem Bihargebirge (Fundorte 20–24), erreichten jedoch 12 bis 13 mm Länge. Die sehr grossen Tiere fallen auch dadurch auf, dass sie auf den Tergiten zahlreichere aber kleinere Höckeren tragen als die kleineren Individuen" (Some individuals from the Bihor Mountains (localities 20–24: caves from Valea Sighiştelului – our note) reach a length of 12–13 mm. These bigger animals are characterized by the presence on the tergites of more rows of smaller tubercles than the tubercles found at animals of smaller sizes (from other localities – our note).

Taking into account this observation, we analysed in detail this population and we have found out that both characters investigated (the size and the granulation) are constant and significative characters that enable us to establish a new subspecies: *Mesoniscus graniger dragani* (the subspecies is named after Andrei Drăgan, a friend of the author) for the populations from Valea Sighiştelului and Huda de la Chişcau.

2. MATERIAL AND METHODS

In order to argue this subspecies and also to study the granulation at *Mesoniscus graniger*, we used material from the following caves (peştera = cave): Peştera Huda de

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la Chişcău (1 male, 6 females, 2-8.11.1964, leg. C. Pleşa), Peştera Drăcoaia (2 males, 3 females, 5.09.2000, leg. A. Giurginca), Peştera Pişolca (2 males, 2 females, 23.05.1968, leg. A. Burghele), Peştera Măgura (2 males, 4 females, 1 juv., 2 manca stadium 2, 22.05.1968, leg. A. Burghele), Peştera Corbasca (1 male, 4 females, 13.07.1969, leg. I. Tabacaru, D. Danielopol, D. Zincenco), Peştera Săncuţa (2 males, 2 females, 1.02.2003, leg. S. Iepure), Peştera Meziad (2 males, 2 females, 1 juv., 1 manca stadium 2,10.07.1969, leg. I. Tabacaru, D. Danielopol, D. Zincenco, I. Juvara), Peştera Mare de la Mereşti (2 males, 4 females, 2 juv., leg. A. Giurginca), Peştera Gaura Turcului (2 males, 1 female, 2 manca stadium 1, 17.07.2002, leg. V. Ilie), Peştera Gaura Pârşului (1 male, 1 female, 7.07.2002, leg. V. Ilie), Peştera Popovăţ (4 females, 1 manca stadium 2, 16.07.2003, leg. V. Ilie). In all, 30 individuals belonging to the subspecies *Mesoniscus graniger graniger* (Frivaldsky, 1865) and 30 individuals belonging to our subspecies, *Mesoniscus graniger dragani*. For the comparison with *Mesoniscus alpicola*, we used 1 male, 2 females from Austria (NË Grabenweggraben, 3km west – Pottenstein Church, approx. 370m; Höhenberg – N Fuss, 6.11.1999, leg. J.Gruber).

At each individual, we numbered the granules from the cephalon, the pereionites, the pleon and the pleotelson with the aid of an Olympus B061, SZ-PT.

3. RESULTS AND DISCUSSIONS

Concerning the size, we noticed that adult males of *Mesoniscus graniger dragani* reach a length of 8–8.2 mm, the females a length of 8–8.5 mm while adult males of *Mesoniscus graniger graniger* reach a length of only 6.5–7 mm and the females only 7–7.5 mm, so the individuals from Valea Sighiştelului and Huda de la Chişcau are bigger than the individuals from other populations.

At both subspecies, the body is covered by numerous granules with an irregular disposition on the cephalon, while on the pereion and the pleon they form more or less regular rows.

At both *Mesoniscus graniger graniger* and *Mesoniscus graniger dragani*, there is a continuous row of granules along the frontal line, the occipital furrow and along the entire outline of the cephalon (in dorsal view); as a matter of fact, this is the sole regular row of granules from the head. Also, we noticed at both subspecies, two granules placed exactly in the center of the frontal line and very close to one another. However, there is a clear difference regarding the number of the granules at the two subspecies: at *Mesoniscus graniger dragani*, the cephalon presents twice as many granules than the cephalon of *Mesoniscus graniger* (see Fig. 1).

At this subspecies, the granulation from the pereionites forms regular, transversal rows. Of contrary, at *Mesoniscus graniger dragani*, the rows of granules from the

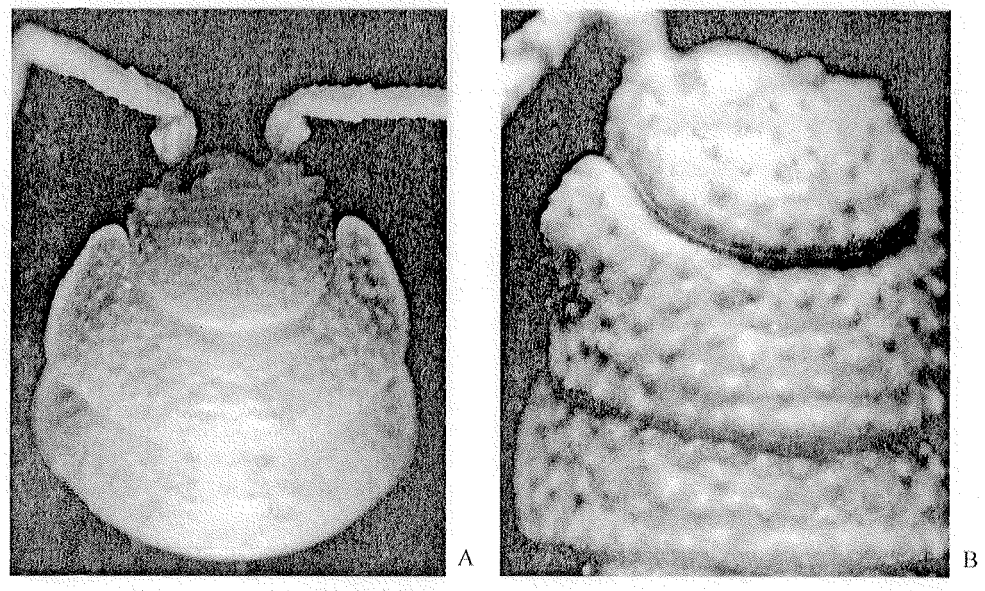

Fig. 1 – The cephalon and the first two pereionites at *M. g. dragani* (A) and *M. g. graniger* (B).

pereionites are very irregular and tend to entwine making difficult the numbering of the granules: for this reason, we chose to compare only the number of granulations from the posterior edge of each pereionite as this row is clearly defined even at very young individuals, allowing very accurate comparisons. In the following discussions, we shall refer strictly at the number of granules from the posterior edge of each pereionite as this row is clearly defined even at very young individuals, allowing very accurate comparisons. In the following discussions, we shall refer strictly to the number of granules from the posterior edge of each body segment (Fig. 2, A and B).

Typically, the adults of *Mesoniscus graniger graniger* present between 56 and 70 granules on the cephalon. The pereionite I has 5 rows of granules, while the pereionites II, III, IV, V, VI and VII have only 3 rows of granules. The pleonites present only one row of granules placed on the posterior edge of each pleonite. A second row on the pleonite 4 is sketched at a few exemplaries from Peştera Mare de la Mereşti, Peştera Popovăț and Peştera Săncuța: here, we noticed 2–3 granules placed toward the edges of the pleonite but they do not form a true row.

The rows of granules vary according with the age and the size of the animals. Table 1 (that presents this variation) does not include manca 1 (animals with a size of 1.5 mm with 6 pereional segments and 6 pereiopodes) as at this stage there is no granulation at all; at manca 1, only the microsculpture resembling a net of scales, is visible.

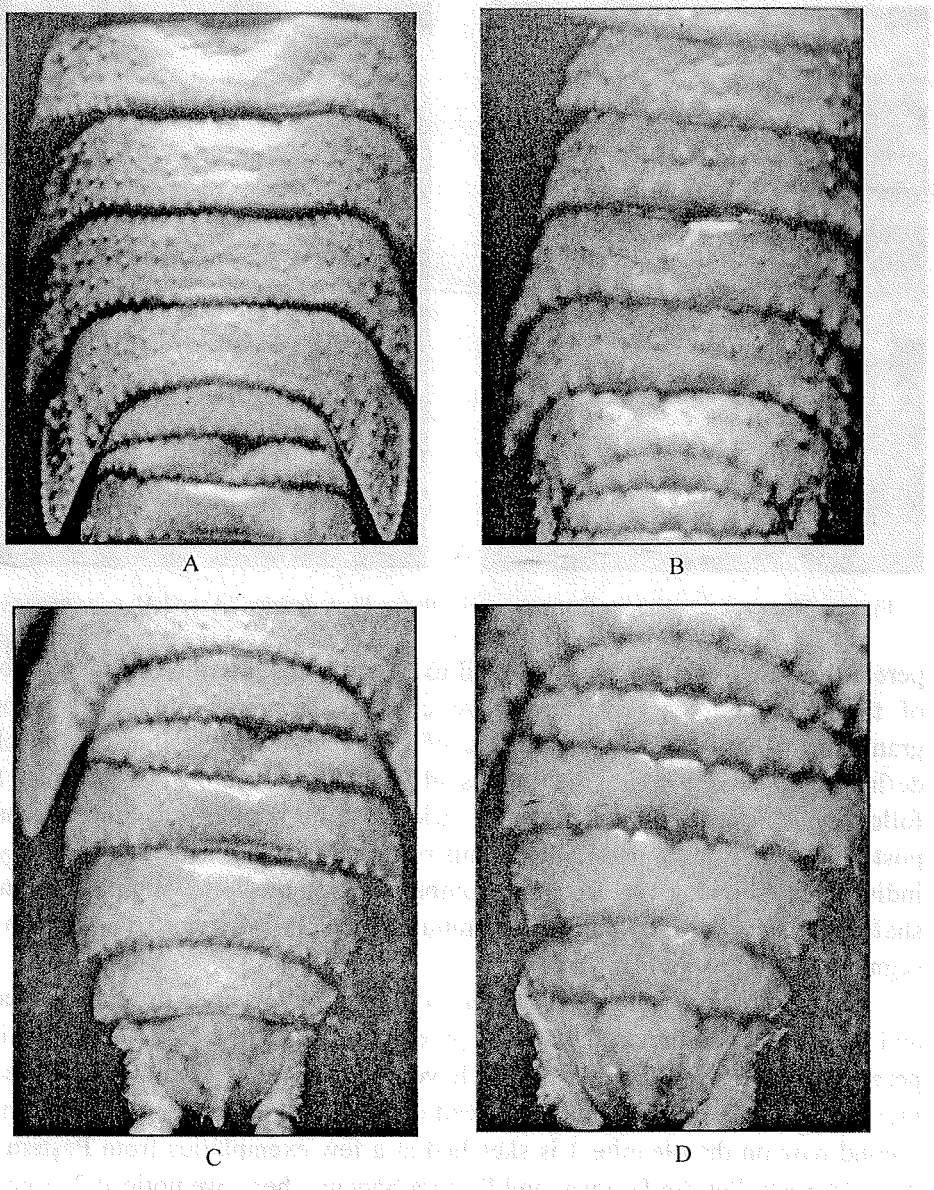

Fig. 2 – The pereionites and pleonites at *M. g. dragani* (A and C) and *M. g. graniger* (B and D).

The granulation appears on all segments only beginning with manca 2 (animals with a size of 2.5 mm with 7 pereional segments and 7 pereiopodes, but with an incompletely developed and non-functional pereiopode 7); from this stage the granulation has a disposition similar to that of the adult: the pereionite I has more rows than the rest of the pereionites.

Table 1

Variation recorded at the rows of granules from the pereional and pleonal segments according to age and size at *Mesoniscus graniger graniger*

Size (mm)	Number of rows from the pereion and pleon											
	PI	PII	PIII	PIV	PV	PVI	PVII	pl1	pl2	pl3	pl4	pl5
2.5	3	2	2	2	2	2	1	1	1	1	1	1
3 – 4	4	3	2	2	2	2	2	1	1	1	1	1
4 – 5	5	3	3	3	3	3	3	1	1	1	1	1
5 – 6	5	3	3	3	3	3	3	1	1	1	1	1
6 – 7	5	3	3	3	3	3	3	1	1	1	1	1
7	5	3	3	3	3	3	3	1	1	1	1	1

Even at this stage, the pleonites present one row of granules just like the adults. At the juveniles (animals between 3–4 mm with 7 pereional segments and 7 pereiopodes but with a fully functional pereiopode 7) on all the pereional segments appears one more row of granules. Already at this stage, the pereionite II reaches the maximum number of rows.

In the next stage (animals between 4–5 mm), all the pereionites reach the maximum number of rows. Although the size continues to increase (females can reach a size of 7.5 mm and males a size of 6.5–7 mm) the number of rows from the pereionites and the pleonites remains the same only the number of granules forming the row from the posterior edge of each pereionite as well as the number of granules from the pleonites continues to record a series of variations.

At manca 2, the number of granules prefigures the situation found at the adult in which the pereionites I, II and III have the greatest number of granules while the pereionites IV, V, VI and VII present a lesser number. Even at this stage, the cephalon has more granules than any pereionite. The pleon has half the number of granules of an adult.

At a size of 4–5 mm, the number of granules from the cephalon and all the pereionites reaches the maximum number of granules present at the adults (see Fig. 2, B). A similar situation is found at the pleonites and the pleotelson with the exception of the pleonites 3 and 4 that reach the maximum number of granules only at the maturity of the animal (see Table 2).

Table 2

Recorded variation in the average number of granules on the body segments according to size and age at *M. g. graniger*

Size mm	Average number of granules from the cephalon, pereion, pleon and pleotelson													
	Cephalon	P I	P II	P III	P IV	P V	P VI	P VII	pl1	pl2	pl3	pl 4	pl5	plt
2.5	40	12	12	11.5	13	13	11	12	5	4	8	8	5	2
3 4	48.3	14.6	15	15.3	13.6	15	13	13	6	6.3	9.6	11	5	3.3
4 – 5	58.3	16.8	16.8	15.5	15.3	15.8	15	15.6	7.8	8.3	12	14	6.3	4
5 – 6	57.2	15.4	16	16.4	16.1	15.3	15.3	17.5	7.3	7.4	11	13	6	3.4
6 7	55.6	16	16.3	16.6	15	14.6	14.6	14	8	8.3	12.6	14	6.3	4.3
7	60	17	17.2	17	15.8	15.8	15.8	15.2	8.4	8.8	13.8	15	8	4.4

The adults of *Mesoniscus graniger dragani* present between 114 and 122 granules on the cephalon. The pereionite I has 6 rows of granules, pereionites II and III have 5 rows while the pereionites IV, V and VI have 4 rows. With the exception of two exemplaries (a 8 mm male from Peştera Pişolca and a 8.2 mm male from Peştera Corbasca) with 4 rows of granules on the pereionite 7, there are only 3 rows of granules on this pereionite at the majority of the studied animals. There are 2 rows of granules on each pleonite.

The number of rows from the pereional and pleonal segments varies according to age and size of the animals but in a different manner than at *Mesoniscus graniger graniger* (see Table 3).

Table 3

Variation recorded at the rows of granules from the pereional and pleonal segments according to age and size at *Mesoniscus graniger dragani*

Size (mm)	Number of rows from the pereion and pleon at *Mesoniscus graniger dragani*											
	PI	P II	P III	P IV	P V	P VI	P VII	pl1	pl2	pl3	pl4	pl5
2.5	3	3	2	2	2	2	1	1	1	1	1	1
3 – 4	4	3	2	2	2	2	2	1	1	1	1	1
4 – 5	5	4	4	3	3	3	3	1	1	2	2	2
5 – 6	5	4	4	4	4	4	3	1+	1+	2	2	2
6 – 7	6	5	5	4	4	4	3	2	2	2	2	2
7 – 8	6	5	5	4	4	4	3	2	2	2	2	2
8 – 9	6	5	5	4	4	4	3	2	2	2	2	2

Similar to *Mesoniscus graniger graniger*, manca 1 has no granulation while in manca 2 (animals with a size of 2.5 mm as in the nominate subspecies) is sketched the disposition found at the adults meaning the pereionite I already presents a greater number of rows. The number of rows at this stage is similar to that found at the nominate subspecies but pereionite II has 3 rows of granules instead of 2. The pleonites bear only one row of granules just like the manca 2 of *Mesoniscus graniger graniger*.

In the next stage (animals with the size between 3 and 4 mm) on pereionite I is added one more row of granules while on other body segments there is no modification. Pleonites continue to present only one row of granules. When the animals reach a size of 4–5 mm (at this size the rows of granules from *Mesoniscus graniger graniger* reach the maximum number) the definitive number of rows is reached on the pereionite VII and on the pleonites 3, 4 and 5 while on the other pereionites is added one more row and the pleonites 1 and 2 maintain the same conformation with a sole row of granules.

In the following stage (animals between 5–6 mm), on the pleonites 1 and 2 is sketched the adult conformation: on the centre of the pleonites, in front of the row already present on the posterior edge, appear 2–3 granules. In the next stage (animals between 6–7 mm), all the pleonites bear 2 rows of granules like the adults. In this moment, all the pereionites and the pleonites already have the same number of rows as the adult individuals although the number of granules has not yet reached its maximum.

Unlike *Mesoniscus graniger graniger*, at which the maximum number of granules reaches the maximum when the animals have sizes between 4 and 5 mm (with the exception of the pleonites 3 and 4 which reach the definitive number of granules at the animals maturity) at *Mesoniscus graniger dragani* the definitive number of granules is reached only when the animals attain sizes of 8–9 mm, therefore the maturity (see Table 4).

Table 4

Variation recorded in the number of granules from the body segments according to age and size at *M. g. dragani*

Size mm	Average number of granules from the cephalon, pereion, pleon and pleotelson at *Mesoniscus graniger dragani*													
	Cephalon	PI	PII	PIII	PIV	PV	PVI	PVII	pl1	pl2	pl3	pl4	pl5	plt
2, 5	59	20	20	23	21	18	18	16	9	9	12	11	9	4
3 – 4	60	20	19	23	23	24	21	17	11	11	14	14	9	4
4 – 5	95	26	28	27	29	29	31	29	12	13	28	31	20	6
5 – 6	97,3	30,3	31	31,3	30	29,3	32,3	29	16	16	27	31	18	6
6 – 7	106	32,2	32	34	35	32	32	29	25	25	34	36,3	23	7
7 – 8	109,3	35	36	36	33,3	36	36	35	24	24,3	37	42	24	6,1
8 – 9	117,1	35,4	34,7	35	33,4	35	36	37	29,4	32,3	42,3	47	28	8,4

It is easy to notice the clear difference between *Mesoniscus graniger graniger* and *Mesoniscus graniger dragani*: practically, starting with the manca 2 stage, our subspecies has a greater number of granules. At the adult animals this difference is extremely visible (see Fig. 3): the cephalon and the pereionites of *Mesoniscus graniger dragani* have twice as many granules than the cephalon and the pereionites of the nominate subspecies.

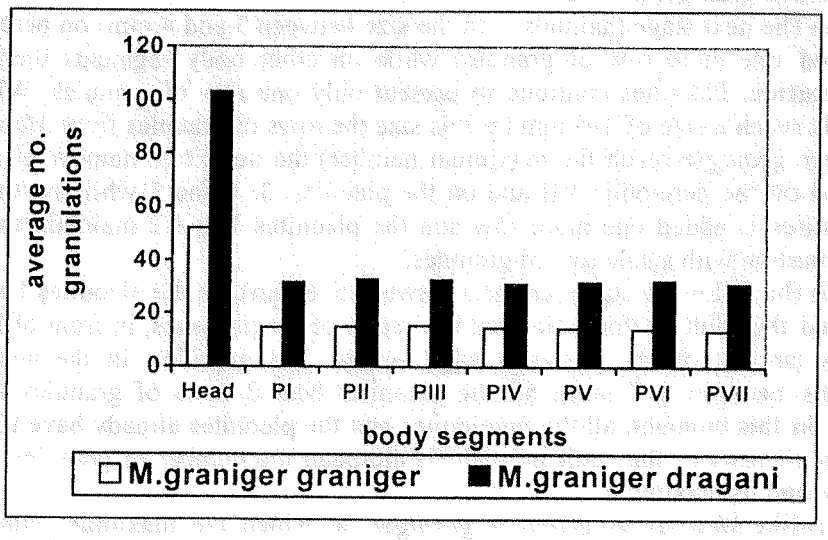

Fig. 3 – Comparison between the average number of granules from the cephalon and pereion at *M. g. dragani and M. g. graniger.*

Regarding the granulation of the pleonites, the difference is even more obvious (see Fig. 4): excepting the individuals under 5 mm, the pleonites of our subspecies present 2 rows of granules while at *Mesoniscus graniger graniger* even the adults have only one row. Also, *Mesoniscus graniger dragani* has thrice as many granules than *Mesoniscus graniger graniger* (see Fig. 2, C and D.)

There are some interesting similarities and differences between *Mesoniscus alpicola* and the two subspecies of *Mesoniscus graniger*. In general, the granulation of *Mesoniscus alpicola* resembles the granulation of *Mesoniscus graniger graniger*: it has big and regularly placed granules on all the body segments but tends to have slightly greater number of granules than the average *Mesoniscus graniger graniger* resembling in this respect the population from Peştera Mare de la Mereşti (Vârghişului Mts.). The number of granules from the cephalon of *Mesoniscus alpicola* (between 92 and 98 granules) is intermediary between that found in *Mesoniscus graniger graniger* (60 granules on the average, 70 being the greatest number found) and that from *Mesoniscus graniger dragani* (117 granules on the average).

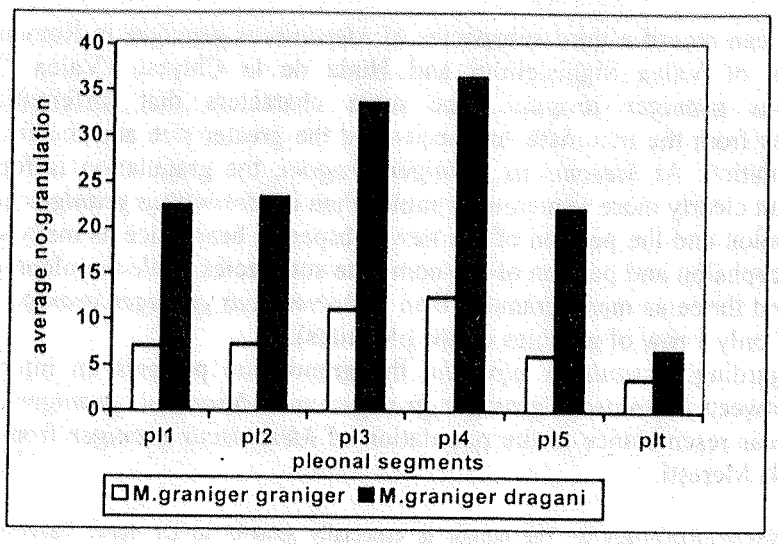

Fig. 4 – Comparison between the average number of granules from the pleonites at *M. g. dragani* and *M. g. graniger*.

There is the same intermediary situation in the rows of granules from the pereionites between *Mesoniscus alpicola* and *Mesoniscus graniger graniger*: just like the nominate subspecies, *Mesoniscus alpicola* has 5 rows of granules on the pereionite I, but 4 rows on the pereionites II, III and IV (while *M. g. graniger* has only 3 and *M. g. dragani* has one more row). The pereionites V, VI and VII have 3 rows just like at *Mesoniscus graniger graniger*. The pleonites 1, 2 and 5 of *Mesoniscus alpicola* have only one row of granules but on the pleonites 3 and 4, we found the same situation noticed at some individuals of *Mesoniscus graniger graniger* from Peştera Mare de la Mereşti: a second row of granules is sketched, generally by 3 to 4 granules placed toward the edges of the pleonites.

Also, the size of the examined *Mesoniscus alpicola* exemplaries corresponds to that of *Mesoniscus graniger graniger*: the male had 5.5 mm (the size of the majority of adult males of *M. g. graniger*) while the females had 6.8–7.5 mm (the size of adult females of *M. g. graniger*).

4. CONCLUSIONS

Holotypus: 1 ♂, Peştera Drăcoaia, 5.IX.2000, leg. A. Giurginca, collection of Speleological Institute in Bucharest; Paratypes: 2 ♂, Peştera Drăcoaia, 5.IX.2000, leg. A. Giurginca, 2♂♂ Peştera Pişolca, 23.V.1968, leg. A. Burghele, 4 ♂♂ Peştera Măgura, 22.V.1968, leg. A. Burghele, 1♂ Peştera Corbasca, 13.VII.1969, leg. I. Tabacaru.

Allotype: 1♀, Peştera Drăcoaia, 5.IX.2000, leg. A. Giurginca.

We can record a third subspecies of *Mesoniscus graniger* in Romania from the caves of Valea Sighiştelului and Huda de la Chişcau (Valea Crăiasa): *Mesoniscus graniger dragani*. The main characters that differentiate our subspecies from the nominate subspecies are the greater size and the features of the granulation. At *Mesoniscus graniger dragani*, the granulation is formed by smaller but clearly more numerous granules than in *Mesoniscus graniger graniger*. The cephalon and the pereion of the new subspecies bear twice as many granules than the cephalon and pereion of the nominate subspecies while the pleon presents 2 rows and thrice as many granules than in *Mesoniscus graniger graniger* (where we found only 1 row of granules on the pleonites).

Regarding *Mesoniscus alpicola*, the granulation presents an intermediary aspect between *Mesoniscus graniger graniger* and *Mesoniscus graniger dragani*, with a clear resemblance to the population of *Mesoniscus graniger* from Peştera Mare de la Mereşti.

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