CONTRIBUTIONS TO THE KNOWLEDGE OF THE EARLY PLIOCENE MAMMALIAN FAUNAS FROM MĂLUȘTENI AND BEREȘTI (ROMANIA) ORDER *INSECTIVORA* FAMILY *TALPIDAE*, SUBFAMILY *DESMANINAE*

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The authors give a description of the *Desmana* remains from Bereşti and Măluşteni (southern Moldavia, Romania), two fossil localities which yielded rich assemblages of mammals indicative of an Early Pliocene age. The fossils examined (a mandibular ramus with P/2 at Bereşti and a mandibular ramus retaining P/4—M/2 at Măluşteni) are considered to represent the lower teeth of the taxon *Desmana verestchagini amutriensis* Radulescu, Samson and Ştiucă, 1989, described on the basis of an upper molar (M2/) found at Lupoaia Quarry (Dacic Basin) in a level dated as Early Pliocene (Cochiti event). A comparative dental analysis of all the specimens led to the conclusion that the Early Pliocene Desman of the Dacic Basin represents a distinct species for which the name *Desmana amutriensis* is retained.

Key words: *Desmana amutriensis* (Insectivora, Mammalia), Ruscinian (MN 14—MN 15), Dacic Basin (Parathetys, Romania), systematics, biostratigraphy.

INTRODUCTION

In a previous paper (Rădulescu, Samson and Ştiucă 1989), we proposed a new taxon of Early Pliocene Desman interpreted as a chronological subspecies and named *Desmana verestchagini amutriensis*. This new form was based on an upper molar (M2/) coming from Lupoaia Quarry, a fossiliferous site located in the western part of the Dacic Basin. The fossil level (clay at the base of coal bed VIII), which yielded remains of insectivores and rodents, was dated by paleomagnetic studies (Andreescu, Radan and Radan 1986) to the end of the Cochiti event (about, 3.8 MY).

In connection with the erection of the new *Desmana* taxon, it became necessary to revise the remains of Desmaninae known from Bereşti and Măluşteni, the two classic Early Pliocene fossiliferous sites of southern Moldavia (northeastern part of the Dacic Basin).

At Bereşti, Simionescu (1932) mentioned a fragmentary right mandible with P/4. In the Balaban collection, which contains the fossils from Bereşti, housed in the Laboratory of Paleontology, University of Bucharest, we have found a right mandible without teeth. An isolated P/2 with partial roots adapted very well to this mandible, the missing portions of the roots being preserved in the alveoli. The roots of P/4 (a tooth mentioned as present by Simionescu (1932; 220)) are retained in the alveoli but, unfortunately, the crown of the tooth is lacking. This fossil represents, undoubtedly, the specimen cited as *Myogale* sp. by Simionescu (l.c.) at Bereşti.

In the report on the Bereşti fauna, Simionescu (1932, Fig. 8, *Myogale* sp.) described briefly a fragmentary left mandible containing P/4—M/2 found at Măluşteni. We have also examined this specimen which

is one of the few fossils from Măluşteni housed in the collection of the Laboratory of Paleontology, Bucharest (the bulk of the material from Măluşteni is kept in the collection of the Laboratory of Geology, University of Iaşi, Moldavia).

DESCRIPTION

Bereşti

The ascending ramus of the mandible is broken; the horizontal ramus is well preserved; judging from the alveoli, P/1 was single rooted and P/3 very short with an oblique position (anterior root situated lingually) relative to the length axis of the tooth-row. There are two mental foramina: one under the anterior root of P/2 and one under the posterior root of M/1. The mandibular ramus is deep (depth behind P/4 more than half the M/1—3 length).

Measurements are indicated in Table 1.

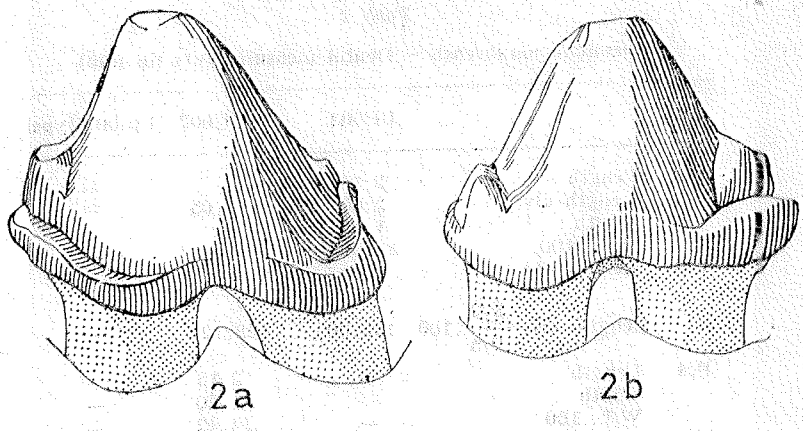
Table 1

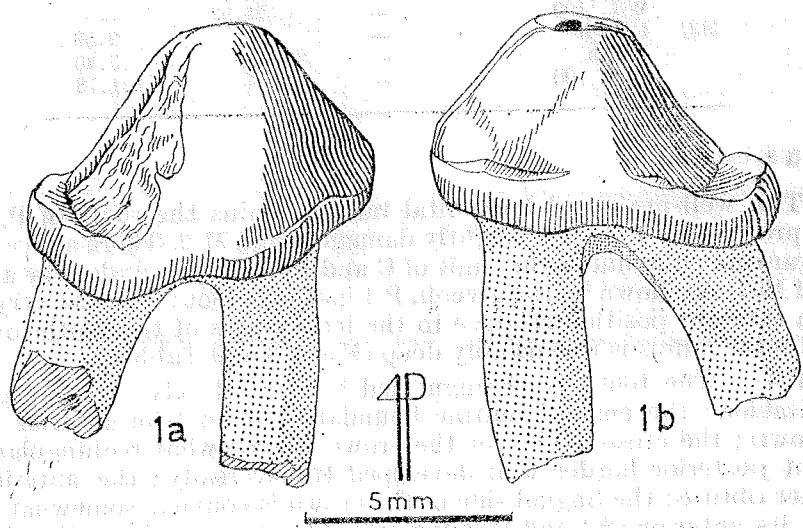
Desmana amutriensis — Mandibular measurements (in mm)

	Br/008	Ml/007
Length alv. P/1 — M/3	13.90	14.40
Length alv. M/1 — M/3	7.20	7.50
Height ramus (int.) behind C	4.20	3.80
Height ramus (int.) behind P/2	4.00	4.00
Height ramus (int.) behind P/4	4.15	4.40
Thickness there	1.80	1.90
Height ramus (int.) behind M/1	4.20	4.65
Thickness there	2.20	2.25
Height ramus (int.) behind M/3	4.20	4.35
Thickness there	1.95	2.00

P/2 — The tooth is very narrow; its cross-section is elliptical with flattened lingual and labial sides; the anterocristid is rather sharp and incorporates at its base a small rather indistinct paraconid; the anterolabial corner of the crown is slightly flattened; a tubercle is present at the base of the fairly well developed posterocristid; the talonid basin is narrow and shallow; the posterior cingulum is well developed and wide, although rather short; the anteroexternal cingulum is faintly indicated; the anterointernal cingulum is longer and more marked; the enamel on the posteroexternal face is strongly wrinkled. The roots are slightly divergent (Fig. 1.1 a—b).

Measurements are indicated in Table 2. For P/2 and P/3 the length at alveoli was taken and a length index of these two premolars was calculated.





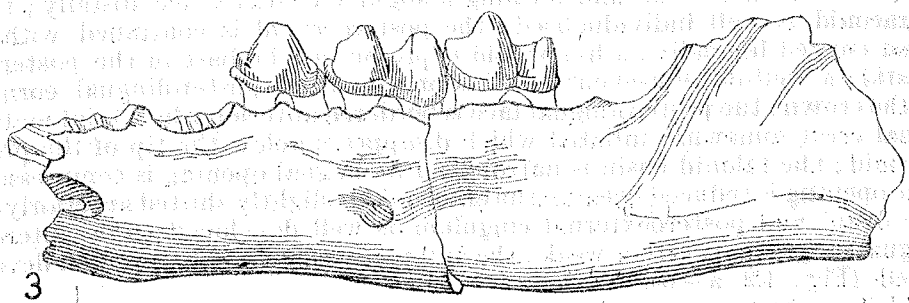


Fig. 1 — *Desmana amutriensis*: 1. right P/2 (Br/008), Berești; 2. left P/4 (Ml/007), Măluștenii: a — labial, b — lingual views; 3. left mandible with P/4 — M/2 (Ml/007) Măluștenii: labial view.

Table 2

Desmana amutriensis — Dental measurements (in mm)

		Br/008	Ml/007	Lp/007(type)
P/2	Length	2.10	—	—
	Length alv.	2.00	2.05	—
	Width	1.25	—	—
	W/L. 100	59.52	—	—
P/3	Length alv.	1.60	1.60	—
	Length alv. $\frac{P/2}{P/3}$.100	125.00	128.12	—
P/4	Length	—	2.15	—
	Width	—	1.60	—
	W/L. 100	—	74.42	—
M/1	Length	—	2.90	—
	Width	—	2.40	—
	W/L. 100	—	82.76	—
M/2	Length	—	2.85	—
	Width	—	2.05	—
	W/L. 100	—	71.93	—
M2/	Length	—	—	2.58
	Width	—	—	3.40
	W/L. 100	—	—	131.78

Măluşteni

The well-preserved horizontal ramus retains the roots of P/2. The teeth present are P/4, M/1 (slightly damaged) and M/2. There are two mental foramina: one under the limit of C and P/2 and one under the anterior root of M/1. As shown by the alveoli, P/1 had one root; P/3 was very short with a straight position relative to the length axis of the tooth-row. The mandibular ramus is remarkably deep (Fig. 1.3 and Table 1).

P/4 — The tooth is distinguished by a relatively strong degree of molarisation; the enamel/dentine boundary rises at the anterior end of the crown; the cross-section of the crown is somewhat rectangular with straight posterior border well developed transversally; the anterior end is rather obtuse; the lingual side of the crown is convex, somewhat flattened at its anterior end and forming a slightly concave face distally; the paraconid is well individualised; the posterocristid is continued with a crest curved lingually; a hypoconid is present at the base of the posterocristid; a well-developed entoconid is present at the posterolingual corner of the crown; the posterolingual face is bordered anteriorly by a faint metaconal crest somewhat inflated which disappears below the tip of the protoconid; the talonid basin is narrow and its lingual opening is compressed (the opening is reduced because the entoconid is slightly shifted anteriorly); the distal and posteroexternal cingulum is well developed; the anterolingual cingulum is rather weak; the anteroexternal cingulum is well developed (Fig. 1.2 a—b).

M/1—M/2 — The molars have a typical morphology for the Desmaninae. We mention, however, that the teeth are relatively slender with

high and sharp cusps; the oblique crest is long, ending near the top of the metaconid; the anterior cingulum is rather strong; in M/1 it disappears gradually towards the anterolingual corner of the crown; on the contrary, in M/2 the cingulum widens anterolingually; a strong entostylid is present. In this stage of wear, some ribs are still visible on the walls of the main cusps adjoining the talonid basin.

Measurements of teeth are indicated in Table 2.

DISCUSSION

The Early Pliocene *Desmana* form discovered at Lupoaia Quarry was interpreted as a larger-sized successor of *D. verestchagini* Topachevsky and separated at a subspecific rank (Rădulescu *et al.* 1989). It is worth remembering that M2/ from Lupoaia Quarry has similar proportions of the crown as compared with the corresponding tooth of *D. verestchagini* based on the Greek material studied by Rümke (1985 a).

Judging from their morphological features (small-sized P/3 in particular, strong tendency to molarisation of P/4, deeper horizontal ramus), the specimens from Bereşti and Măluşteni show similarities with *D. verestchagini* but, as in the case of the Lupoaia specimen, they are significantly larger.

This difference in size statistically significant led us to consider all the specimens of the Dacic Basin described here as belonging to a single species named *Desmana amutriensis*, characteristic of the time interval corresponding to the lying down of the fossiliferous levels at Bereşti, Măluşteni and Lupoaia Quarry.

Supplementary diagnosis (using the criteria proposed by Rümke, 1985a and Topachevky and Pashkov, 1983): P/1 single-rooted; length of P/2 2.10 (Bereşti); length of P/4 2.15 (Măluşteni); small-sized P/3; the alveolar index of P/2 and P/3 125.0 (Bereşti) and 128.12 (Măluşteni). Mandibular ramus relatively deep (depth behind P/4 more than half the M/1—M/3 length).

Supplementary differential diagnosis: the significantly larger size distinguishes *D. amutriensis* from *D. verestchagini* (MN 14). The small P/3, the proportions of M2/ (transverse diameter well developed) and deeper mandibular ramus distinguish *D. amutriensis* from *D. kowalskae* Rümke (MN 15 b) and *D. nehringi* Kormos (known essentially from MN 16 b/MN 17 and persisting into the Early Pleistocene), although the dimensions of teeth are overlapping. According to Rzebik-Kowalska (1971), P/4 in *D. nehringi* (incl. *D. kowalskae*) from different Pliocene localities of Poland is practically deprived of paraconid and there is no metaconid; the cingulum is well developed and it occurs all round the tooth. Rümke (1985 a) confirms this morphology stating that in P/4 of *D. kowalskae* the paraconid is indistinct and there is no metaconid or metaconal rib. In addition, the mandibular ramus in *D. kowalskae* and *D. nehringi* is lower (Rzebik-Kowalska 1971, Schreuder 1940).

Topachevsky and Pashkov (1983) used the great depth of mandibular ramus behind P/4 (more than half the M/1—M/3 length) to individualise at a subgeneric rank a lineage *Desmana (Archaeodesmana)*

(including *D. verestchagini*) — *D. (Praedesmana)* (type-species *D. thermalis* Kormos) — *D. (Desmana)* (type species *D. moschata* (Linnaeus)). On the contrary, *D. nehringi* possessing among other distinctive features a lower mandibular ramus (depth behind P/4 less than half the M/1—M/3 length) is allocated to a separate parallel lineage named *D. (Paleodesmana)*. Judging from its deeper mandibular ramus, *D. amutriensis* belongs to the former of these lineages.

In the MN biozonation of Europe (M e i n 1990), the presence of *D. nehringi* is indicated as early as the Podlesice faunal assemblage correlative with MN 14. It is worth noting that the *Desmana* dental remains from Podlesice (R z e b i k-K o w a l s k a 1971) are relatively large and comparable in size with those from later localities as Weze (MN 15 b) and Rebielice Krolewskie (MN 16b), whereas the roughly contemporary *Desmana* samples (*D. verestchagini*, MN 14) in southern Europe (Greece) are smaller (R ü m k e 1985a). The mandibular ramus of the Podlesice *Desmana* form is relatively low (R z e b i k-K o w a l s k a 1971, Table IV) and suggests a relationship with *D. nehringi*-group. However, further studies are needed before a satisfactory specific status of the *Desmana* remains from Podlesice can be attempted.

CHRONOLOGY

As already shown, *D. amutriensis* is known in the Dacic Basin from three fossil localities: Lupoaia Quarry, Măluşteni and Bereşti. The relationship between these sites, on the evidence of fauna and paleomagnetic determinations, may be established as follows:

Bereşti — Absence of arvicolid rodents. The faunal assemblage (dominance of ochotonids and leporids, occurrence of *Cricetulus*-like small cricetids) points to a more continental climate. The Bereşti fauna seems to correspond to a time interval intercalated between two dispersal events to Europe; the older event is characterised by the appearance of *Prosomys insuliferus* (Kowalski), the later one by the invasion of *Mimomys moldavicus* Kormos. The fossiliferous level at Bereşti can possibly belong to the later part of MN 14 zone (Late Dacian).

Măluşteni — Presence of *M. moldavicus*, one of the most archaic species belonging to this genus. This taxon indicates a biochronological situation corresponding seemingly to the MN 14/MN 15 boundary (Dacian/Romanian transition). It is worth mentioning that in Europe, at the present state of our knowledge, there is no likely ancestor for *M. moldavicus*. The fossiliferous level at Măluşteni might be coincident with the immigration of *M.moldavicus* to Europe (R ă d u l e s c u and S a m s o n 1989).

Lupoaia Quarry — Presence of a primitive large-sized *Mimomys* species named *M. rhabonensis* Rădulescu, Samson and Ştiucă, 1989. Described as a chronological subspecies (*M. occitanus rhabonensis*) (R ă d u l e s c u *et al.* 1989), this form is here considered as a distinct species more primitive than *M. occitanus* Thaler from Sète. In comparison with *M. moldavicus*, *M. rhabonensis* is distinguished by a larger size and a more specialised dental morphology. The fossiliferous level at Lupoaia is situated by paleomagnetic determinations within the Cochiti event (normal polarity) at about 3.8 MY (MN 15 a, Early Romanian).

D. amutriensis appears therefore to be chracteristic of the last part of MN 14 zone and the beginning of MN 15 zone. *D. verestchagini*, taking into account its smaller size and accompanying micromammals (presence of a more primitive arvicolid species identified as "*Promimomys*" *insuliferus* at Ptolemais 1 and Kardia, Greece (v. d. W e e r d 1979)), may belong to an earlier time interval within MN 14 zone.

At present, as noted above, a closer relationship is suggested on morphological grounds only between *D. amutriensis* and *D. verestchagini* (especially with the samples from Ptolemais 1 and Kardia) (R ü m k e 1985a). Although *D. amutriensis* is a possible ancestor of later *Desmana* forms, its relationships, as reflected in dental morphology, to *D. nehringi* group (incl. *D. kowalskae*) is not yet clearly established (except M2/, the upper dentition of *D. amutriensis* is still unknown).

As suggested by R ü m k e (1985a, b), *D. kowalskae-D. nehringi* seem to represent one lineage with *D. inflata* Rümke as an offshoot; *D. thermalis-D. moschata* represent another lineage. *D. amutriensis*, on the basis of its dental features and deep mandibular ramus, appears to have more affinities with *D. thermalis* distinguished by similar morphological peculiarities (short P/3, molarisation of P/4, wider M2/, deep horizontal ramus).

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