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The Biharian fauna from Monte La Mesa (Verona, northeastern Italy)

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Abstract. An Early Biharian fauna from Monte La Mesa, near Rivoli Veronese (Verona, northeastern Italy), is reported here. The rich micro-mammal association comprises *Erinaceus* sp., *Crocidura* sp., *Beremendia fissidens, Petenyia hungarica, Asoriculus gibberodon, Sorex bor, S. minutus, S. praealpinus, S. (Drepanosorex) praearaneus,* Soricidae indet. I-II, *Talpa minor, Hypolagus beremendensis, Sciurus warthae,* Sciuridae indet., *Allocricetus bursae, A. ehiki, Pliomys episcopalis, Dinaromys dalmatinus, Mimomys tornensis, M. pusillus, M.* cf. *ostramosensis, Clethrionomys* sp., *Microtus (Allophaiomys)* gr. *pliocaenicus, Apodemus atavus, Glis sackdillingensis, Muscardinus* cf. *dacicus*, and, among the reptiles, *Ophisaurus* sp.Some taxa are reported in Italy for the first time, including more than 500 remains of *Apodemus atavus*, making it the richest collection of this species in Europe. With regard to the fossiliferous contents, the fauna from Monte La Mesa is considered similar to those from Żabia Cave (Poland), Osztramos 8 (Hungary), and Betfia 10 (Rumania), while in Italy it is regarded as being more ancient than those from Pietrafitta and Pirro Nord.

Key words: Micromammals, Systematics, Biharian, northeastern Italy.

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I. INTRODUCTION

The fossil material of Monte La Mesa was found in a diaclase, brought to light by the work in a limestone quarry on removing a wall. This quarry is located in the southern side of the mountain bearing the same name, south of the village of Rivoli Veronese (Verona, NE Italy), in an area about 200 metres above sea level, facing east toward the Ceraino Gorge where the River Adige flows.

The filling was partially removed by meteoric washing and accumulated at the base of the diaclase, only small pockets of the preserved wall still containing records of the old filling. Sediment in the pockets and at the base of the diaclase contained the same fossil contents. The deposit was discovered in 1996.

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*M. MARCHETTI studied Erinaceidae, Soricidae and Talpidae, K. PAROLIN Sciuridae, Muridae and Gliridae, B. SALA Cricetidae and Leporidae

Washing of the sediments made it possible to bring a considerable amount of vertebrate remains to light, particularly osteoderms of *Ophisaurus* and skeleton fragments of Insectivores and Rodents. This paper presents the study of Mammal remains from this karst fissure, which, because of its abundance of fossils, number of species, and age, represents one of the richest and most interesting Biharian fossil associations in western Europe.

The nomenclature used for the Insectivores is taken from REUMER (1984, 1985a and 1998), RZEBIK-KOWALSKA (1998), and MILLER (1912), and that for the Rodents from VAN DER MEULEN (1978), RABEDER (1981), and HUTTERER et al. (1988). The collections of the Department of Geological and Palaeontological Sciences, University of Ferrara, of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences of Kraków, and of the Institute of Palaeontology, University of Vienna, have been used for the taxa determinations.

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II. SYSTEMATIC PALEONTOLOGY

The following measurements, in mm, were taken: L, depth; LT, depth of the talon; H, height; BL, buccal depth; PE, depth to the distal emargination; LL, lingual depth; W, breadth; AW, mesial breadth; PW, distal breadth; TAW, talonid breadth; TRW, trigonid breadth; LM_1-M_3, depth of the molar series; HCP, height of the coronoid process; HC, height of the condyle; WUF, breadth of the condylar upper facet; WLF, breadth of the condylar lower facet; HM_2, height of the horizontal ramus in correspondence to the distal end of M_2; WS, minimum breadth.

Order: Insectivora

Family: Erinaceidae BONAPARTE, 1838

Genus: *Erinaceus* LINNAEUS, 1758

Erinaceus sp.

M a t e r i a l. 1 C_1; 2 M_2; 1 M_3.

D i m e n s i o n s. LM_2 4.65; $TAWM_2$ ~3.01 and 3.14; $TRWM_2$ 3.21; LM_3 2.55; WM_3 1.96.

D e s c r i p t i o n. C_1: very worn; developed cingulum. M_2: cusps separated; protoconid and especially hypoconid inflated; buccal cingulum extending from the buccal side of the paraconid to the middle of the hypolophid, high and developed, except in correspondence with the hypoconid; lingual cingulum very short and not pronounced, situated under the distal side of the metaconid. M_3: reduced; metaconid separated from the buccal one by a rather shallow "V"-shaped indentation; metaconid more inflated and larger than the buccal one; lingual cingulum barely visible; buccal cingulum, in the middle part of the molar, roughly rises forming an obtuse angle.

D i s c u s s i o n. While the dimensions of the teeth are similar to those of *Erinaceus europaeus*, many differences can be verified in their morphology. In the specimens of Monte La Mesa, M_2 has: more developed buccal cingulum, especially connected with the re-entrant valley, which roughly rises mesially to form an obtuse angle (in *E. europaeus* it rises more gradually); lingual cingulum shorter and less visible; protoconid and hypoconid more inflated and more lingually shifted. M_3: lingual cingulum less pronounced; metaconid larger and more inflated than the buccal one (un-

like *E. europaeus*); the depression separating the metaconid from the buccal lingual one is "V" shaped (in *E. europaeus* it is "U"-shaped). C_1: buccal cingulum more developed.

The distinction between the Plio-Pleistocene European hedgehogs is mainly based on the inferior teeth dimensions. In the literature measurements of M_3 are lacking, whereas those of M_2 are numerous (BRUNNER, 1934; KORMOS, 1934; SULIMSKI, 1959, 1962; JÁNOSSY, 1972; JAMMOT, 1973). The dimensions of M_2 from Monte La Mesa fall within the range of *E. lechei* KORMOS, 1934 from Hungarian localities of Beremend 4 (LM_2 4.6; WM_2 3.0), and Osztramos 3 (LM_2 4.5; WM_2 3.3), but also within the minimum values of *E. praeglacialis* BRUNNER, 1934 from Tarkö (Hungary) (LM_2 min. 4.6; WM_2 min. 3.1) and of the present *E. europaeus* LINNAEUS, 1758. In the original description of *E. lechei* the reduced M_3 is a diagnostic character, and therefore smaller than in the present species; moreover, the teeth of *E. europaeus* have different features in comparison with those of Monte La Mesa; consequently, the remains of this fossiliferous locality may belong to *E. praeglacialis*. However, the scanty material and the inadequacy of the description of fossil hedgehogs in the literature do not permit a specific attribution.

Family: Soricidae GRAY, 1821

Genus: *Crocidura* WAGLER, 1832

Crocidura sp.

M a t e r i a l. 1 hemimandible with M_{2+3}.

D i m e n s i o n s. LM_3 1.15; WM_3 0.71; HM_2 1.42.

D e s c r i p t i o n. Dental elements not stained. M_2: too incomplete for any description. M_3: talonid reduced to a single cusp, in a central position on the distal side of the tooth; occlusal surface has the shape of a right-angled triangle.

D i s c u s s i o n. The lack of pigmentation combined with a reduced M_3 distinguishes this specimen of *Crocidura* from those of *Asoriculus* (REUMER, 1984). A specific attribution of a single incomplete specimen is impossible.

Genus: *Beremendia* KORMOS, 1934

Beremendia fissidens (PETÉNYI, 1864)

M a t e r i a l. 13 I^1; 3 P^4; 7 M^1; 1 M^3; 1 upper jaw with M^{1+2}; 28 I_1; 3 M_1; 3 M_2; 2 M_3; 1 hemimandible with M_{1+2}, 3 with M_2, 1 with M_{2+3}, 4 toothless; 8 ascending rami; 3 isolated mandibular condyles (Fig. 1: 1-3, Table I).

D e s c r i p t i o n a n d d i s c u s s i o n. The material is assigned to *Beremendia fissidens* on the basis of the following criteria: very large dimensions; teeth intensely stained a dark red; I^1 with bifid apex; condyle with broad interarticular area and lower facet mesially located; I_1 acuspulate. The material from Monte La Mesa does not differ from that found in Poland (MF/1458/74 from Kielniki and MF31/60 from Kadzielnia) or from that described in the literature (RZEBIK-KOWALSKA, 1976; REUMER, 1984).

Genus: *Petenyia* KORMOS, 1934

Petenyia hungarica KORMOS, 1934

M a t e r i a l. 5 I^1; 2 M^1; 1 upper jaw with $A^{3+4}+P^4+M^{1+2}$, 1 with P^4+M^{1+2}; 13 I_1; 3 M_2; 2 hemimandibles with P_4+M_{1+2}, 2 with M_{1+2}, 3 with M_{1+2+3}, 2 with M_2, 1 with M_{2+3}, 1 with M_3; 9 ascending rami; 2 isolated mandibular condyles (Fig. 1: 4-7, Table II).

D e s c r i p t i o n a n d d i s c u s s i o n. Dimensions, tooth pigmentation, condyle and incisor shape, and short, massive hemimandible lead one to attribute the material to *Petenyia hungarica*. The remains have been compared with those from Poland and Rivoli Veronese. MF/1790/87/n°1 from Kielniki 3A, MF/81/60/n°2 from Kamyk, and MF/32/60 from Kadzielnia fall within the morphology and dimensions of the remains from Monte La Mesa. The upper jaw

Table I

Dimensions of *Beremendia fissidens*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LI^1	3	3.86	4.12	4.01	0.14	0.46
LTI^1	1	–	–	1.63	–	–
HI^1	1	–	–	2.16	–	–
BLM^1	4	2.30	2.44	2.36	0.07	0.18
PEM^1	5	1.70	2.03	1.90	0.14	1.00
LLM^1	5	2.28	2.37	2.33	0.03	0.05
AWM^1	6	2.30	2.53	2.41	0.08	0.26
PWM^1	3	2.47	2.65	2.57	0.09	0.34
BLM^2	1	–	–	1.95	–	–
PEM^2	2	1.50	1.55		0.04	0.082
LLM^2	2	1.73	1.80		0.05	0.14
AWM^2	3	2.20	2.35	2.28	0.06	0.26
PWM^2	1	–	–	2.00	–	–
LM_1	3	2.55	2.80	2.65	0.13	0.68
WM_1	3	1.63	1.76	1.69	0.09	0.50
LM_2	8	2.06	2.58	2.30	0.14	0.91
WM_2	8	1.35	1.69	1.44	0.11	0.90
LM_3	3	1.45	1.70	1.58	0.13	1.00
WM_3	3	0.89	1.05	0.95	0.09	0.76
HC	7	3.56	4.06	3.82	0.18	0.89
HM_2	6	2.30	2.62	2.48	0.18	0.56

MF1785/87 from Rebielice Królewskie 2 is similar to that from Monte La Mesa in shape, dimensions, and position of foramina, while that from Rivoli Veronese only differs from the former in its much weaker tooth pigmentation. The sole differences from some existing descriptions of the species (REUMER, 1984; RZEBIK-KOWALSKA, 1989) are: shorter talon in I^1; occasional presence of the buccal cingulum on the ventral side of I_1; I_1 which tends to be tricuspidated. These differences, observed in a few specimens, are believed to reflect part of the variability of *P. hungarica*.

Genus: *Asoriculus* KRETZOI, 1959

Asoriculus gibberodon (PETÉNYI, 1864)

M a t e r i a l. 51 I^1; 1 A^1; 9 P^4; 3 M^1; 8 M^2; 1 upper jaw with I^1+A^1, 1 with P^4+M^{1+2}; 100 I_1; 1 M_1; 1 hemimandible with I_1+A_1+P_4, 2 with I_1+A_1+P_4+M_1, 1 with A_1+P_4+M_{1+2}, 1 with P_4+M_{1+2} and with ascending ramus, 1 with M_1, 12 with M_{1+2}, 3 with M_{1+2+3}, 1 with M_{1+3}, 13 with M_2 (1 with ascending ramus), 6 with M_{2+3} (1 with ascending ramus); 32 fragmentary toothless hemimandibles; 5 isolated mandibular condyles (Fig. 1, 8-12, Table III).

D e s c r i p t i o n a n d d i s c u s s i o n. On account of their dimensions, typically shaped condyle and pale orange tooth pigmentation, these remains have the same diagnostic features as *A. gibberodon*. Nevertheless, the material differs from that of other European fossil lo-

Table II

Dimensions of *Petenyia hungarica*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LI^1	1	–	–	2.53	–	–
LTI^1	2	1.23	1.35		0.08	0.56
HI^1	3	1.26	1.39	1.35	0.08	0.42
BLP^4	2	1.50	1.51		0.01	0.00
PEP^4	2	1.10	1.12		0.01	0.02
LLP^4	2	1.10	1.12		0.01	0.00
WP^4	2	1.39	1.40		0.01	0.00
BLM^1	4	1.32	1.43	1.38	0.05	0.16
PEM^1	4	1.23	1.29	1.27	0.03	0.07
LLM^1	4	1.26	1.39	1.34	0.06	0.25
AWM^1	4	1.32	1.42	1.38	0.05	0.19
PWM^1	4	1.48	1.55	1.51	0.03	0.06
BLM^2	2	1.25	1.26		0.01	0.00
PEM^2	2	1.17	1.17		0.00	0.00
LLM^2	2	1.23	1.25		0.01	0.02
AWM^2	2	1.54	1.55		0.01	0.00
PWM^2	2	1.35	1.40		0.04	0.09
LI_1	10	3.90	4.15	4.02	0.10	0.25
HI_1	16	0.90	1.01	0.96	0.07	0.07
LM_1	6	1.39	1.57	1.47	0.06	0.27
WM_1	5	0.92	1.01	0.97	0.03	0.12
LM_2	12	1.29	1.48	1.39	0.05	0.20
WM_2	9	0.85	0.92	0.90	0.03	0.09
LM_3	4	1.05	1.14	1.11	0.04	0.16
WM_3	4	0.67	0.77	0.72	0.04	0.25
LM_1-M_3	2	3.67	4.00		0.23	1.42
HCP	3	4.45	4.52	4.47	0.04	0.04
HC	5	1.88	2.09	1.99	0.09	0.45
HM_2	10	1.42	1.57	1.52	0.06	0.21

calities (RZEBIK-KOWALSKA, 1981; REUMER, 1984) in the following ways: slightly greater dimensions; absence in P^4 of a high parastylar crest which divides the parastyle from the paracone; the presence, in some specimens, of three mandibular foramina; apex of I_1 sometimes stained a pale red. Moreover, *Asoriculus* from Monte La Mesa differs from the specimens of *A. gibberodon* from Podlesice, Osztramos 7, Kielniki 3A, and 3B, in the extent of its infraorbital and lacrimal foramina, but it shares the weak tooth pigmentation, dimensions, and the position of the last superior antemolar.

A comparison with the scanty material of *Asoriculus castellarini* (PASA, 1948) was not possible because it had not yet returned to the Civic Museum of Natural History of Verona. This species,

Table III

Dimensions of *Asoriculus gibberodon*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LI^1	5	1.71	2.16	1.90	0.23	2.88
LTI^1	5	0.74	0.92	0.81	0.07	0.59
HI^1	5	1.20	1.45	1.31	0.11	0.86
BLP^4	1	–	–	1.57	–	–
PEP^4	1	–	–	0.92	–	–
LLP^4	1	–	–	1.08	–	–
WP^4	1	–	–	1.76	–	–
BLM^1	1	–	–	1.48	–	–
PEM^1	1	–	–	1.17	–	–
LLM^1	1	–	–	1.48	–	–
AWM^1	1	–	–	1.48	–	–
PWM^1	1	–	–	1.67	–	–
BLM^2	1	–	–	1.29	–	–
PEM^2	1	–	–	1.08	–	–
LLM^2	1	–	–	1.32	–	–
AWM^2	1	–	–	1.60	–	–
PWM^2	1	–	–	1.51	–	–
LI_1	16	3.33	4.87	3.71	0.41	4.44
HI_1	16	0.83	1.14	0.95	0.08	0.65
LM_1	11	1.48	1.73	1.58	0.09	0.46
WM_1	13	0.92	1.12	1.02	0.06	0.37
LM_2	20	1.39	1.57	1.51	0.05	0.18
WM_2	20	0.89	1.02	0.94	0.04	0.14
LM_3	5	1.01	1.17	1.07	0.07	0.41
WM_3	5	9.61	0.77	0.67	0.06	0.54
LM_1-M_3	1	–	–	3.64	–	–
HCP	9	4.25	4.65	4.45	0.15	0.48
HC	18	2.00	2.39	2.15	0.09	0.41
HM_2	26	1.39	1.69	1.54	0.06	0.26

however, is not well known, and its taxonomic position is uncertain (REUMER, 1984; RZEBIK-KOWALSKA, 1998).

Owing to the high morphological variability encountered in several European populations of *A. gibberodon,* and since the material does not share the features of similar taxa, the differences observed in the specimens from Monte La Mesa are considered intraspecific.

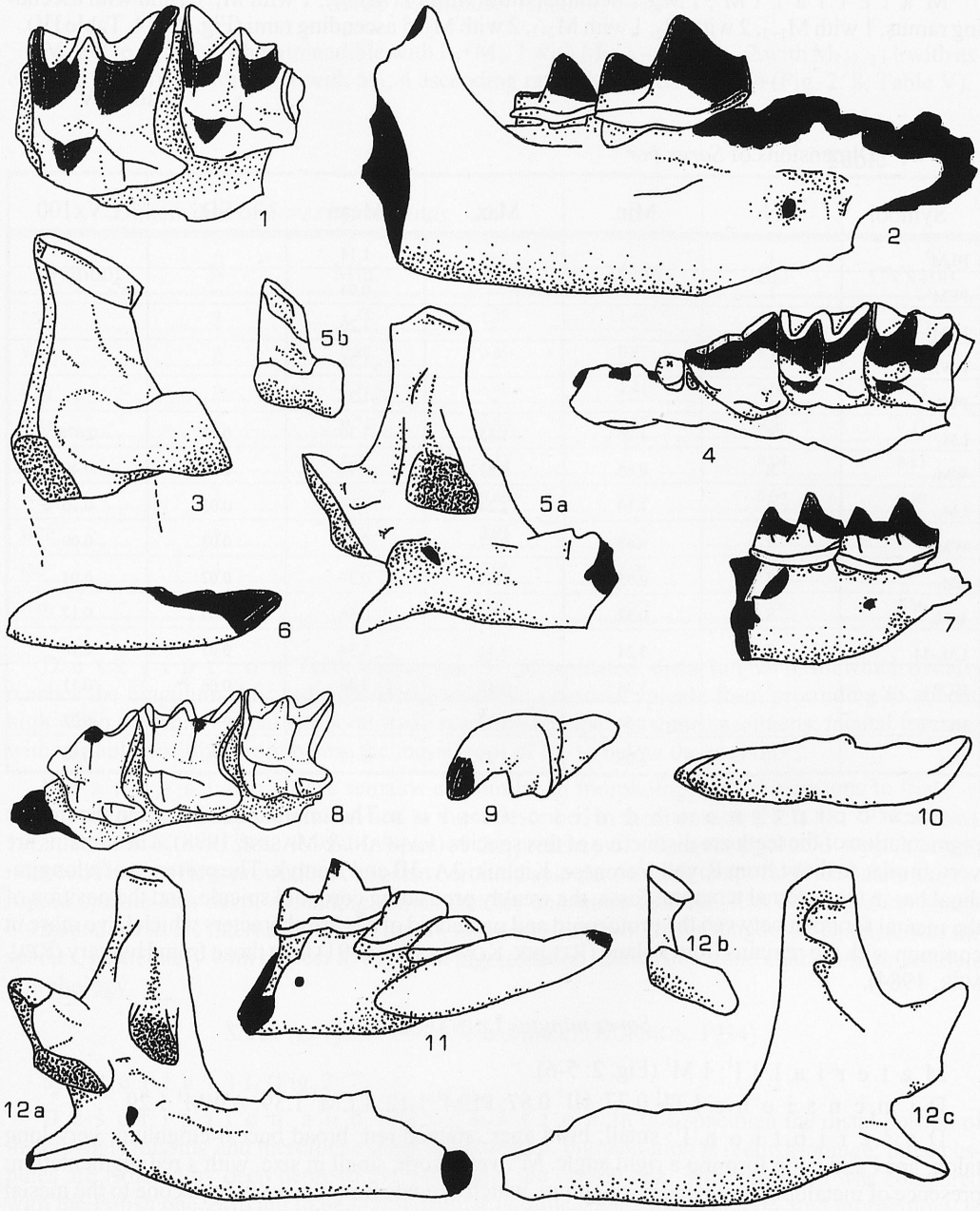

Fig. 1. *Beremendia fissidens*: 1 – upper jaw with M^{1+2}; 2 – hemimandible with M_{2+3}; 3 – condyle. *Petenyia hungarica*: 4 – upper jaw with A^{3+4}, P^4, M^{1+2}; 5 – ascending ramus and condyle; 6 – I_1; 7 – hemimandible with M_{1+2}. *Asoriculus gibberodon*: 8 – upper jaw with P^4, M^{1+2}; 9 – I^1; 10 – I_1; 11 – hemimandible with I_1, A_1, P_4, M_1; 12 – hemimandible. All figures are ×9.

Genus: *Sorex* LINNAEUS, 1758

Sorex bor REUMER, 1984

M a t e r i a l. 1 M^2; 1 M_2; 1 hemimandible with P_4+M_{1+2+3}, 1 with M_{1+2+3} and with ascending ramus, 1 with M_{1+2}, 2 with M_2, 1 with M_{2+3}, 2 with M_3; 5 ascending rami (Fig. 2: 1-4, Table IV).

Table IV

Dimensions of *Sorex bor*

Symbol	N	Min.	Max.	Mean	SD	CVx100
BLM^2	1	–	–	1.14	–	–
PEM^2	1	–	–	0.94	–	–
LLM^2	1	–	–	1.20	–	–
AWM^2	1	–	–	1.25	–	–
PWM^2	1	–	–	1.27	–	–
LM_1	8	1.26	1.35	1.30	0.03	0.078
WM_1	8	0.65	0.83	0.78	0.06	0.40
LM_2	9	1.14	1.24	1.19	0.03	0.10
WM_2	9	0.68	0.77	0.72	0.03	0.09
LM_3	8	0.95	1.01	0.97	0.02	0.04
WM_3	8	0.52	0.58	0.56	0.03	0.17
LM_1-M_3	5	3.24	3.41	3.34	0.07	0.16
HCP	5	3.39	3.52	3.46	0.06	0.11
HC	2	1.54	1.97		0.30	5.27
HM_2	10	1.05	1.23	1.13	0.06	0.30

D e s c r i p t i o n a n d d i s c u s s i o n. The small dimensions and the orange pigmentation of the teeth are distinctive of this species (FANFANI & MASINI, 1998). The remains are very similar to those from Rivoli Veronese, Kielniki 3A, 3B and Kamyk. The presence of a longitudinal bar in the external temporal fossa, the weakly protruding coronoid spicule, and the position of the mental foramen between the protoconid and paraconid of M_1 are characters which have more in common with the remains from Poland (RZEBIK-KOWALSKA, 1991) than those from Hungary (REUMER, 1984).

Sorex minutus LINNAEUS, 1766

M a t e r i a l. 1 I^1; 1 M^1 (Fig. 2: 5-6).

D i m e n s i o n s. LTI^1 0.77; HI^1 0.87; PEM^1 1.12; LLM^1 1.39; AWM^1 1.29.

D e s c r i p t i o n. I^1: small; bifid apex, stained red; broad buccal cingulum; very long talon; apex and talon forming a right angle. M^1: very worn, small in size, with a red pigmentation; presence of metaloph; pronounced cingulum, which extends from the weak hypocone to the mesial side of the protocone; ridge of protocone distally extending to the hypocone, but separate from it.

D i s c u s s i o n – Upper incisor typical of *S. minutus* on account of its small size, bifid apex, and morphology as mentioned above (REUMER, 1984). The molar differs from those of *S. bor* in the presence of metaloph and red pigmentation, from those of *S. praealpinus* in the profile of the tooth, and from those of *S. subaraneus* in its less developed hypocone and cingulum of protocone. The absence of any descriptions of *S. runtonensis* upper molars prevents comparison. However, the

presence in Monte La Mesa of *S. bor* – which has never been found alongside *S. runtonensis* – and the age of the fauna suggest that the latter can be excluded. The morphology, pigmentation, and especially the dimensions, allow this M^1 to be ascribed to *S. minutus*.

Sorex praealpinus HELLER, 1930

M a t e r i a l. 1 hemimandible with P_4+M_1, 1 with M_1, 3 with M_{1+2}, 2 with M_{1+2+3} (1 with ascending ramus), 1 with M_2, 1 with M_3; 4 ascending rami; 1 isolated condyle (Fig. 2: 8, Table V).

Table V

Dimensions of *Sorex praealpinus*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LM_1	4	1.35	1.48	1.43	0.06	0.28
WM_1	5	0.80	0.89	0.85	0.04	0.19
LM_2	6	1.23	1.40	1.31	0.06	0.25
WM_2	6	0.74	0.83	0.77	0.03	0.11
LM_3	2	1.08	1.13		0.04	0.11
WM_3	3	0.58	0.66	0.63	0.04	0.30
HCP	6	3.46	3.94	3.65	0.16	0.67
HC	4	1.58	2.06	1.80	0.21	2.49
HM_2	10	1.10	1.35	1.23	0.08	0.56

D e s c r i p t i o n. Teeth stained red. P_4: bicuspidated; distal lingual basin which distally reaches the cingulum. M_3: reduced. Hemimandible: coronoid spicule from protruding to absent, high when present; internal temporal fossa reaching the apex in some specimens; mental foramen with variable position, from below the mesial root of M_1 to below the root of P_4.

D i s c u s s i o n. These remains are similar in morphology and dimensions to those of *Sorex praealpinus* from Kielniki 3A and to those described in the literature (HELLER, 1958; DEHM, 1962; RZEBIK-KOWALSKA, 1991). In spite of the presence of younger specimens with less pronounced features (less protruding or absent coronoid spicule, external temporal fossa below the coronoid spicule less deep, ascending ramus smaller and more delicate, less developed or absent horizontal bar in the internal temporal fossa), the remains fall within the diagnostic characters of the species, particularly with respect to the tooth pigmentation, dimensions, and characteristic condyle morphology.

Sorex (*Drepanosorex*) *praearaneus* (KORMOS, 1934)

M a t e r i a l. 1 I_1 (Fig. 2: 7).

D e s c r i p t i o n a n d d i s c u s s i o n. In this specimen the distal portion of the crown is missing and therefore cannot be measured. Pigmentation is reddish-orange; three cuspules are isolated by deep depressions, especially the central one. This specimen was compared with the Polish one, proving to be highly similar in dimensions, pigmentation, and morphology to MF/1933/91/n°7 from Kielniki 3A. Even if fragmentary, there are no doubts as to the specific attribution of this specimen.

Soricidae indet. I (small sized)

M a t e r i a l. 1 M_1.

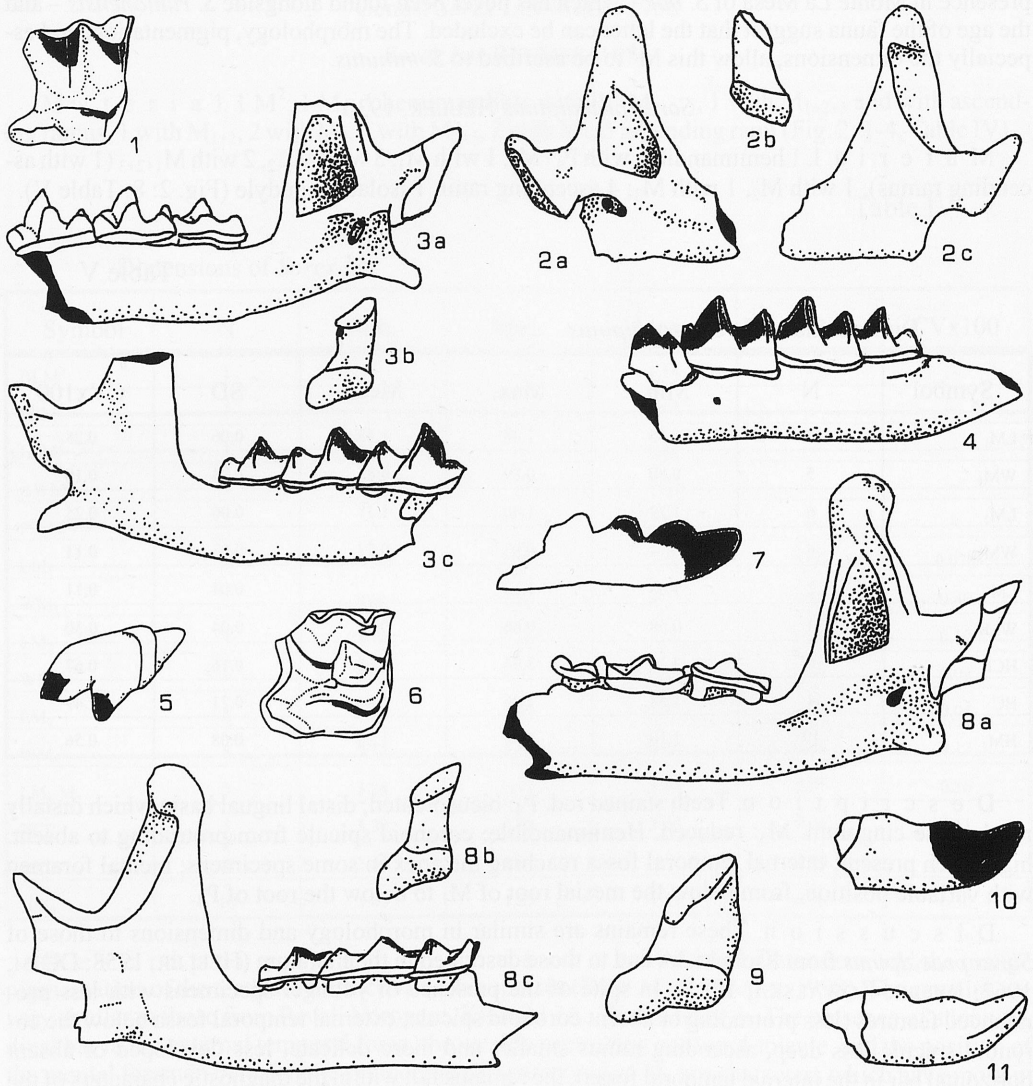

Fig. 2. *Sorex bor*: 1 – M^2; 2 – ascending ramus and condyle; 3 – hemimandible with M_{1+2+3} and condyle; 4 – hemimnadible with P_4, M_{1+2+3}. *Sorex minutus*: 5 – I^1; 6 – M^1. *Sorex* (*Drepanosorex*) *praearaneus*: 7 – I_1. *Sorex praealpinus*: 8 – hemimandible with M_{1+2+3} and condyle. Soricidae indet. II: 9 – condyle; 10-11 – I_1. Fig. 2.1: ×12.5; Fig. 2.2-4: ×9; Fig. 2.5-6: ×12.5; Fig. 2.7-11: ×9.

D i m e n s i o n s. LM_1 1.42; $TAWM_1$ 0.75; $TRWM_1$ 0.67.

D e s c r i p t i o n. M_1: long and narrow, with the mesial portion much longer than the distal one; pale orange pigmentation; undulated buccal cingulum, only mesially and distally pronounced, low especially in the central portion; the lingual cingulum is as pronounced as the buccal one, but much higher.

D i s c u s s i o n. The molar differs from those of *S. bor* because it is longer, narrower, and has different proportions between talonid and trigonid; it also differs from those of *S. praealpinus* in its different pigmentation. In size it is very similar to the smallest remains of *S. (D.) praearaneus* from Tegelen (REUMER, 1984), but differs from *S. (D.) praearaneus* of Rivoli Veronese (FANFANI and MASINI, 1998) in morphology and size; its attribution is therefore uncertain.

Soricidae indet. II (large sized)

M a t e r i a l. 3 I_1; 1 M_1 or M_2; 1 isolated condyle (Fig. 2: 9-11).

D i m e n s i o n s. LM ~1.97; WM ~1.29; HC 2.45; WUF 1.32; WLF 1.79.

D e s c r i p t i o n. I_1: worn, showing two wide cusps, the mesial one particularly low. Two lack pigmentation, while the third one is stained red on the apex. M_1 or M_2: very worn, similar in size to those of *Beremendia*, but with low buccal cingulum. Interarticular area of the condyle wide, low, right-angled trapezium in shape, with its greater base on the buccal side; the upper articular facet is very wide and more inclined than the lower one; the lower facet has a concave lower edge in its central portion, particularly high where it joins the lower lingual end of the interarticular area, and lingually bending downwards; viewed laterally, the upper edge of the condyle stands out considerably, so that the upper sigmoid notch is deep. Although fragmented, the external temporal fossa seems to be very low.

D i s c u s s i o n. The remains, vaguely resembling those of *Dimylosorex* from Deutsch-Altenburg (RABEDER, 1982), have been kindly compared with the type material by Prof. RABEDER, who excluded their belonging to this taxon. The scarce material and the impossibility of knowing whether they belong to one or more species lead them to be ascribed only to Soricidae indet. II (large sized).

Family: Talpidae GRAY, 1825

Genus: *Talpa* LINNAEUS, 1758

Talpa minor FREUDENBERG, 1914

M a t e r i a l. 3 P^4; 1 M^3; 1 upper jaw with P^{1+2}; 2 M^1; 1 P_4; 3M_1; 5 M_2; 3 M_3; 1 hemimandible with M_1, 1 with M_{1+2}, 5 toothless; 1 scapula, 12 humeri, 14 radii, 9 ulnae, 4 femurs, 7 tibiae-fibulae (Fig. 3: 1-4, Table VI).

Table VI

Dimensions of *Talpa minor*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LM_1	2	1.88	1.97		0.06	0.21
LM_2	5	2.25	2.45	2.36	0.09	0.33
LM_3	3	1.97	2.10	2.05	0.08	0.27
HM_2	3	1.85	2.20	2.07	0.19	1.77
WS humerus	8	3.21	3.73	3.35	0.16	0.77

D e s c r i p t i o n a n d d i s c u s s i o n. Mole fossils are distinguished mainly by their dimensions. During the Plio-Pleistocene, in Europe, the following species have been documented: *Talpa episcopalis* KRETZOI, 1956, *Talpa fossilis* PETÉNYI, 1864, *Talpa stromeri* BRUNNER, 1950, *Talpa* sp. (very small in size) (FANFANI and MASINI, 1998), *Talpa neagui* RADULESCU and SAMSON, 1989, *Talpa csarnotana* KRETZOI, 1959 and *Talpa minor*. On the basis of the works by HELLER (1930, 1936, 1958), KORMOS (1937), KRETZOI (1959), DEHM (1962), RABEDER (1972), and DAHLMANN and STORCH (1996), the remains from Monte La Mesa differ from the first three moles mentioned above in their small size, from the fourth and fifth in their larger size, and from the sixth in the proportions of the humerus, while they correspond perfectly with the dimensions of *T. minor* from Hundsheim. This latter attribution is supported by the characteristic lack of the mesial lingual cingulum in M_1.

Order: Lagomorpha

Family: Leporidae GRAY, 1821

Genus: *Hypolagus* DICE, 1917

Hypolagus beremendensis (PETÉNYI, 1864)

M a t e r i a l. 14 upper I; 12 lower I; 42 upper jugals of which 11 P^2; 19 lower jugals of which 7 P_3; 1 proximal fragment of right radius; 1 second phalanx (Fig. 3: 5-8).

D e s c r i p t i o n a n d d i s c u s s i o n. P^2: the breadth of the teeth reaches 3.73 mm without cement; no mesoflex (buccal mesial re-entrant angle); paraflex (major mesial re-entrant angle) well developed; hypoflex (lingual mesial re-entrant angle) short, U or V shaped; lingual lobe with flattened margin. P_3: the greatest diameters (breadth x depth) are 3.18 x 3.18 mm. The diameters of the caput radii are 7.5 x 4.7 mm, and fall within the middle values of the material from Deutsch-Altenburg (FLADERER, 1984); no anteroflexid; mesial margin of trigonid enlarged; protoflexid (antero-buccal re-entrant angle) well developed; hypoflexid (greatest buccal re-entrant angle) with thick enamel in mesial side, sometimes crenulated; no paraflexid (anterior lingual groove). In accordance with FLADERER and REINER (1996), the characters quoted above permit the attribution of this leporid to an evolved form of *Hypolagus beremendensis*.

Order: Rodentia

Family: Sciuridae GRAY, 1821

Genus: *Sciurus* LINNAEUS, 1758

Sciurus warthae SULIMSKI, 1964

M a t e r i a l. 3 I^1; 1 D^4; 1 P^4; 1 M^1; 1 M^{1-2}; 2 I_1; 4 P_4; 3 M_1; 1 M_2; 1 M_3 (Fig. 3: 9-14, Table VII)

Table VII

Dimensions of *Sciurus warthae*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LD^4	1	–	–	2.13	–	–
WD^4	1	–	–	2.00	–	–
LP^4	1	–	–	2.28	–	–
WP^4	1	–	–	2.31	–	–
LM^1	1	–	–	2.34	–	–
WM^1	1	–	–	2.50	–	–
LP_4	3	2.13	2.16	2.14	0.17	0.01
WP_4	3	1.91	2.1	2.03	0.10	0.51
LM_1	3	2.47	2.62	2.55	0.08	0.22
WM_1	3	2.28	2.59	2.44	0.16	0.99
LM_2	1	–	–	2.62	–	–
WM_2	1	–	–	2.59	–	–
LM_3	1	–	–	3.01	–	–
WM_3	1	–	–	2.62	–	–

D e s c r i p t i o n a n d d i s c u s s i o n. The dimensions, greater than in *Sciurus vulgaris*, fall within the range of the material from Weze 1, type locality of *S. warthae* (SULIMSKI, 1964). M_3: four roots. D^4: three small roots; in comparison with those from Podlesice and Zamkowa Dolna (BLACK and KOWALSKI, 1974) and attributed to *Sciurus* cf. *warthae*, there is a hint of protoconule and metalophule towards the protocone. The dimensional relationships between the cusps, the pattern of the teeth, and their morphologies correspond precisely to those of *S. warthae*.

Sciuridae indet.

M a t e r i a l. Dental crown of D_4 or P_4.

D e s c r i p t i o n a n d d i s c u s s i o n. The tooth (1.66-1.45) is characterized by: subtriangular shape of chewing surface, elongated anterior part, lack of paraconid, well isolated mesoconid, presence of metastylid. This tooth is more complex than a P_4 of present *Tamias* (OGNEV, 1966) and recalls that of *Pliosciuropterus* (SULIMSKI, 1964), but its dimensions are smaller. Because it is a crown, it could be a deciduous tooth.

Family: Cricetidae ROCHEBRUNE, 1883

Genus: *Allocricetus* SCHAUB, 1930

Allocricetus bursae SCHAUB, 1930

M a t e r i a l. 2 M^1; 2 M^3; 1 M_1; 2 M_2; 2 M_3 (Fig. 3: 16, Table VIII).

Table VIII

Dimensions of *Allocricetus bursae*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LM^1	2	1.85	2.07		0.16	1.23
AWM^1	2	1.01	1.08		0.05	0.23
PWM^1	2	1.17	1.29		0.08	0.59
LM^3	2	1.14	1.20		0.04	0.15
WM^3	2	1.01	1.01		0.30	0.00
LM_1	1	–	–	1.97	–	–
AWM_1	1	–	–	0.80	–	–
PWM_1	1	–	–	1.17	–	–
LM_2	2	1.51	1.57		0.04	0.12
WM_2	2	1.20	1.29		0.04	0.33
LM_3	2	1.48	1.54		0.04	0.12
WM_3	2	1.08	1.17		0.06	0.36

Allocricetus ehiki SCHAUB, 1930

M a t e r i a l. 1 M^1; 1 M_2 (Fig. 3: 15).

D i m e n s i o n s. LM^1 2.22; AWM^1 1.12; PWM^1 1.39; LM_2 2.07; WM_2 1.08.

D e s c r i p t i o n a n d d i s c u s s i o n. The dimensions of this material, smaller than those of *Mesocricetus* and larger than those of *Cricetulus*, together with the distally inflated occlusal profile of M^1, permit the attribution of these remains to the *Allocricetus* genus. The greater dimensions, pre-anterocone cingulum, parastyle, more lobate profile of M^1, and more in-

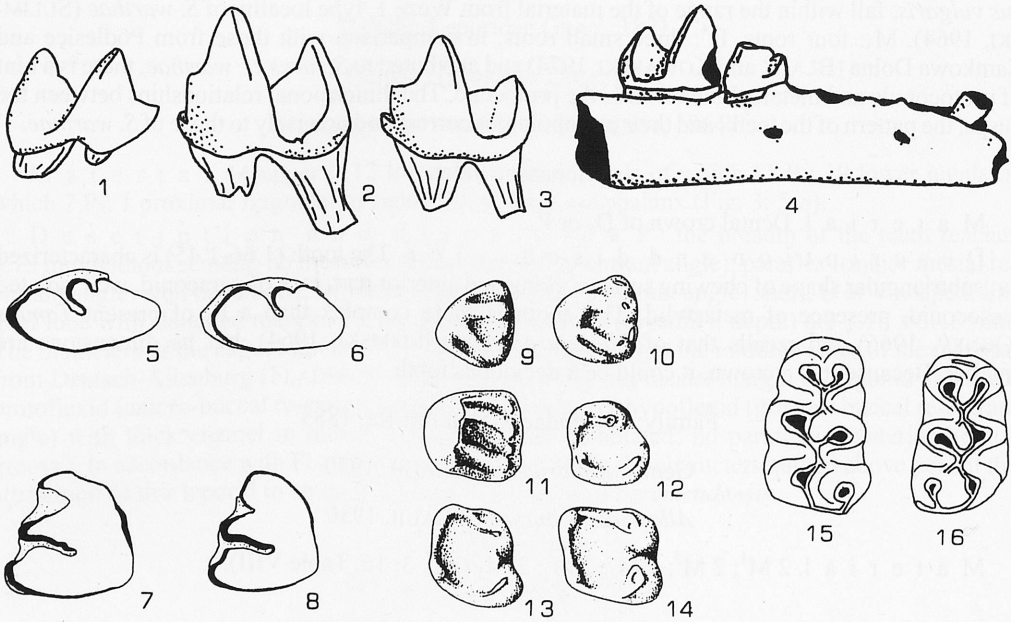

Fig. 3. *Talpa minor*: 1 – M_1; 2 – M_2; 3 – M_3; 4 – hemimandible with M_{1+2}. *Hypolagus beremendensis*: 5-6: P^2; 7-8 – P_3. *Sciurus warthae*: 9 – D^4; 10 – P^4; 11 – M^1; 12 – P_4; 13 – M_1; 14 – M_2. *Allocricetus ehiki*: 15 – M^1. *Allocricetus bursae*: 16 – M^1. Fig. 3.1-3: ×9; Fig. 3.4: ×6; Fig. 3.5-16: ×10.

flated cusps of M_2 induce ascription of two specimens to *Allocricetus ehiki*. The others, simpler and with a more linear profile, are attributed to *A. bursae*. The descriptions and dimensions provided by PRADEL (1988) for the material from Zamkowa Dolna Cave, Kielniki 3A and Kozi Grzbiet and by HÍR (1989, 1992) for the Tarkö shelter and Hajnóczy cave support these attributions.

Genus: *Pliomys* MÉHELY, 1914

Pliomys episcopalis MÉHELY, 1914

M a t e r i a l. 52 M^1; 51 M^2; 51 M^3; 1 M^{1+2}; 107 M_1; 60 M_2; 65 M_3; 1 M_{1+2}; 1 M_{1+2}; 1 M_{1+2+3} (Fig. 4: 1-9, Table IX).

Table IX

Dimensions of *Pliomys episcopalis*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LM^3	39	1.51	1.85	1.72	0.08	0.38
LM_1	52	2.19	2.71	2.52	0.14	0.77

D e s c r i p t i o n a n d d i s c u s s i o n. M_1: most common morphotype with asymmetrical AC more developed buccally, narrow LRA4 and broader BRA3; less frequent morphotypes with quite small AC, a hint of BRA4, and extremely confluent T4 and T5 forming almost a pitymyoid rhombus; one specimen with an enamel islet in a very broad AC. M^3: dentine field of AL and T2 continuous, that of T3 isolated or slightly confluent with T4; BRA1 always shallow, LRA2,

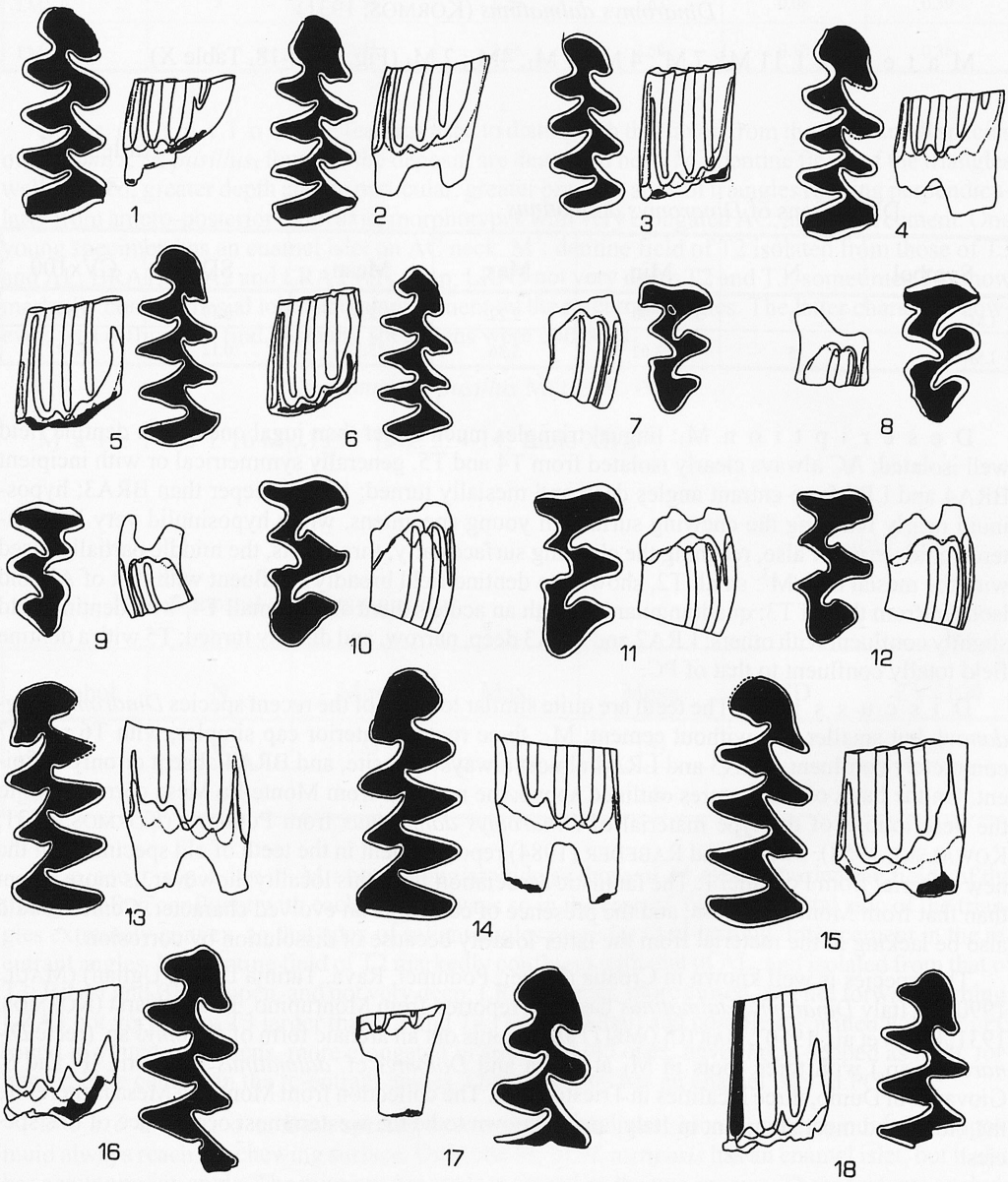

Fig. 4. *Pliomys episcopalis*: 1-6 – M_1; 7-9 – M^3. *Dinaromys dalmatinus*: 10-12 – M^3; 13-18, M_1. Occlusal view: ×10, buccal view: ×5.

BRA2 and LRA3 narrow, deep, and turned forward; dentine field of PC and T4 continuous, hook shaped due to the presence of T5; anterosinulus and protosinus very high, with distosinus more than half-way up the tooth in young individuals; chewing surface pattern quite angular, with triangles showing trapezoidal profile. The above features allow ascription of these remains to *Pliomys episcopalis*.

Genus: *Dinaromys* KRETZOI, 1955

Dinaromys dalmatinus (KORMOS, 1931)

M a t e r i a l. 11 M^1; 7 M^2; 4 M^3; 9 M_1; 4M_2; 2 M_3 (Fig. 4: 10-18, Table X).

Table X

Dimensions of *Dinaromys dalmatinus*

Symbol	N	Min.	Max.	Mean	SD	CVx100
LM^3	3	1.90	2.22	2.02	0.17	1.50
LM_1	5	3.02	3.36	3.17	0.12	0.49

D e s c r i p t i o n. M_1: lingual triangles much larger than jugal ones; each dentine field well isolated; AC always clearly isolated from T4 and T5, generally symmetrical or with incipient BRA4 and LRA5; re-entrant angles deep and mesially turned; LRA4 deeper than BRA3; hyposinuid nearly reaching the chewing surface in young specimens, while hyposinulid very low; anterosinuid very low also, reaching the chewing surface early; three roots, the middle partially fused with the mesial one. M^3: small T2, showing a dentine field broadly confluent with that of AL and isolated from that of T3; quadrangular T3, with an acute salient angle; small T4, with dentine field slightly confluent with others; LRA2 and LRA3 deep, narrow, and distally turned; T5 with a dentine field totally confluent to that of PC.

D i s c u s s i o n. The teeth are quite similar to those of the recent species *Dinaromys bogdanovi*, but smaller and without cement; M_1: three rooted; anterior cap simpler, with T6 and T7 completely confluent; BRA3 and LRA4 almost always opposite, and BRA4 absent or only incipient. On the basis of the features outlined above, the material from Monte La Mesa corresponds to the descriptions of the type material of *Dinaromys dalmatinus* from Podumci (KORMOS, 1931; KOWALSKI, 1958). MALEZ and RABEDER (1984) report cement in the teeth of old specimens of the new material from Podumci 1. The faunistic association from this locality, however, is more recent than that from Monte La Mesa, and the presence of cement is an evolved character. Cement could also be lacking in the material from the latter locality because of dissolution by corrosion.

This species is well known in Croatia (Dubci, Podumci, Rava, Tatinja Draga, Ugljan) (MAUL, 1990). In Italy *Dinaromys dalmatinus* has been reported from Monrupino, Trieste Karst (KORMOS, 1931; COEN et al., 1950); BARTOLOMEI (1980) points out an archaic form of *Dolomys* sp. (recte *Dinaromys* sp.) with three roots in M_1 at Slivia and *Dolomys* cf. *dalmatinus* at Bristie II° and S. Giovanni di Duino, three localities in Trieste Karst. The collection from Monte La Mesa is therefore the oldest and most abundant in Italy, and is known to be the westernmost occurrence of this species.

Genus: *Mimomys* FORSYTH-MAJOR, 1902

Mimomys tornensis JÁNOSSY and VAN DER MEULEN, 1975

M a t e r i a l. 15 M_1; 1 M_1+M_2; 11 M^3 (Fig. 5: 15-19, Table XI).

Table XI

Dimensions of *Mimomys tornensis*

Symbol	N	Min.	Max.	Mean	SD	CV×100
LM^3	8	1.54	1.76	1.63	0.08	0.39
LM_1	6	2.41	2.68	2.58	0.10	0.36

D e s c r i p t i o n. The features used to distinguish this taxon from the other small species of *Mimomys*, *M. pusillus*, found in the deposit, are described here. M_1: dentine fields of the triangles well isolated; greater depth and, in particular, greater breadth; apex of triangles running perpendicularly from antero-posterior tooth axis; morphotypes with very elongated AC; abundant cement. One young specimen has an enamel islet on AC neck. M^3: dentine field of T2 isolated from those of T3 and AL; BRA1, BRA2 and LRA2 very deep; LRA3 not very deep; T2 and T3, sometimes T4, show markedly convex mesial lobe; abundant cement on the re-entrant angles. The latter character, however, was difficult to find, as many specimens were corroded.

Mimomys pusillus MEHÉLY, 1914

M a t e r i a l. 16 M_1; 13 M^3 (Fig. 5: 4-14, Table XII).

Table XII

Dimensions of *Mimomys pusillus*

Symbol	N	Min.	Max.	Mean	SD	CV×100
LM^3	11	1.35	1.69	1.53	0.09	0.52
LM_1	6	2.22	2.68	2.49	0.16	1.05

D e s c r i p t i o n. M_1: not so long or wide as those of *M. tornensis*; dentine fields of the triangles often confluent with each other, always so in the case of T1 or T2; distal side of the triangles extremely convex, so that apex of salient angles more forward-turning; little cement in the re-entrant angles. M^3: dentine field of T2 markedly confluent with that of AL, and isolated from that of T3; BRA1 and BRA2 open, and not very deep; LRA2 deeper, more closed, and not forward-turning; LRA3 not very deep; T3 larger than T2 and T4; T4 very small and completely joined with PC; PC round in young specimens, more elongated in adult and old ones, never hook-shaped as in *M. tornensis*; little cement in the re-entrant angles. One specimen has an enamel islet in PC neck.

D i s c u s s i o n. Both species have a very high linea sinuosa; anterosinuid and hyposinuid always reach the chewing surface. Only one M_1 of *M. tornensis* has an enamel islet, but it also has a mimomyian angle. The mimomyian angle is shared by the two species. These features exclude the attribution of this material to *M. coelodus*. M_1 from Monte La Mesa are slightly smaller than the 7 specimens of the type material of *M. tornensis* from Osztramos 3 (JÁNOSSY and VAN DER MEULEN, 1975). The presence of highly characteristic M^3 provides further support to both the attribution of these species and their coexistence in the same locality.

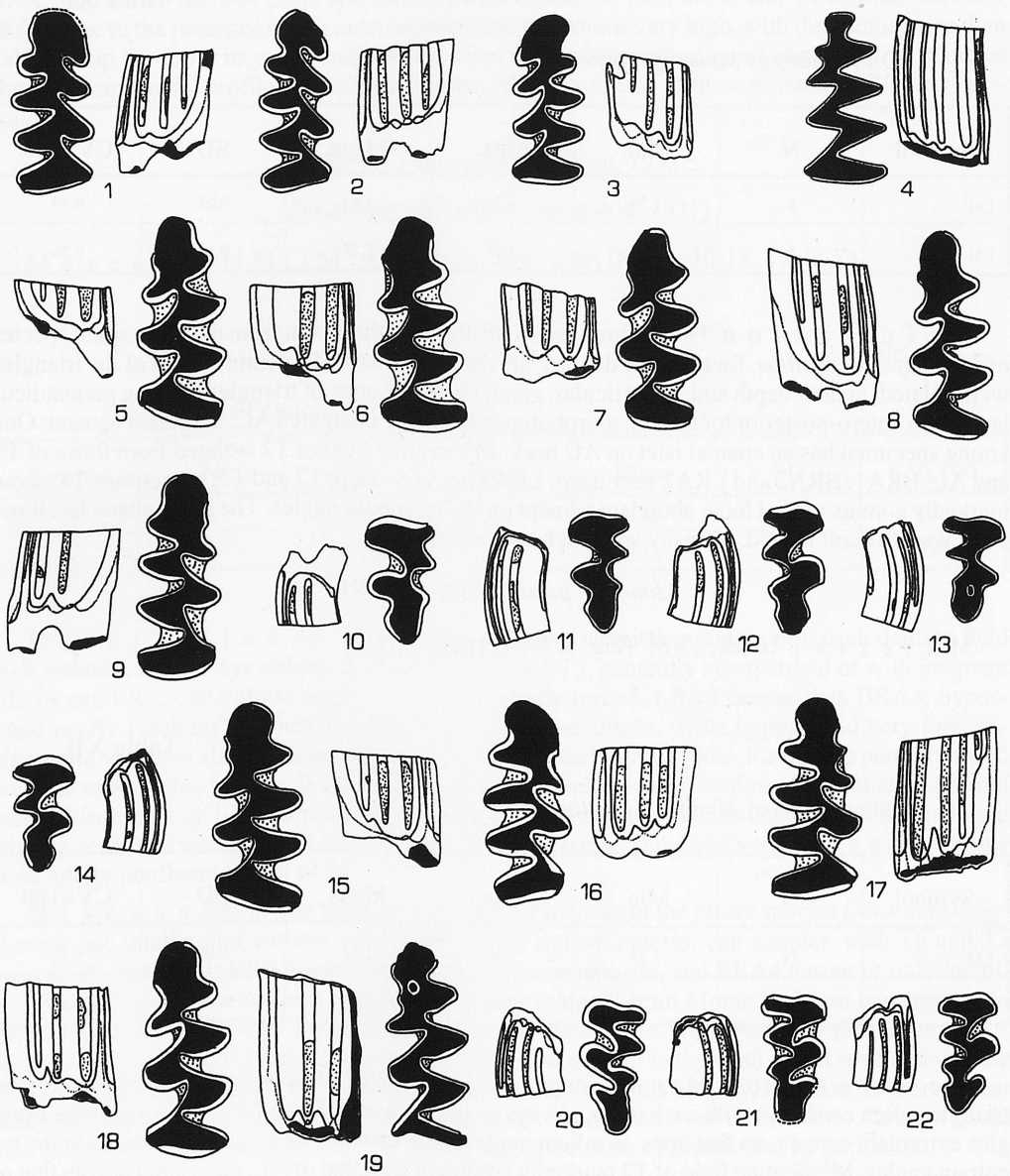

Fig. 5. *Clethrionomys* sp.: 1-3 – M_1. *Mimomys pusillus*: 4-9 – M_1; 10-14, M^3. *Mimomys tornensis*: 15-19 – M_1; 20-22 – M^3. Occlusal view: ×10, buccal view: ×5.

Mimomys cf. *ostramosensis* JÁNOSSY and VAN DER MEULEN, 1975

M a t e r i a l. 1 M^2; 1 M^3 (Fig. 6: 1-2).

D i m e n s i o n. LM^2 2.26; LM^3 2.07.

D e s c r i p t i o n. Only two teeth, showing a mimomyian enamel thickness differentiation, presence of cement and large size. M^2 represents an adult specimen, M^3 a young one; the latter tooth has an enamel islet in the distal loop.

D i s c u s s i o n. On the basis of their dimensions, these remains fall within the range of *Mimomys pliocaenicus-ostramosensis* and *M. savini*. The presence of M^3 with enamel islet excludes its attribution to *M. savini* (HINTON, 1926); it is similar to *M. ostramosensis* from Deutsch-Altenburg (RABEDER, 1981) and to the description of the type material from Osztramos 3 (JÁNOSSY and VAN DER MEULEN, 1975). The finding of only two specimens, of which M^2 is non-diagnostic, do not permit a sure attribution to be made.

Genus: *Clethrionomys* TILESIUS, 1850

Clethrionomys sp.

M a t e r i a l. 3 M_1 (Fig. 5: 1-3, Table XIII).

Table XIII

Dimensions of *Clethrionomys* sp.

Symbol	N	Min.	Max.	Mean	SD	CV×1 00
LM_1	3	2.16	2.31	2.24	0.08	0.25

D e s c r i p t i o n a n d d i s c u s s i o n. The M_1 are referred to this genus on the basis of the following features: small dimensions; undifferentiated enamel; characteristic pattern of chewing surface, with very slanting mesial jugal side of the triangles; confluence of dentine fields in T1 and T2, and in T4 and T5; AC asymmetrical, with BRA3 narrow and deep and LRA4 broader; thick enamel; cement in the re-entrant angles in one specimen. The two remaining teeth do not have cement or dentine, owing to corrosion.

Genus: *Microtus* (*Allophaiomys*) (KORMOS, 1932)

Microtus (*Allophaiomys*) gr. *pliocaenicus* (KORMOS, 1932)

M a t e r i a l. 84 M_1; 54 M_2; 28 M_3; 45 M^1; 38 M^2; 42 M^3; M_1+M_2 (Fig. 6: 3-16, Table XIV).

Table XIV

Dimensions of *Microtus* (*Allophaiomys*) gr. *pliocaenicus*

Symbol	N	Min.	Max.	Mean	SD	CV×100
LM^3	23	1.51	1.88	1.72	0.10	0.56
LM_1	40	2.5	3.01	2.72	0.12	0.53
A/L index	40	37.59	45.90	42.04	1.82	0.079

D e s c r i p t i o n. This is the only rootless vole found in the deposit. M_1: trigonid with well isolated triangles, T3 larger than or, infrequently, same as T1; T4 and T5 with highly confluent dentine fields; AC quite isolated and often elongated, asymmetrical; axis of tooth weakly jugally concave; AC asymmetrical, partly due to the presence of LSA5 and a weak LRA5, or broad BRA3 and narrow LRA4; generally undifferentiated enamel; abundant cement, sometimes very abundant. M_3: well isolated triangles with deep re-entrant angles, sometimes a third lingual re-entrant angle which shows T4 blended with distal cap; enamel scarcely differentiated.

D i s c u s s i o n. The presence of scarcely or non-differentiated enamel, M_1 with weakly elongated anteroconid and isolated AC permit ascription of this material to *Microtus* (*Allophaiomys*) gr. *pliocaenicus*. The remains from Monte La Mesa were previously studied and published by MASINI et al. (1998).

Family: Muridae GRAY, 1821

Genus: *Apodemus* KAUP, 1829

Apodemus atavus KRETZOI, 1959

M a t e r i a l. 159 M^1; 76M^2; 4 M^3; 224 M_1; 93 M_2; 24 M_3 (Fig. 6: 17-40, 42-48, Table XV).

Table XV

Dimensions of *Apodemus atavus*

Symbol	N	Min.	Max.	Mean	SD	CV×100
LM^1	168	1.82	2.16	1.95	0.07	0.27
LM^2	76	1.23	1.48	1.36	0.06	0.27
LM_1	176	1.76	2.16	1.94	0.08	0.30
LM_2	91	1.17	1.35	1.25	0.04	0.15

D e s c r i p t i o n. M^1: t1 and t3 (nomenclature in HUTTERER et al., 1988) often at the same level; t1bis and t3bis sometimes present; one specimen with a further mesial accessory tubercle; t1 more isolated from t2 than from t3; t1 and t3 usually well isolated from t5; a thin enamel ridge often runs at the base of t1, t2, and t3, extending at times to t4 and t5; t4 at the same level as t6 or further back; t4 well isolated from t7 by a deep groove: occasionally they are connected by a strong cingulum; posterior cingulum is a large tubercle, infrequently small and curved towards t9; t8 and t9 connected by a thin enamel ridge; three roots: only one large specimen four-rooted. M^2: small and round t3; t1 larger than t3, often triangular or oval; t4 and t7 separated by a deep groove; pc more or less developed, tubercle shaped; t8 and t9 joined by a thin enamel ridge; t9 relatively large, oval or elongated. M^3: on account of the small number their description is not considered significant. M_1: in over half of the specimens, tma is similar to anteroconids (L1) (tE and tF in PASQUIER, 1974) in size, almost always blended to the anterior couple of tubercles, but sometimes to a single tubercle, not blended at all, or absent altogether; three-four accessory tubercles, five in a few specimens, forming a strong cingular edge; posterior cingulum always round, high, behind L3 (tA and tB); two roots always present. M_2: alc slightly reduced and oval; outer cingular edge strong, with only one accessory tubercle (occasionally two or none, very rarely three tubercles); strong, round posterior cingulum, behind L3. M_3: tB, tC, and tD always present, sometimes tA and tE.

D i s c u s s i o n. This is the first finding in Italy of *Apodemus atavus*, hitherto known only in Switzerland, Germany, and Austria (HELLER, 1936; RIETSCHEL and STORCH, 1974; MAUL, 1990; BOLLIGER et al., 1993; MÖRS et al., 1998; KOLFSCHOTEN et al., 1998) or, as *Apodemus* cf. *atavus*, in Anatolia (ÜNAY and DE BRUIJN, 1998). The remains mentioned in the references, except those of MÖRS et al. and KOLFSCHOTEN et al., are similar in dimensions and morphology; the specimens from Anatolia are larger.

The population from Monte La Mesa is the largest one known.

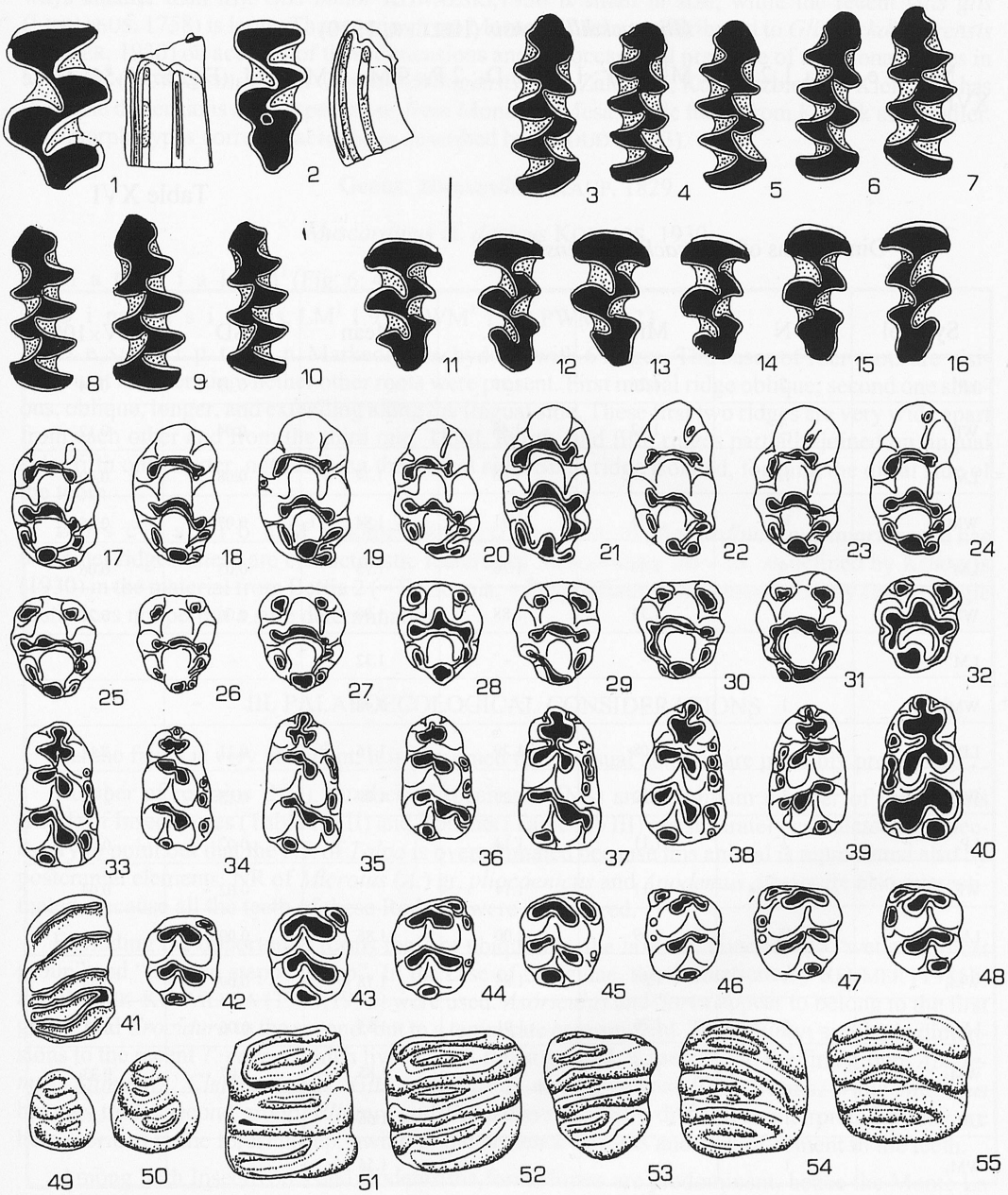

Fig. 6. *Mimomys* cf. *ostramosensis*: 1 – M^2; 2, M^3. *Microtus* (*Allophaiomys*) gr. *pliocaenicus*: 3-10 – M_1; 11-16 – M^3. *Apodemus atavus*: 17-24 – M^1; 25-32 – M^2; 33-40 – M_1; 42-48 – M_2. *Glis sackdillingensis*: 49 – D_4; 50 – P_4; 51 – M_1; 52 – M_2; 53 – M_3; 54 – M^1; 55 – M^2. *Muscardinus* cf. *dacicus*: 41 – M^1. Occlusal view: ×10, buccal view: ×5.

Family: Gliridae THOMAS, 1897

Genus: *Glis* ZIMMERMANN, 1780

Glis sackdillingensis (HELLER, 1930)

M a t e r i a l. 2 P^4;12 M^1; 4 M^2; 1 M^3; 3 D_4; 2 P_4; 9 M_1; 6 M_2; 1 M_3 (Fig. 6: 49-55, Table XVI).

Table XVI

Dimensions of *Glis sackdillingensis*

Symbol	N	Min.	Max.	Mean	SD	CV×100
LP^4	2	1.26	1.39		0.09	0.64
WP^4	2	1.42	1.48		0.04	0.12
LM^1	12	1.57	1.85	1.77	0.08	0.40
WM^1	12	1.73	1.91	1.84	0.07	0.25
LM^2	4	1.69	1.76	1.73	0.03	0.06
WM^2	4	1.73	1.88	1.80	0.06	0.21
LM^3	1	–	–	1.32	–	–
WM^3	1	–	–	1.48	–	–
LD_4	3	1.08	1.29	1.16	0.11	1.11
WD_4	3	0.92	1.20	1.09	0.15	2.00
LP_4	2	1.11	1.14		0.02	0.04
WP_4	2	1.11	1.14		0.02	0.04
LM_1	9	1.69	2.00	1.86	0.09	0.41
WM_1	9	1.57	1.85	1.78	0.09	0.44
LM_2	6	1.76	1.91	1.85	0.06	0.21
WM_2	6	1.73	1.91	1.85	0.07	0.23
LM_3	1	–	–	1.66	–	–
WM_3	1	–	–	1.54	–	–

D e s c r i p t i o n. Very small P^4; M^1 and M^2 similar, or M^2 larger; low, flattened crown; 4 main and 3 extra ridges well developed in M^1 and M^2 (nomenclature in DAOUD, 1993), less so in P^4 where the first ridge is often absent. Extra ridges usually alternate with the main ones; however, in one M^2 the second extra ridge is shorter. In one M^1 there are two small additional ridges under the centroloph. In the lower molars, none of the extra ridges reach the edge of the crown. D_4 differs from P_4 in its smaller dimensions and development of median ridges.

D i s c u s s i o n. The dormouse from Monte La Mesa cannot be ascribed to *Glirulus pusillus* (HELLER, 1936) because of the number and morphology of the ridges, and because M_1 is always smaller than M_2. *Glis minor* KOWALSKI,1956 is small in size, while the recent *Glis glis* (LINNAEUS, 1758) is large. The remains from Monte La Mesa are attributed to *Glis sackdillingensis* (HELLER, 1930) on account of their dimensions and the occasional presence of additional ridges in M^1 or M^2 (KOWALSKI, 1963). *Glis sackdillingensis* from Zalesiaki, Kozi Grzbiet and Kielniki 1 has the same dimensions as the specimens from Monte La Mesa, while those from Kamyk are smaller. The morphotypes correspond to those described by DAOUD (1993).

Genus: *Muscardinus* KAUP, 1829

Muscardinus cf. *dacicus* KORMOS, 1930

M a t e r i a l. 1 M^1 (Fig. 6: 41).

D i m e n s i o n s. LM^1 1.97; AWM^1 1.14; PWM^1 1.23.

D e s c r i p t i o n. Markedly brachydont, with 6 ridges. The bases of four roots are visible, but it is uncertain whether other roots were present. First mesial ridge oblique; second one sinuous, oblique, longer, and extending along the lingual side. These first two ridges are very wide apart from each other and from the third one. Third, fourth, and fifth ridges partially joined on lingual side; fifth one shorter, not reaching the buccal side. Sixth ridge isolated, forming the distal side of the tooth.

D i s c u s s i o n. M^1 is somewhat larger than those of *Muscardinus avellanarius*, and has 6 enamel ridges: these are characteristic features of *Muscardinus dacicus*, as defined by KORMOS (1930) in the material from Betfia 2 (= Episcopia, = Püspökfürdö), in Rumania. In any case, a single tooth does not permit a sure determination.

III. PALAEOECOLOGICAL CONSIDERATIONS

As the fauna is very abundant, it is presumed that unusual animals are probably present too.

Number of remains (NR), number of specimens (NS) and minimum number of individuals (MNI) of Insectivores (Table XVII) and Rodents (Table XVIII) are separately calculated. It is necessary to point out that the NR of *Talpa* is overestimated because this animal is represented also by postcranial elements. NR of *Microtus* (*A.*) gr. *pliocaenicus* and *Apodemus atavus* are also overestimated, because all the teeth of these Rodents were considered.

Excluding the opportunist forms that are ubiquitous, the taxa are divided into "wet and forest group" and "dry and steppe group". In the case of Soricidae, the evaluations by REUMER (1985b) and RZEBIK-KOWALSKA (1994;1995) were used. *Asoriculus* and *Sorex* appear to belong to the first group, and *Crocidura* to the second, but to a temperate environment. *Talpa minor*, similar in dimensions to the recent *T. caeca*, which lives in soft forest ground, is assigned to the first group. *Apodemus, Mimomys, Clethrionomys, Glis* and *Sciurus* are considered forest forms, while *Microtus* belongs to the second group. *Pliomys* and *Dinaromys* are more difficult to interpret, but they are here ascribed to the forest group, owing to the presence of roots and lack of cement in the teeth.

Among both Insectivores and Rodents the forest forms are predominant, hence the Monte La Mesa fauna suggests a wooded environment. The forest conditions would explain the corrosion of part of the remains, expecially the lack of cement in some teeth.

Since the number of Soricidae diminishes from the Upper Pliocene because of gradual drying and cooling of the climate (REUMER, 1985b), Monte La Mesa appears to document a wet and temperate phase, occurring shortly after the arid phase which would have permitted the distribution of *Microtus* (*Allophaiomys*) across the Holarctic region, and is probably correlated to Waalian A of Central-Northern Europe.

Table XVII

Frequency percentage for Insectivora

Taxon	NR	%	NS	%	MNI	%
Erinaceus sp.	4	0.79	2	1.08	1	0,91
Crocidura sp.	1	0.20	1	0.54	1	0.91
Beremendia fissidens	81	16.04	28	15.05	14	12.73
Petenyia hungarica	48	9.50	13	6.99	12	10.91
Asoriculus gibberodon	256	50.70	103	55.38	54	49.09
Sorex bor	17	3.37	10	5.38	6	5.45
Sorex minutus	2	0.40	1	0.54	1	0.91
Sorex praealpinus	14	2.77	9	4.84	7	6.36
Sorex (Drepanosorex) praearaneus	1	0.20	1	0.54	1	0.91
Soricidae indet. I	5	0.99	3	1.61	3	2.73
Soricidae indet. II	1	0.20	1	0.54	1	0.91
Talpa minor	75	14.85	14	7.53	9	8.18
Insectivora total	**505**	**100.01**	**186**	**100.02**	**110**	**100**

Table XVIII

Frequency percentage for Rodentia

Taxon	NR	%	NS	%	MNI	%
Sciurus warthae	18	1.26	4	0.82	3	1.08
Sciuridae indet.	1	0.07	1	0.21	1	0.36
Allocricetus bursae	9	0.63	2	0.41	2	0.72
Allocricetus ehiki	2	0.14	1	0.21	1	0.36
Pliomys episcopalis	390	27.25	110	22.63	63	22.58
Dinaromys dalmatinus	37	2.59	11	2.26	6	2.15
Mimomys tornensis	27	1.89	15	3.09	8	2.87
Mimomys pusillus	29	2.03	16	3.29	16	5.73
Mimomys cf. *ostramosensis*	2	0.14	1	0.21	1	0.36
Clethrionomys sp.	3	0.21	3	0.61	2	0.72
Microtus (*A.*) gr. *pliocaenicus*	292	20.41	85	17.49	54	19.35
Apodemus atavus	580	40.53	224	46.09	114	40.86
Glis sackdillingensis	40	2.80	12	2.47	7	2.51
Muscardinus cf. *dacicus*	1	0.07	1	0.21	1	0.36
Rodentia total	**1431**	**100.02**	**486**	**100**	**279**	**100.01**

IV. BIOCHRONOLOGICAL POSITION

The fauna from Monte La Mesa is attributed to the Early Biharian owing to the presence of *Microtus* (*Allophaiomys*) gr. *pliocaenicus*; as regards the evolutive degree of *M.* (*A.*) gr. *pliocaenicus* and the presence of *Mimomys pusillus* together with *M. tornensis*, this mammal association is biochronologically close to those from Żabia Cave (Poland) (NADACHOWSKI, 1990; RZEBIK-KOWALSKA, 1998), Osztramos 8 (Hungary) (JÁNOSSY, 1986; RZEBIK-KOWALSKA, 1998) and Betfia 10 (Rumania) (TERZEA, 1994), and is slightly older than the Italian ones from Pietrafitta and Pirro Nord (MASINI et al., 1998).

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