

The Middle Pleistocene large mammal remains from the Lipova Cave at Hronec (Slovakia)

By

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Abstract. The macro-mammalian fauna of the Lipova Cave at Hronec in Slovakia was excavated in 1837 and 1851. Some animal remains were published as Upper Pleistocene species. The metrical and morphological investigations of the animal remains showed them to be Middle Pleistocene. The oldest *Ovibos* remains are in the fauna of the Lipova Cave.

The Lipova Cave is (or was) in the upper valley of the river Hron (Garam) west of Brezno (Breznóbánya) near Hronec (Hronyec, Rhonitz, Rohnic, Garamfalva, Kisgaram; Zólyom (Zvolen) region, Slovakia, Czechoslovakia). A conjectural use of past tense in the sentence above is reasonable, because apart from the references to the cave in the last century literature (MNM, GÁO. 1851, NEUBEHLER 1851, PETÉNYI 1854, 1864, KUBINYI 1856) I have not found any more exact or recent data on the site. According to J. S. PETÉNYI the "bone-cave" called Lipova is near Garamfalva (Hronecz, Rohnitz) on the slope of a mountain ascending to the North (PETÉNYI 1854). I have no knowledge of the origin of the name of the cave.

It seems therefore that the Lipova Cave can be found in the northern part of the Slovak Ore Mountains (Slovenské rudohorie), where it is situated on the left bank of the Cser brook on the steep southern slope of one of the eastern, 645 m high, spurs of the Chvatimeck mountains.

The earliest reference to the Lipova Cave is from 1837 when A. KOCH, Imperial and Royal member of mining-commission, director at Besztercebánya (Banská Bystrica), visited it and made excavations there (PETÉNYI 1864).

Though the participants of the 3rd General Assembly of Hungarian Doctors and Researchers of Natural Sciences held in 1842 at Besztercebánya (now Banská Bystrica) did not visit the Lipova Cave, they knew about it and the "minerale-bones" which were found there (BALOGH 1846).

Imperial and Royal Adjuncten P. NEUBEHLER at Besztercebánya presented five *Rhinoceros* teeth from the Lipova Cave at the meeting of the Kais. und könig. geologischen Reichsanstalt held in Vienna on 1st April, 1851 (NEUBEHLER 1851).

When in 1851 J. S. PETÉNYI, founder of ornithological, mammal and vertebrate paleontological collections in Hungary was appointed as ordinary curator of the Natural History Department of the National Museum, several private collectors offered their material for the museum from different parts of the country. The animal bone assemblage of the Lipova Cave had got to the National Museum at that time. In July 1851 J. S. PETÉNYI visited Besztercebánya and its environs when he requested, received and brought to Pest and there he identified the bone remains of the Lipova Cave. Although he had no comparative bone material available, J. S. PETÉNYI gave an excellent anatomical description of the finds, save for a few exceptions. The specific identifications of the finds, especially that of "atypical" knuckles, vertebrae, etc. corresponds to the paleontological knowledge of macromammals in the middle of the last century (Table 1).

Half of the finds (more than 40 pieces) have been destroyed. Therefore I consider the registration of the bone remains originating from the cave on the basis of the old inventory, so important; it is necessary to indicate their presence or absence and to give the results of re-examination. In the inventory book the anatomical determinations of the bones are written in Hungarian, I present them here according to the Latin nomenclature.

Table 1
List of the macromammals found in the Lipova Cave (pieces)

	KOCH 1837	NEU- BEHLER 1851	Sum.	revised fauna	
"Ursus spelaeus"	3	5	8	Ursus cf. arctos	3
"Rhinoceros antiquitatis"	21	1	22	Dicerorhinus sp.	5
"Elephas primigenius"	5	-	5	Mammuthus primigenius	3
"Equus caballus fossilis"	4	-	4	Missing	-
"Cervus elaphus fossilis"	4	-	4	Praemegaceros sp.	1
				Alces alces	2
"Ovibos fossilis"	5	-	5	Ovibos pallantis ssp.	6
"Bos taurus fossilis"	26	1	27	Bison schoetensacki	6
	68	7	75	Bison priscus	9
					35

BONE REMAINS COLLECTED BY A. KOCH IN 1837

According to his inventory entries made on the 5th of July, 1851 (MNM. GÁO.) J. S. PETÉNYI identified the following bones originating from the Lipova Cave (68 specimens):

1851. N° 89.

- I. "Ursus spelaeus" - 3 (NEUBEHLER 1851, PETÉNYI 1854, 1864, KOCH 1900). 3 vertebrae - all missing.
- II. "Cervus elaphus fossilis" - 4 (PETÉNYI 1854, 1864, KOCH 1900). Corpus mandibulae dext. with P₃₋₄-M₁ (KUBINYI later mentions a M₂ too, in PETÉNYI 1864) - revid. Alces alces; vertebra fr. - missing; humerus fr. dext. - missing; os phalangis III. post. sin. lat. - revid. Alces alces.
- III. "Ovibos fossilis PETÉNYI" - 5 (only in the literature of the last century: PETÉNYI 1854, 1864, KUBINYI 1856, KOCH 1900). Skull fr. with its two horn-cores meeting horizontally in front of the forehead; M₃ dext. - revid. M³ dext.; M₃ sin. - revid. M³ sin.; 2 M₁ sin. - revid. M₁₋₂ dext.
- IV. "Bos taurus fossilis" - 26 (PETÉNYI 1854, 1864, KUBINYI 1856, KOCH 1900). top of horn-core fr. dext. - revid. Bison schoetensacki; M₂₋₃ sin. - revid. Bison priscus; atlas fr. - missing; epistropheus fr. - revid. Bison priscus; proc. spinosus of vert. thorac. fr. - missing; vert. lumbalis (later vert. cervic. 5th by KUBINYI 1856, PETÉNYI 1864) - revid. Ovibos pallantis vert. cervic 5th; 4 costae fr. - all missing; humerus sin. - missing; humerus sin. et dext. fr. - both missing; radius sin. fr. ("tarsale" lower part by KUBINYI 1856, PETÉNYI 1864) - revid. Bison priscus metatarsus dext. dist.; carpale - revid. Dicerorhinus sp. ph I. dext.; tibia sin. - revid. Bison schoetensacki; tibia dext. fr. - missing; 5 os phalangis large - revid. Bison priscus 2 ph I. ant. and 2 ph I. post., Praemegaceros sp. ph I. ant. sin.; os phalangis small - revid. Bison priscus ph II. post.; 2 os phalangis III. - revid. Bison schoetensacki.
- V. "Equus caballus primigenius" - 4 (PETÉNYI 1854, 1864, KOCH 1900). M₂ sin.; M²⁻³ dext.; radius sin. fr. - all missing.
- VI. "a still unidentified molar of an unknown mammal" - missing.
- VII. "Elephas primigenius" - 5 (PETÉNYI 1854, 1864, KOCH 1900). 2 smaller teeth - 1 missing, M₁ sin. aboral fr.; humerus sin. et dext. fr. - both missing; metatarsus - revid. magnum dext. juv.
- VIII. "Rhinoceros antiquitatis" - 21 (NAUBEHLER 1851, PETÉNYI 1854, 1864, KOCH 1900) 2 Pm⁴ dext. - revid 2 Pm⁴ sin., M² dext. - revid P^{3/4} sin., M³ sin. - revid M¹ dext.,

Dm₄ sin. - revid M_{1/2} sin. with corpus mandibulae fr. ; os zygomaticum fr. juv. - missing; scapula sin. fr. - missing; 2 costae fr. dext. - both missing; humerus dext. fr. and 2 sin. fr. - all missing; ulna dext. et sin. fr. (fragmentary) - left one missing; tibia 2 dext. and 1 sin. fr. - the two right-side ones missing; calcaneus dext. - revid. Bison schoetensacki; 2 os phalangis dext. ant. - revid. mc III. sin. juv. the other one missing; os phalangis ant. sin. - revid. mc III. dext. juv.

BONE REMAINS COLLECTED BY P. NEUBEHLER IN 1851

The old inventory contains the following bones taken over from P. NEUBEHLER at Besztercebánya (Banska Bystrica) by J. S. PETÉNYI on 18th July, 1851:

1851. N^o 95.

- I. "Ursus spelaeus" - 5
5 costae fr. - revid. Ursus cf. arctos 3 costae, 2 missing.
- II. "Bos taurus fossilis" - 1 (KUBINYI 1856, PETÉNYI 1864) corpus mandibulae dext. with P₃₋₄-M₁₋₃ - revid. Bison schoetensacki.
- III. "Rhinoceros antiquitatis" - 1
tibia dext. fr. - missing.

REVISED BONE REMAINS OF THE LIPOVA CAVE

The bone remains are deposited in the Paleontological Department of the Hungarian Natural History Museum, formerly part of the Hungarian National Museum.

Ursus cf. arctos LINNÉ, 1758

- 3 ribs prox. fragments (Plate I: 1, 2, 3). Old Inv. Nr. 95. 1851.
 - 2., 3., one of them unnumbered; new Inv. Nr. V. 61.2313.
- The ribs are thin, narrow and slight. Length of the fragments: 270, 320 and 410 mm. There are two deep bites on the collum of the largest rib.

Dicerorhinus sp.

- P⁴ sin. (mat.) Old Inv. Nr. 89. 1851-309. 1., new V. 60.205. 1.
- P^{3/4} sin. (mat.) Old Inv. Nr. u9. 1851-309. 2., new V. 60.205. 2.
- P⁴ sin. (sen.) Old Inv. Nr. 89. 1851-310. 1., new V. 60.209. 1.
- M¹ dext. (mat.) Old Inv. Nr. 89. 1851-310. 2., new V. 60.209. 2.
- M_{1/2} sin. with corpus mandibulae fr. (juv.) Old Inv. Nr. 89. 1851-311., new V. 60.230.

Tooth measurements (in mm):

	P ^{3/4}	P ⁴	P ⁴	M ¹	M _{1/2}
Basal length	36	35	36	43	38
breadth	47	51	50	58	28
Corona height	25	18	5	20	50

- ulna dext. juv. (Plate I: 4). Old Inv. Nr. 89. 1851.-319., new Inv. Nr. V. 60.261. There are spots of a film-like dripstone layer with small pebbles on its surface. The tuber and the dist. epiph. of ulna are unfused, both are missing. Dimensions (in mm): greatest length 305, olecranon length 102, smallest thickness of olecranon 34. The width of corpus ulnae is 48, its diameter is 47. Maximal breadth of the articular surface is 95.
 - mc III. sin. juv. (Plate I: 6). Old Inv. Nr. 89. 1851. - 321., new Inv. Nr. V. 60.251. The mc III. dist. epiph. is unfused, missing. The prox. epiph. is thick, its medial tuber is well developed. The diaphysis is dorso-volar thick.
 - mc III. dext. juv. (Plate I: 7). Old Inv. Nr. 89. 1851.-323., new Inv. Nr. V. 60.227. The mc III. dext. dist. epiph. is unfused, missing. The dorso-medial tuber of the prox. epiph. is broken off.
- The vertical diameter of the facette posterior on the medial side of the prox. epiph. is 25, its horizontal diameter is 15 mm.

- tibia diaph. sin. (Plate I: 5). Old Inv. Nr. 89.1851.-325., new Inv. Nr. V. 60.263. The prox. and dist. epiph. of the tibia are unfused, both are missing.
 - os phalangis I. dext. digiti IV. (Plate I: 8).
 Old Inv. Nr. 89.1851.-288., new Inv. Nr. V. 60.178.
 Ph I. is short, the prox. epiph. is extremely thick. The breadth of the articular surface of the prox. epiph. is 38, its diameter is 34 mm.
 Bone dimensions (in mm):

	GL	Bp	SBd	Bd	Dp	SDd	Dd
mc III. sin.	(130)	68	46	(60)	50	28	(46)
mc III. dext.	-	-	45	(58)	-	27	(43)
tibia sin.	(230)	-	60	-	-	50	-
ph I ₄ ant.	43	50	39	39	42	31	34.5

The shape and dimensions of juvenile mc III. and the digiti 4th ph I. show characteristics which differ from those of Coelodonta. The wide, thick mc III., especially its prox. epiph. form and the low, but extremely wide ph I₄ are characteristic of rather Dicerorhinus hemitoechus. Dicerorhinus etruscus is more robust.

Mammuthus primigenius (BLUMENBACH, 1799)

- M₁ sin. aboral fr. (Plate II: 1). Old Inv. Nr. 89.1851.-, new Inv. Nr. V. 60.635. The aboral part consists of 4 lamellae; breadth of the tooth is 66, its height is 105 mm. The thickness of the lamella is 8 mm, that of the enamel is 1.5 mm.
 - magnum (C₄) dext. juv. (Plate II: 2). Old Inv. Nr. 89.1851.-306. The magnum is damaged, the dorso-lateral and volaro-medial tubers are broken off.

Dimensions (in mm): length of the fragment is 122, its greatest breadth is 70 in front, and 62 at the back; its greatest height in front is 71, and 84* at the back. Breadth of the mc II. facette is 26 mm on the distal articular surface; breadth of the mc III. facette is 38 mm.

The characteristics of the juvenile Elephas remains of the Lipova Cave do not differ from those of Mammuthus primigenius which existed in the Carpathian Basin (VÖRÖS 1983). Archaic characteristics are not observed on them.

Praemegaceros sp.

- ph I. sin. ant. lat. (Plate VII: 3). Old Inv. Nr. 89.1851.-287., new Inv. Nr. V. 60.452.

The medio-volar proc. of the ph I. prox. epiph. is broken off. The knuckle is short, massive; the prox. epiph. is wide.

Dimensions (in mm):

	GL	Bp	SBd	Bd	Dp	SDd	Dd
Lipova Cave	71	32	24.5	27	-	17.5	22
Lambrecht Cave	71	31	-	27	-	-	-
(JÁNOSSY 1964)	76	33	-	28	-	-	-
Voigstedt 526.	75	32.5	25.0	27.5	36	22.5	25
(KAHLKE 1965)							

The form of the cervid ph I. of the Lipova Cave, especially the form and dimensions of the prox. epiph. differ from both those of the larger Alces and from those of the smaller Cervus. Morphologically it is similar to the Megaloceros-form. Its relatively small dimensions are identical with the known dimensions of the early form, Praemegaceros.

Alces alces (LINNÉ, 1758)

- corpus mandibulae dext. fr. with P₃ fr. -₄-M₁ (Plate III: 7).

Old Inv. Nr. 89.1851.-262., new Inv. Nr. V. 60.3491.

The ento- and hypocond structures of P₄, the dimensions and form of the teeth put this find definitely to the genus Alces. The dimensions of the teeth of Alces latifrons are large.

Dimensions (in mm):

	P ₃	P ₄	M ₁
basal length	19.6	22.5	24.5
basal breadth	16.1	20.1	18.1

- ph III. post. (Plate VIII:4). Old. Inv. Nr. 89.1851.-265., new Inv. Nr. V. 60.421. The characteristic ph III. has a narrow corpus, the margo anterior and solero exist, the proc. extensorius (pyramidale) is medially notched and bent; the tuber solearis is lateral. On the basis of these characteristics the find unquestionably belongs to an Alces.

Ovibos pallantis ssp. (H. SMITH, 1827)

- "skull fragment"; frontale with sin. horn-core (the top has broken off) and dext. horn-core base fr. (Plate IV:1, 2). Old Inv. Nr. 89.1851.-266., new Inv. Nr. V. 82.23.

The most famous find which came to light from the Lipova Cave is an Ovibos skull fr. Its earliest reference is the 1851 list of MNM. GÁO. J. S. PETÉNYI identified and registered it together with the 4 teeth as Ovibos fossilis. He published for the first time the species Ovibos in the species list of the Lipova Cave (PETÉNYI 1854). The Ovibos finds in the collection of the MNM GÁO. were published for the first time on the basis of the inventory book by KUBINYI (1856, Table 1., 2., 3). Later F. KUBINYI published again the Ovibos skull fr. of the Lipova Cave in the book entitled "The posthumous works of J. S. PETÉNYI" but this time without mentioning the teeth (PETÉNYI, 1864). In his catalogue A. KOCH mentions the species from the Lipova Cave together with the sites Hrónicz, Rhonicz, Rhonitz (KOCH 1900).

After it the Ovibos find of the Lipova Cave is mentioned by FRECH (1903) and this was taken over later by KOWARZIK (1912, Find Nr. 81). I. GAÁL mentions the "Ovibos mackenzianus fossilis KOW." find in connection with the Zebevény Ovibos find (GAÁL 1933).

W. SOERGEL, in his work on Central European fossil Ovibos, cites R. KOWARZIK's reference to the Lipova Cave and I. GAÁL's one to "Ronic". Thus in W. SOERGEL's paper the Ovibos find of the Lipova Cave belongs already to two different localities: Nr. 62 - Lipova Cave; Nr. 63 - Ronic (one is located) below the other on the location map of the sites (In SOERGEL 1942).

The latest reference to the Ovibos skull find of "Lipova Cave at Rónic" is in M. KRETZOI's paper dealing with Ovibos finds in Hungary (KRETZOI 1942, Taf. XXV, 4). Description of the skull remains:

It belongs to an adult bull. It is broken and the pieces are glued together. Its right-side part was broken either when it was excavated or it was found already in its present condition. There is only the part over the orbits which have been preserved of the frontale. There is a semicircular linea on its surface and a small foramen in front of the right-side horn-core. On both sides the frontale has a straight wall below the horn-cores. The braincase has broken off, only a small piece of the left parietale has remained. Ahead the sinus frontales can be seen well (Plate IV:2).

The right-side horn-core is fragmentary, several sinus cornuales and sulci vasculosi can be found in it. The largest sinus cornualis (cavum) is at the back; it is at the border of the parietale-frontale. The posterior part of the right-side horn-core has broken off together with the brain case; its frontal part is worn.

The left-side horn-core base is intact, its top has broken off, now it is missing. When the skull was found, this top still existed (KUBINYI 1856, Table 2,3). There is a caudolatero-medial sulcus along the posterior 3rd part of the horn-core. The horn-core base has a medium length, its orocaudal surface is slightly concave, while mediolaterally it is convex (!). The sulcus intercornualis is narrow (its smallest breadth is 14 mm) and shallow (its depth is 10 mm). The horn-core is bent laterally downwards, vertically towards the sides of the skull, but it is not near to the frontalia.

Dimensions (in mm):

1. orocaudal length of horn-core base	165
2. orocaudal length in the middle of horn-core	115
3. vertical diameter in the middle of the horn-core	76
4. orocaudal length of the end of horn-core fr.	75
5. vertical diameter of the end of horn-core fr.	50

6. length of the horn-core fr.	193
7. circumference of the horn-core base	430
8. vertical diameter of the horn-core base	90
9. half of the greatest tangential distance between the outer curves of the horn-cores	135
10. least frontal breadth (fs-fs)	124
11. least breadth between the antero-medial bases of the horn-cores	80
12. the thickness of the squama parietale spongiosa	70

The dimensions of the horn-core of the *Ovibos* skull from the Lipova Cave are identical with those of a certain group of *Ovibos* bulls found in England and in Central Europe (KOWARZIK 1912, KAHLKE 1963, 1969).

Ovibos bull small horn-core dimensions (in mm):

	orocaudal	basal length
1. Sea bottom (KOWARZIK Nr. 70, REYNOLDS Fig. 1. A.)		160
2. Freshford (KOWARZIK Nr. 71, REYNOLDS Plate I. 1-2)		165
3. Koblenz (KOWARZIK Nr. 45, SOERGEL Nr. 14)		161
4. Süssenborn (KAHLKE Inv. Nr. 9071)		165.8
5. Kamnig (KOWARZIK Nr. 40, Taf. II. 1-2; SOERGEL Nr. 79)		169
6. KREUZBERG (KOWARZIK Nr. 37, Taf. II. 3-4; SOERGEL Nr. 38)		170
7. Lipova Cave (KOWARZIK Nr. 81, SOERGEL Nr. 62 (=63!))		165
8. Witebsk I. (KOWARZIK Nr. 24)		170

Further *Ovibos* remains from the Lipova Cave:

- M³ sin. (Plate III:2). Old Inv. Nr. 89.1851.-268., new Inv. Nr. V. 60.523. Crown height 41 mm.
- M³ dext. (Plate III:1) Old Inv. Nr. 89.1851.-267., new Inv. Nr. V. 60.489. Crown height 40 mm.
- M₁ dext. (Plate III:3) Old Inv. Nr. 89.1851.-270., new Inv. Nr. V. 60.487. Crown height 28 mm.
- M₂ dext. (Plate III:4) Old Inv. Nr. 89.1851.-269., new Inv. Nr. V. 60.479. Crown height 40 mm.

Dimensions of teeth (in mm):

	basal length	basal breadth
<i>Ovibos</i>		
Lipova Cave	31.0	21.5
	31.2	21.0
Süssenborn (KAHLKE 1963, 1969)	33.0	24.3
	33.1	24.5
	32.3	22.4
<i>Praeovibos</i>		
Frankenhaus Nr. 1646 (KAHLKE 1963)	46.8	26.4
M ₁ crown		
<i>Ovibos</i>		
Lipova Cave	19.0	15.3
Predmost (KOWARZIK 1912)	19.0	15.0
M ₂ crown		
<i>Ovibos</i>		
Lipova Cave	22.5	16.6
Predmost (KOWARZIK 1912)	20.5	15.5
Frankenhaus Nr. 1642 (KAHLKE 1963)	23.0	17.1
Süssenborn (KAHLKE 1969)	26.1	18.2
<i>Praeovibos</i>		
Frankenhaus Nr. 1643 (KAHLKE 1963)	29.2 ^x	21.7 ^x

The crown column is very high, with a characteristic occlusal pattern. There is a strong, interlobally central annular in the upper and lower parts of the M³ metastyle. The

lower M_{1-2} are narrow. The anterior wall of the crown is straight between the proto- and metastylids. The lower molars are leaning forward in the alveoli of the corpus mandibula, therefore a lack of enamel had developed anteriorly over the roots of the teeth.

The teeth of the Ovibos find of the Lipova Cave are smaller than those of the Ovibos teeth from the gravels of Süssenborn (KAHLKE 1963, 1969).

- vert. cervicalis 5th (Plate V: 1). Old Inv. Nr. 89.1851.-275., new Inv. Nr. V.60-427. The vert. cervicalis is not intact: the proc. spinosus and the ant. proc. articularis dext. are broken off; the bilateral proc. transversus bones are damaged. The corpus vertebrae is short, wide. The caput vertebrae is wide, the facies terminalis cranialis is widened below and it is bellshaped; it extends over the ventral tubers of the proc. transversus. The foramen vertebrae is rounded. The foramen transversarium is narrow.

Dimensions (in mm):

vertebra height (to the bases of the proc. spinosus) 90; greatest length 72; body length 55; width across the proc. articularis caudalis 88; smallest width between proc. artic. cran. and caud. 66; least vertebra breadth (the most medial points of the lateral borders of the arcus) 60; for. vertebrae breadth 24; its height 25; breadth of the fac. terminalis cranialis 73; its height 50; breadth of the fac. term. caudalis 66.5; its height 55.

The Ovibos remains of the Lipova Cave belong to the form Ovibos pallantis (H. SMITH, 1827). KRETZOI (1942) who made the first exact re-examination of the phylogeny and taxonomy of fossil Ovibovini was also the first to point out that there are different, valid names of both fossil and recent forms. That is why we cannot apply the specific names of recent Ovibos forms to denominate fossil ones.

The oldest known Ovibos at present is Ovibos moschatus süssenbornensis KAHLKE, 1963 (= O. pallantis süssenbornensis). Its teeth are larger, while the dimensions of its horn-core are identical with those of the Lipova Cave specimen. The dimensions of the horn-cores are identical with those of the horn-core of the finds identified as "O. moschatus wardi LYD." (SOERGEL 1941, measurements in KOWARZIK 1912). However, the surfaces of the horn-cores of this last-mentioned finds are latero-medially widely and deeply concave.

The horn-cores identified as belonging to "O. moschatus moschatus (ZIM.)" or "O. mackensianus KOW." from the Upper Pleistocene layers are larger. The skull found in the Danube valley near Zebegény in Hungary belongs to these above-mentioned forms (GAÁL 1933, KRETZOI 1942, Taf. XXV. 1-3).

Bison schoetensacki schoetensacki FREUDENBERG, 1910

- top of horn-core dext. (Plate VI: 1). Old Inv. Nr. 89.1851.-277., new Inv. Nr. V.60.434. There are thin spots of film-like dripstone layer on the surface of the horn-core fr. Its cross-section is circular, its diameter is 48-50 mm. The horn-core is slightly arched. The length of the fragment is 200 mm.

- corpus mandibulae dext. with P_{3-4} - M_{1-3} (Plate VI: 2). Old Inv. Nr. 95.1851.-6., new Inv. Nr. V.60.436. The lower edge of the corpus mandibulae is arched, its inner wall is straight (flat). The crowns of teeth are high and thin, outwards they are concave, especially M_3 . The 3rd cusp of M_3 is thin. The height of the corpus mandibulae is 54 at $P_{2/3}$; while it is 67 mm at $M_{2/3}$. Its breadth is 32 mm.

Dimensions of teeth (in mm):

	P_3	P_3	M_1	M_2	M_3
basal length	17	21	22	32	47
breadth	12	15	17	18	17
crown height					56

The distribution of tooth dimensions of Bison (in mm):

Lower teeth row length	P-M	P	M
<u>B. schoetensacki</u>			
Lipova Cave	170	58.5	108
Tiraspol (FLEROV and DAVID 1971)	170-175	60-61	105-112
Voigtstedt (FISCHER 1965)	156.5	58-60.5	96.5-102

M ₁ crown	basal length	basal breadth
<u>B. schoetensacki</u>		
Lipova Cave	22.0	17.0
Tiraspol (FLEROV and DAVID 1971)	25-28	20-22
Voigtstedt (FISCHER 1965)	23.5-26.5	16-17.0
Mauer	23.3	17.5
M ₂ crown		
<u>B. schoetensacki</u>		
Lipova Cave	32	18
Tiraspol (FLEROV and DAVID 1971)	28-33	16.8-23.0
Voigtstedt (FISCHER 1965)	29-40.5	13.0-19.0
Mauer	27.1	18.9
<u>B. priscus ssp.</u>		
Lipova Cave	27	20
Ehringsdorf (FLEROW 1975)	29-29	
Heppenloch (ADAM 1975)	34.8-35.7	
M ₃ crown		
<u>B. schoetensacki</u>		
Lipova Cave	47.0	17.0
Tiraspol (FLEROV and DAVID 1971)	41-48.0	17.4-22.5
Voigtstedt (FISCHER 1965)	42.5-46	16.0-17.5
Mauer	39.3	16.4
<u>B. priscus ssp.</u>		
Lipova	42	19
Ehringsdorf (FLEROW 1975)	45-60(!)	
Burgtonna (FLEROW 1978)	49	
Heppenloch (ADAM 1975)	48-48	

- tibia sin. without prox. epiph., juv.- subad. (Plate V:3). Old Inv. Nr. 89.1851.-291., new Inv. Nr. V. 60.537.

There is a sandy layer with small pebbles on its surface. The diaphysis of the tibia is long, wide, like that of the dist. epiph. too. The length of the diaph. is 365 mm., the whole tibia length is 400 mm, without the prox. epiph. The smallest breadth of the diaph. is 49 mm, its smallest diameter is 37 mm.

Tibia dist. epiph. dimensions (in mm):

	breadth	diameter
Lipova Cave	84	62.5
Tiraspol (FLEROV and DAVID 1971)	78-97	62-72
Taubach (FLEROV 1977)	92-101(!)	68-76

- calcaneus dext. fragmentary (Plate V:2). Old Inv. Nr. 89.1851.-326., new Inv. Nr. V. 60.430. Large calcaneus, with huge tuber calcanei. Breadth of the collum calcanei 30, its diameter 38 mm. Breadth of the tuber calc. 50, its diameter 54 mm. The length of the calcaneus fragment is 185, its breadth is 73 mm.

- ph III. ant. sin. med. (Plate VII:5). Old Inv. Nr. 89.1851.-289., new Inv. Nr. V. 60.449. The ph III. is very large, with a wide pad. The breadth of the articular surface is 42 mm.

- ph III. ant. sin. lat (?) (Plate VII:6). Old Inv. Nr. 89.1851.-290., new Inv. Nr. V. 60.533. The posterior half of ph III is broken off.

Dimensions (in mm):	length	breadth	height
Lipova Cave	115	46	55
Szuhogy-Csorbakó (JÁNOSSY and VÖRÖS 1985)	112	43	57
Taubach (FLEROV 1977)	70-101	28-40	-

Bison priscus ssp.

- M₂ sin. (Plate III:5). Old Inv.Nr. 89.1851.-271., new Inv.Nr. V. 60.522.

- M₃ sin. (Plate III:6). Old Inv.Nr. 89.1851.-272., new Inv.Nr. V. 60.520.

Dimensions of the teeth (in mm):

	M ₂	M ₃
basal length	27	42
breadth	20	19
crow height	38	43

- epistropheus cranial fr. (Plate VI:3). Old Inv.Nr. 89.1851.-273., new Inv.Nr. V. 60.535.
Corpus length is 114 mm, the smaller breadth of the corpus vertebrae is 73 mm. Breadth of the cranial articular surface is 108, length of the dens is 30, its breadth is 58 mm.

- ph I. ant. dext. med. (Plate VII:2). Old Inv.Nr. 89.1851.-285., new Inv.Nr. V. 60.439.

- ph I. ant. dext. lat. (Plate VII:1). Old Inv.Nr. 89.1851.-286., new Inv.Nr. V. 60.447.

- metatarsus dist. dext. (Plate VII:7). Old Inv.Nr. 89.1851.-281., new Inv. Nr. V. 60.435.1.

Metatarsus dist. epiph. measurements (in mm):

	breadth	diameter
Lipova Cave	69	39
Ehringsdorf (FLEROW 1975)	71-85	40-50
Taubach (FLEROV 1977)	73-91	-
Burgtonna (FLEROW 1978)	90	-

- ph I. post. dext. med. (Plate VII:9). Old Inv.Nr. 89.1851.-282., new Inv.Nr. V. 60.435.2.

- ph I. post. dext. lat. (Plate VII:8). Old Inv.Nr. 89.1851.-283., new Inv.Nr. V. 60.435.3.

- ph II. post. dext. med. (Plate VII:10). Old Inv.Nr. 89.1851.-284., new Inv.Nr. V. 60.435.4.

Ph I. measurements (in mm):

	length	prox. breadth	dist. breadth
Lipova Cave	74-75	34-36	29-30.5
Taubach (FLEROV 1977)	75-98	36-49	32-43
Ehringsdorf (FLEROW 1975)	79-88	38-45	35-42

Ph II. measurements (in mm):

Lipova Cave	48	34	25
Taubach (FLEROV 1977)	44-66!	31-49!	27-40!
Ehringsdorf (FLEROW 1975)	59	30-47	26-36

The crown of the lower teeth is relatively low and thick. A long ectostylid had been developed in the interlobus. The lateral walls of the conids are pointed. The 3rd cusp of the M₃ is thick (8.1 mm). The Bison find assemblage of one of those regions which have yielded the most Bison remains, namely the group of the classical Late Middle Pleistocene sites near Weimar (Ehringsdorf, Burgtonna, Taubach), is rich in various species. The remains of different species and subspecies are known from deposits of different ages, e.g.: Bison priscus mediator, Bison priscus priscus, Bison priscus ssp., Bison sp. (FLEROW or FLEROW 1975, 1977, 1978). On the basis of the dimensions at Taubach, an earlier Bison form occurs.

For the time being the more exact subspecific identification of Bison priscus remains of the Lipova Cave is impossible, as I would have to compare the data with dimensions known so far from mixed-species assemblages.

CHRONOLOGICAL DETERMINATION OF THE LIPOVA CAVE ASSEMBLAGE

The bone remains which have come to light from the Lipova Cave are in good condition, there are spots of a thin dripstone layer on the surface of some of them. We have only indirect knowledge of the sediments of the Lipova Cave. Remains of original cave infilling can even now be found in the cavities of some bones, in their acetabuli or on their surface. According to the remains of this material the bones were in an ochre-yellow coloured loose, sandy loess with small and medium-sized (8-16 mm diameter) gravel.

Though the macromammal fauna of the Lipova Cave is now the result of a selection, it is still interesting that "Non-Arctic" and "Non-Würm" elements are predominant in it. The Ovibos remains of the Lipova Cave furnish further evidence for M. KRETZOI's observation (KRETZOI 1942, 1968), namely that fossil Ovibos forms must not be regarded as indicator animals of the unquestionable, direct existence of a tundra, and they must not be considered as undoubtedly glacial (arctic) forms (KAHLKE 1969) either.

According to the old identifications the specific composition of the Lipova Cave suggests the existence of a "Typical Late Würm" fauna. However, re-examination of the fauna showed a Middle-Pleistocene age on the basis of new specific diagnoses. Dicerorhinus, Præmegaceros and Bison schoetensacki are indicative of a lower phase, while the Ovibos form which is more evolved than the earliest Ovibos pallantis süssenbornensis, as well as Alces and Mammuthus are indicative of an upper phase.

For lack of further data which would make possible a more exact chronological determination, we put the finds of the Lipova Cave to the period from sensu lato Mindel (Elster)-Riss (Saale), so called Holstein interglacial, to the Riss (Saale) glacial.

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EXPLANATION OF PLATES

PLATE I.

- | | |
|----------------------------|------------------------------------|
| 1. <i>Ursus cf. arctos</i> | costa fr. V. 61.2313.1. |
| 2. <i>Ursus cf. arctos</i> | costa fr. V. 61.2313.2. |
| 3. <i>Ursus cf. arctos</i> | costa fr. V. 61.2313.3. |
| 4. <i>Dicerorhinus sp.</i> | ulna dext. juv. V. 60.261. |
| 5. <i>Dicerorhinus sp.</i> | tibia sin. juv. V. 60.263. |
| 6. <i>Dicerorhinus sp.</i> | mc III. sin. juv. V. 60.251. |
| 7. <i>Dicerorhinus sp.</i> | mc III. dext. juv. V. 60.227. |
| 8. <i>Dicerorhinus sp.</i> | ph I ₄ dext. V. 60.178. |

PLATE II.

- | | |
|---------------------------------|------------------------------------|
| 1. <i>Mammuthus primigenius</i> | M ₁ sin. fr. V. 60.635. |
| 2. <i>Mammuthus primigenius</i> | magnum dext. V. 60.622. |

PLATE III.

- | | |
|---------------------------------|---|
| 1. <i>Ovibos pallantis ssp.</i> | M ³ dext. V. 60.489. |
| 2. <i>Ovibos pallantis ssp.</i> | M ³ sin. V. 60.523. |
| 3. <i>Ovibos pallantis ssp.</i> | M ₁ dext. V. 60.487. |
| 4. <i>Ovibos pallantis ssp.</i> | M ₂ dext. V. 60.479. |
| 5. <i>Bison priscus ssp.</i> | M ₂ sin. V. 60.522. |
| 6. <i>Bison priscus ssp.</i> | M ₃ sin. V. 60.520. |
| 7. <i>Alces alces</i> | corp. mandibulae dext. with P ₃₋₄ -M ₁ V. 60.349. |

PLATE IV.

- | | |
|---------------------------------|---------------------------------|
| 1. <i>Ovibos pallantis ssp.</i> | skull fr. dorsal view V. 82.23. |
| 2. <i>Ovibos pallantis ssp.</i> | skull fr. frontal view |

PLATE V.

- | | |
|---------------------------------|---|
| 1. <i>Ovibos pallantis ssp.</i> | vert. cervical 5 th V. 60.427. |
| 2. <i>Bison schoetensacki</i> | calcaneus dext. V. 60.430. |
| 3. <i>Bison schoetensacki</i> | tibia sin. V. 60.537. |

PLATE VI.

- | | |
|-------------------------------|-----------------------------------|
| 1. <i>Bison schoetensacki</i> | horn-core fr. dext. V. 60.434. |
| 2. <i>Bison schoetensacki</i> | corp. mandibulae dext. B. 60.436. |
| 3. <i>Bison priscus ssp.</i> | epistropheus fr. V. 60.535. |

PLATE VII.

- | | |
|-------------------------------|--------------------------------------|
| 1. <i>Bison priscus ssp.</i> | Ph I. dext. ant. lat. V. 60.447. |
| 2. <i>Bison priscus ssp.</i> | Ph I. dext. ant. med. V. 60.439. |
| 3. <i>Praemegaceros sp.</i> | Ph I. sin. ant. lat. V. 60.452. |
| 4. <i>Alces alces</i> | Ph III. post. V. 60.421. |
| 5. <i>Bison schoetensacki</i> | Ph III. ant. sin. med. V. 60.449. |
| 6. <i>Bison schoetensacki</i> | Ph III. sin. ant. lat. V. 60.533. |
| 7. <i>Bison priscus ssp.</i> | mt dext. dist. V. 60.435.1. |
| 8. <i>Bison priscus ssp.</i> | Ph I. dext. post. lat. V. 60.435.3. |
| 9. <i>Bison priscus ssp.</i> | Ph I. dext. post. med. V. 60.435.2. |
| 10. <i>Bison priscus ssp.</i> | Ph II. dext. post. med. V. 60.435.4. |

Photo: A DABASI

PLATE I.



PLATE II.

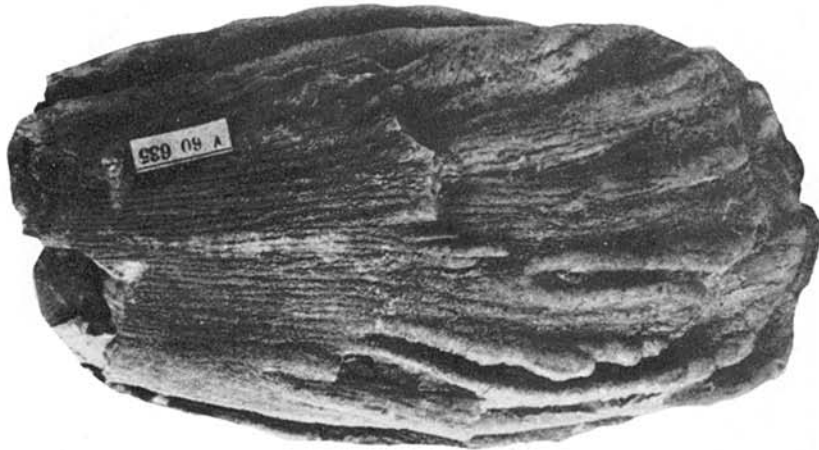


PLATE III.

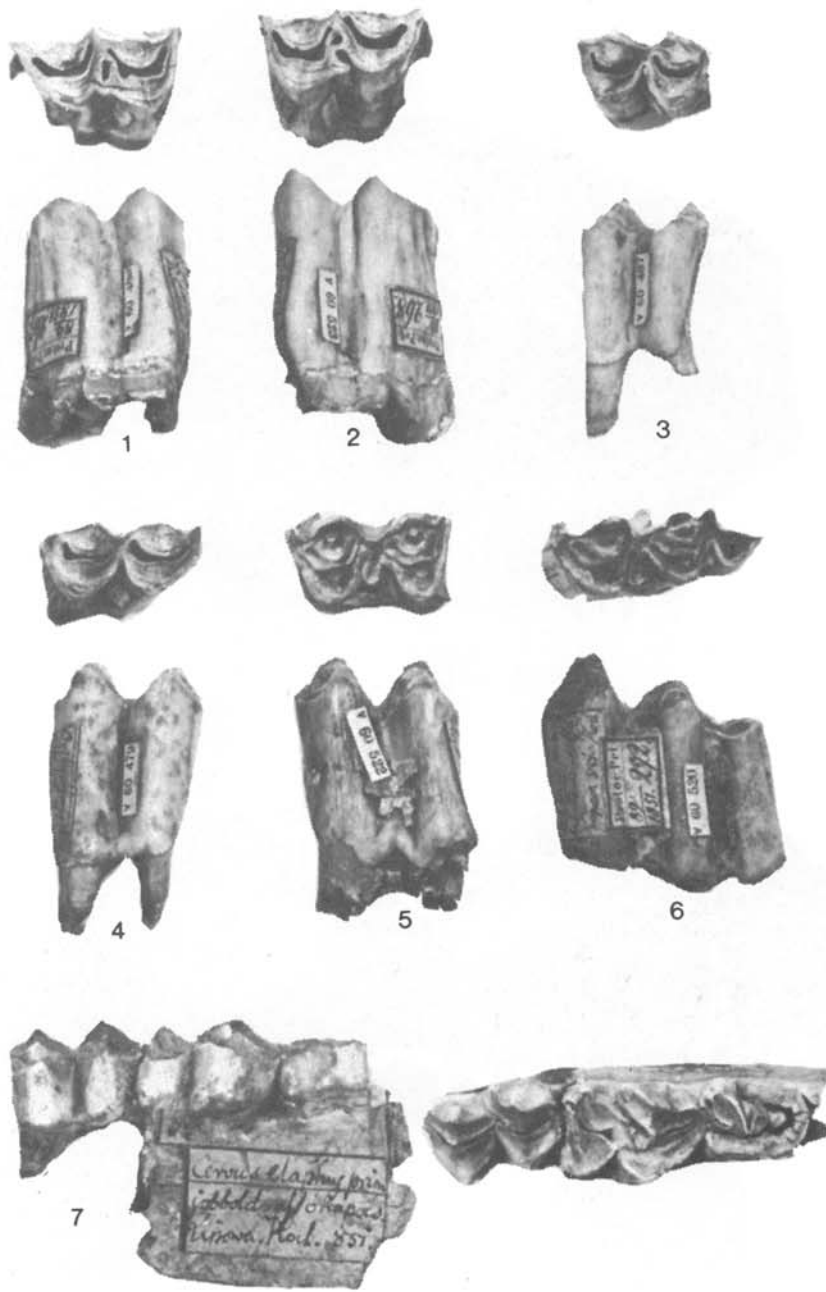


PLATE IV.

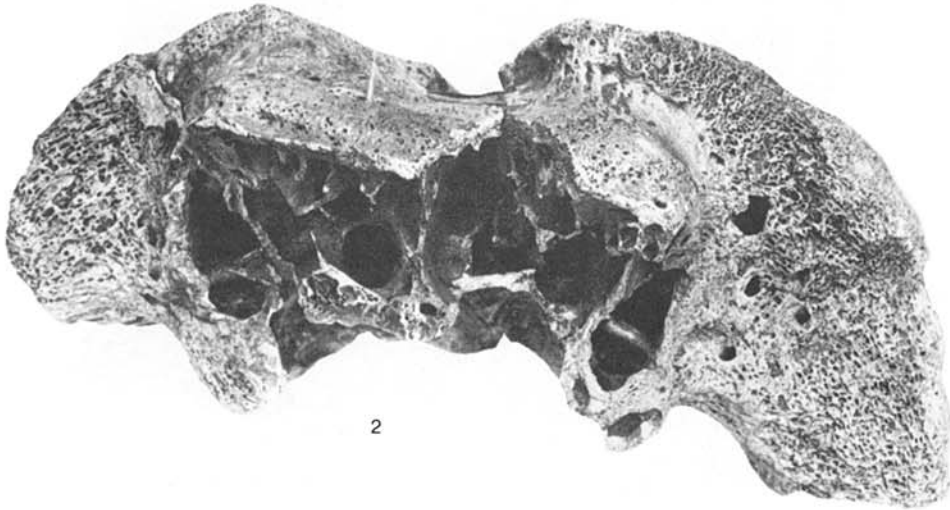
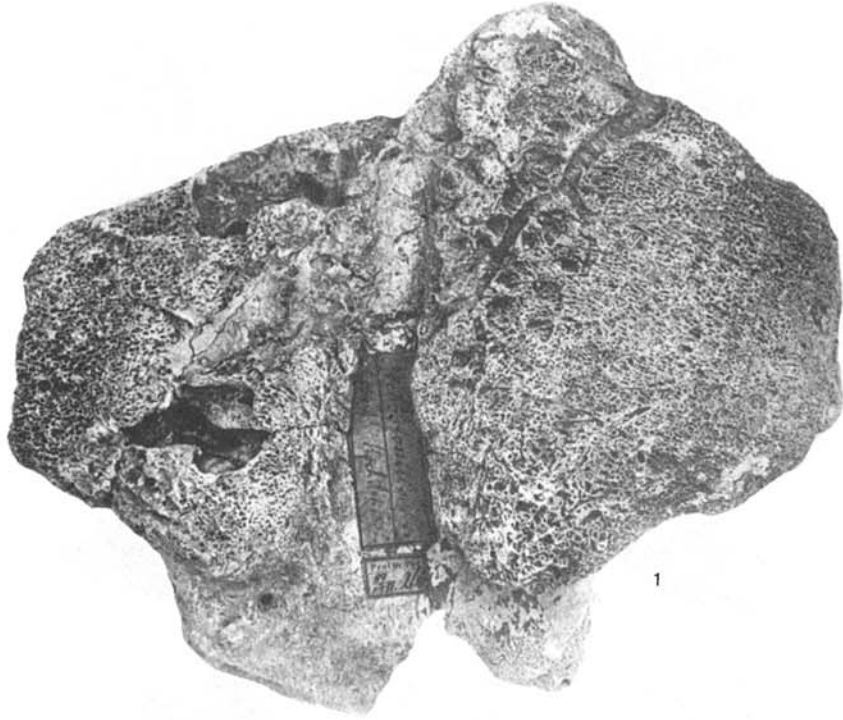


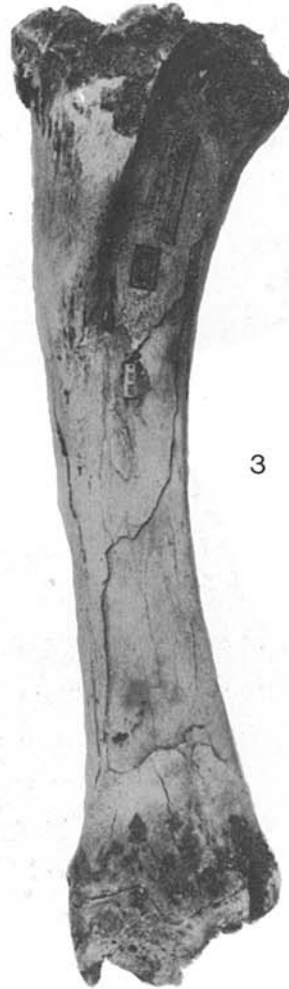
PLATE V.



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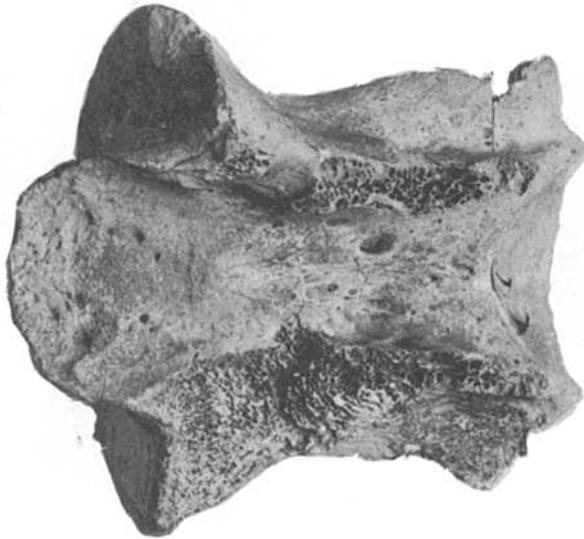
PLATE VI.



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PLATE VII.



1



2



7



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