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Kordosia, a new genus for some Late Miocene Amblycoptini shrews (Mammalia, Insectivora)

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With 9 figures and 1 table in the text

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Abstract: A very rich and well preserved Late Turolian soricid material (formerly named *Amblycoptus topali* Jánossy 1972) is described, which have been found in Polgárdi quarry, Locality 5. Detailed anatomical studies of these remains constituted the basis for description of the new genus *Kordosia* and for drawing some phylogenetical and ecological conclusions. Morphological characters suggest this genus to be closer relatived to *Anourosorex* than *Amblycoptus*. On the basis of Mediterranean occurrence of *Kordosia ? jessiae* (Doukas 1995), an other member of this genus, a relatively warm climate is indicated.

Zusammenfassung: In diesem Artikel wird ein sehr reiches und gut erhaltenes Material von *Kordosia* (früher als *Amblycoptus* genannt) *topali* (Jánossy 1972) beschrieben, welches im Steinbruch von Polgárdi, Stelle 5, gefunden wurde. Eine sehr gründliche anatomische Untersuchung des Materials ermöglichte die Definition einer neuen Gattung *Kordosia* und erlaubt phylogenetische und ökologische Rückschlüsse. Die anatomischen Eigenarten dieser Gattung zeigen eine engere Verwandtschaft mit *Anourosorex* als mit *Amblycoptus*. Das Vorkommen von *Kordosia ? jessiae* (Doukas 1995) – einem anderen Vertreter dieser Gattung – im Mediterraneum wird als Hinweis auf ein relativ warmes Klima betrachtet.

Introduction

Polgárdi is situated in western Hungary (Fejér County), about 10 km south-west of Székesfehérvár. The Köszár Hill of Polgárdi is mainly of Devonian limestone which has been quarried since Roman times. Numerous karst fissures and caves in this rock have been exposed by the intensive quarrying activities in this century. The cavity-filling sediments contain rich and well preserved Late Miocene faunas. Five localities have been discovered since 1909 (Freudenthal & Kordos 1989, Kordos 1991). Specimens described in this paper were found in locality 5. The age of the locality is Late Miocene, Late Turolian, MN 13.

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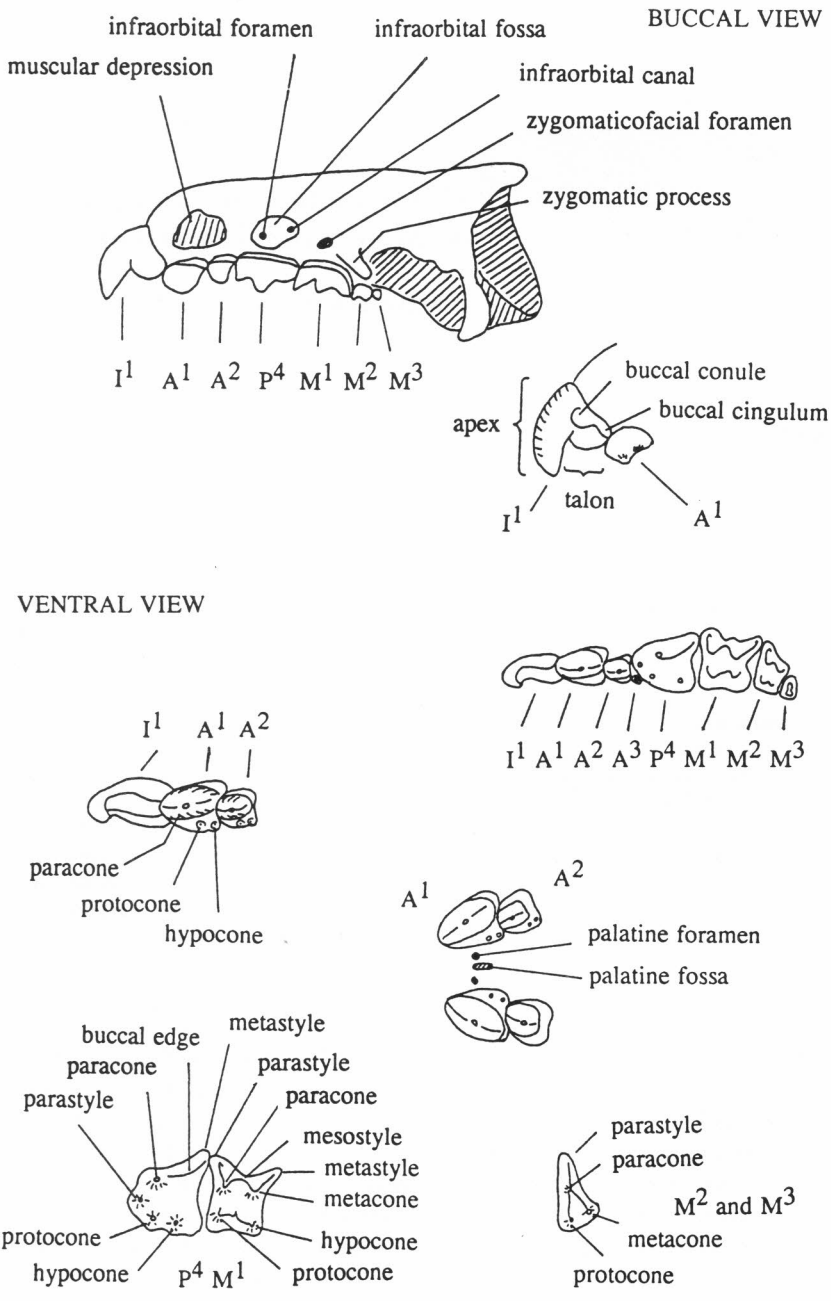

Fig. 1. Nomenclature of the parts of the skull, maxilla and upper dentition.

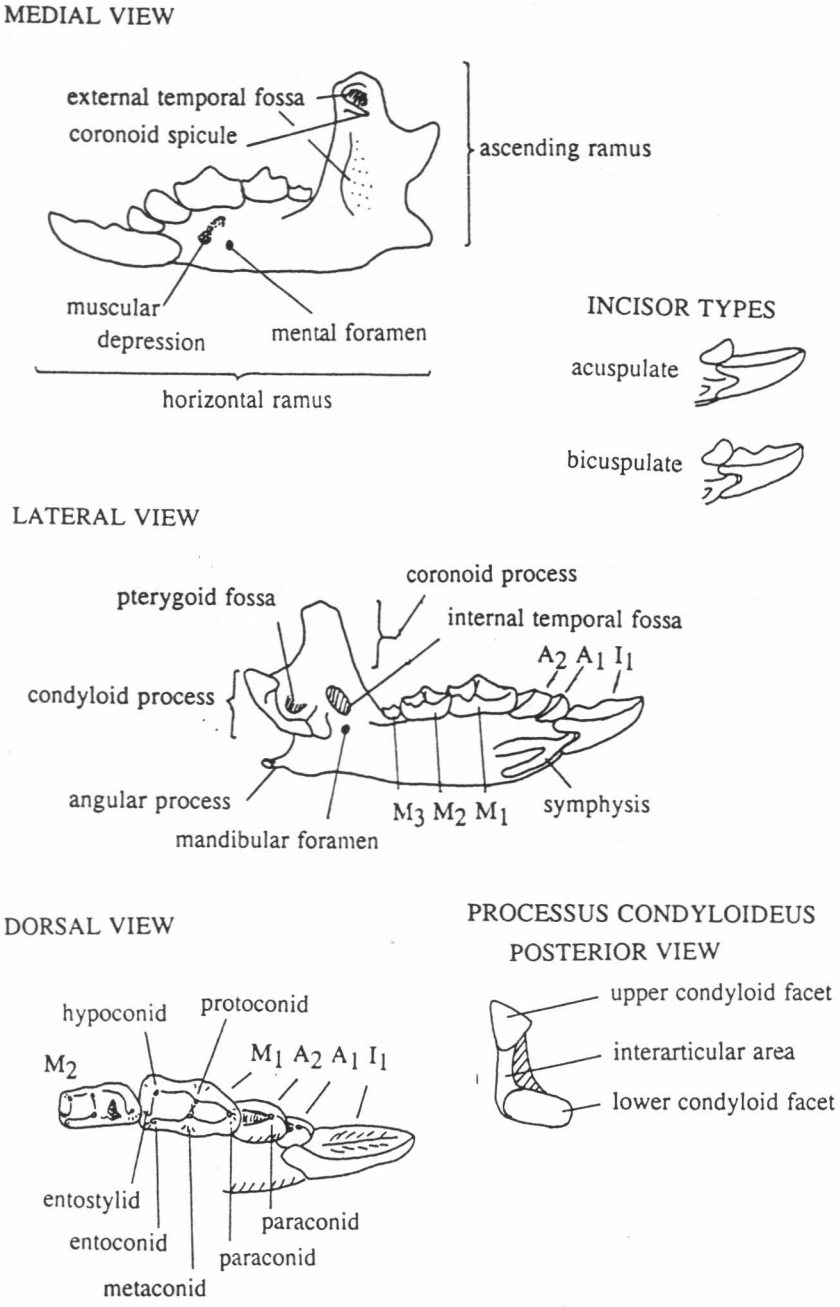

Fig. 2. Nomenclature of the parts of the mandible and lower dentition.

The author picked up the *Kordosia* specimens from the material collected by Prof. L. KORDOS, director of the Geological Museum of Hungary. The specimens belong to the collection of this Museum. The nomenclature of parts of the skulls, maxillas, mandibles and dentition is given in Figures. 1–2. For methods of taking measurements see Figure. 3.

Kordosia topali originally was described from Osztramos 1 by JÁNOSSY (1972) as *Amblycoptus topali*. Nevertheless, that material contained numerous specimens, many important characters could not be studied on them. In the following description new additions to the anatomy of this species are given. Some of them (mainly the dental formula) induce to establish a new genus for this species and its close relative *Kordosia* ? *jessiae* (DOUKAS 1995).

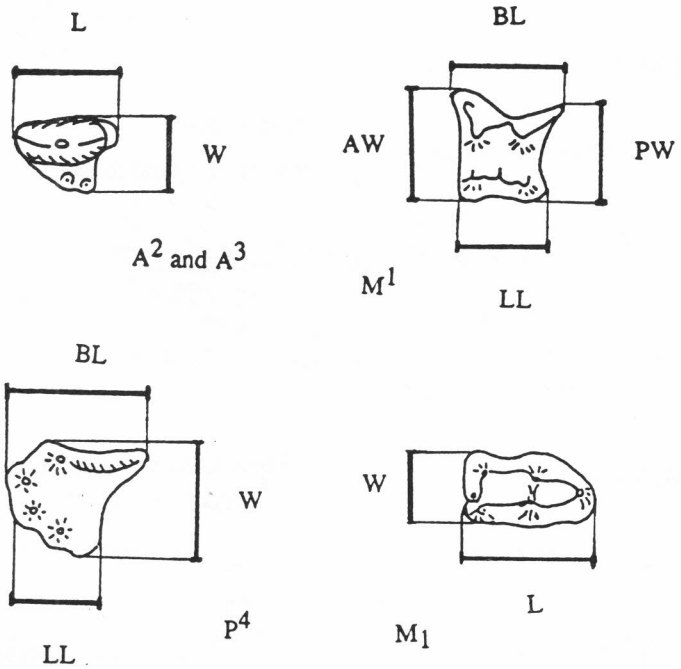

Fig. 3. Methods of taken measurements:
L = length,
BL = buccal length,
LL = lingual length,
W = witdh,
AW = anterior witdh,
PW = posterior witdh.

Systematic description

Classis Mammalia Linnaeus 1735
Order Insectivora Bowdich 1821
Family Soricidae Gray 1821
Subfamily Soricinae Fischer von Waltheim 1817
Tribe Amblycoptini Kormos 1926

Kordosia n. g.

Type species: *Amblycoptus topali* Jánossy 1972. Holotype: Right mandible fragment with the incisor, the two antemolars and the first molar, Hungarian Natural History Museum, V. 71. 149 (Jánossy 1972, plate 3, figs. 7–10). Type locality: Osztramos 1 (Late Ruscinian, MN 14).

Etymology: The genus is named after Prof. L. Kordos, collector of the exceptional material from Polgárdi 5, which constituted the basis for the definition of this new genus.

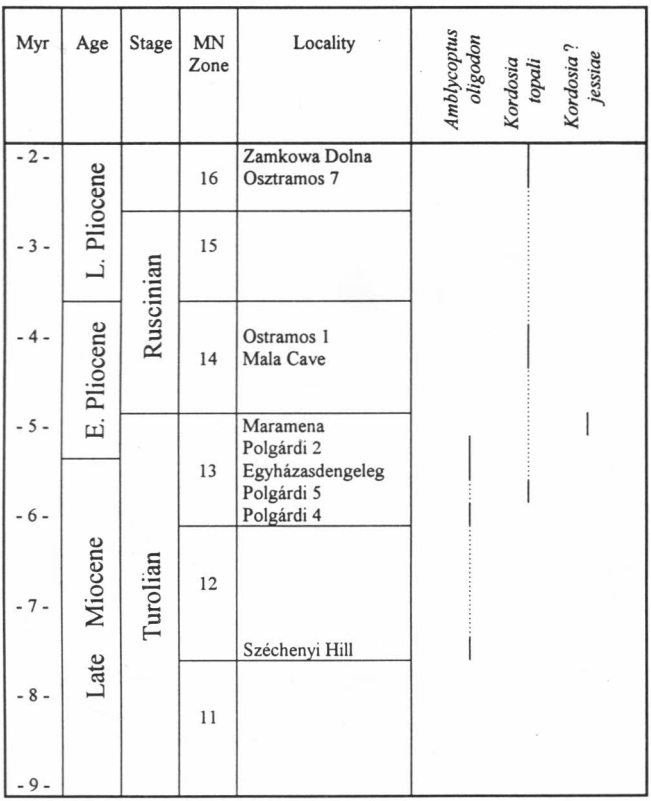

Fig. 4. Stratigraphic range of *Kordosia* and *Amblycoptus* species.

Diagnosis: *Kordosia* has the most reduced dental formula in the tribe Amblycoptini: 132/122. A^3, M^3 and M_3 is always missing, ventral profile of P^4 is much like an oblong. PW of M^1 is far less than AW, I_1 is acuspulate. On the mandible the internal temporal fossa is extremely tight.

Differential diagnosis: *Kordosia* differs from *Amblycoptus* in missing of A^3, its larger size, the tighter internal temporal fossa, the present parastyle of A^1, the more anteriorly situated hypocone of A^2, the oblong shaped P^4, and the less PW of M^1. *Kordosia* is different from Asian *Anourosorex* mainly in the missing of the little M^3 and M_3 and acuspulate structure of I_1, from *Paranourosorex* in missing of A^3, M^3 and M_3 and acuspulate structure of I_1.

Stratigraphic range. Late Miocene (Late Turolian, MN 13) – Pliocene (Early Villányian, MN 16), Middle and Southeast Europe (Fig. 4).

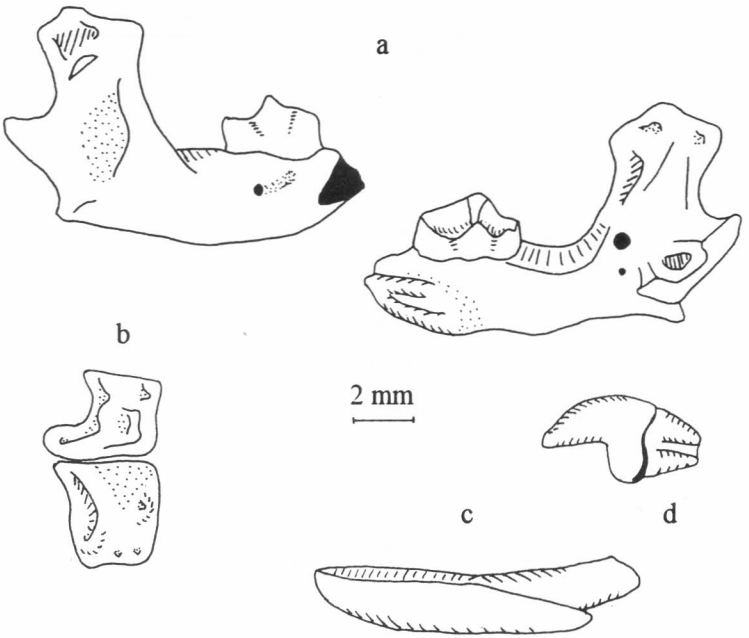

Fig. 5. *Kordosia topali* (Jánossy 1972) from Osztramos 1, Hungarian Natural History Museum, V. 7318. (a = right mandible fragment, b = left P^4 and M^1, c = right I_1, d = left I^1).

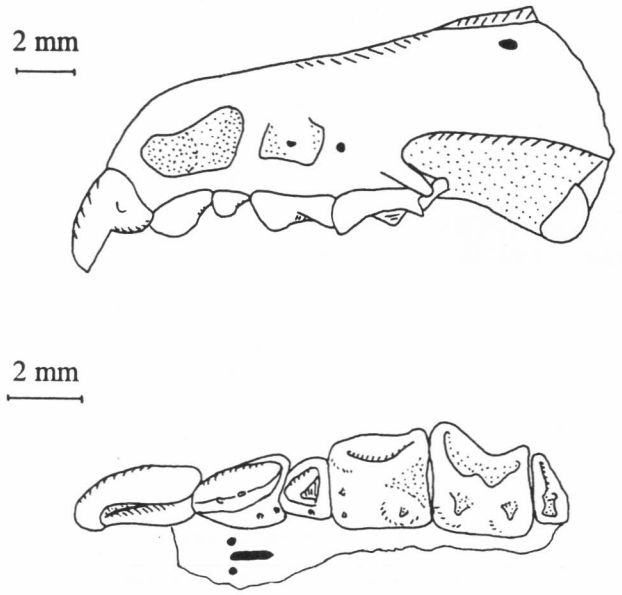

Fig. 6. Skull, maxilla and upper dentition of *Kordosia topali* (JÁNOSSY 1972) from Polgárdi 5, Geological Museum of Hungary, V 20390.

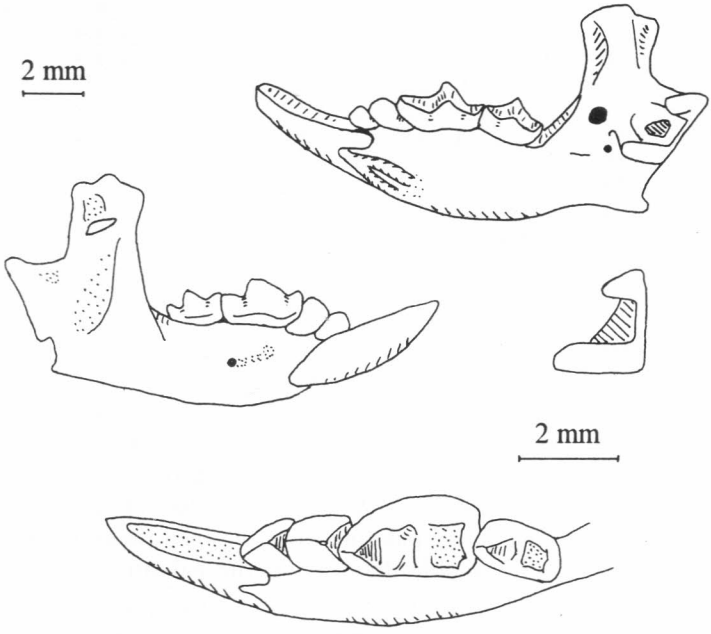

Fig. 7. Mandible and lower dentition of *Kordosia topali* (JÁNOSSY 1972) from Polgárdi 5, Geological Museum of Hungary, OB 20391.

Kordosia topali (JÁNOSSY 1972)
Figs. 5–7

1972 *Amblycoptus topali* sp. n. – JÁNOSSY, p. 38, plate 3, figs. 7–10 (Osztramos 1)
1975 *Amblycoptus* cf. *topali* JÁNOSSY 1972 – RZEBIK-KOWALSKA, p. 178, fig. 4 (Zamkova Dolna)
1979 *Amblycoptus topali* JÁNOSSY 1972 – SULIMSKI et al., p. 387 (Mala Cave)
1984 *Amblycoptus topali* JÁNOSSY 1972 – REUMER, p. 110 plate 35, figs. 7–9; plate 36, figs. 1–3 (Osztramos 1)
1984 *Amblycoptus* sp. – REUMER, p. 113 plate 35, fig. 10 (Osztramos 7)

Studied material: *Kordosia topali* (JÁNOSSY, 1972) from Polgárdi 5: The figured specimens (Geological Museum of Hungary – Geological Institute of Hungary, V. 20390., V. 20391). Other material: 123 complete skulls, maxillas or maxillary fragments, 322 mandibles or mandible fragments.

Measurements: See Table 1.

Table 1. Measurements of the teeth of *Kordosia topali* from Polgárdi 5 (in mm).

		number of specimens	minimum	mean	maximum	standard error	standard deviation
A^1	L	87	1.80	2.16	2.50	0.1237	0.1576
	W	87	1.10	1.50	1.80	0.0986	0.1431
A^2	L	106	0.80	1.13	1.70	0.0968	0.1312
	W	106	0.85	1.17	1.40	0.0891	0.1098
P^4	BL	141	2.00	2.23	2.95	0.1464	0.2156
	LL	141	2.10	2.68	3.10	0.1424	0.1963
	W	141	2.10	2.51	2.90	0.1111	0.1479
M^1	BL	117	1.90	2.15	2.50	0.1071	0.1311
	LL	117	2.05	2.44	2.70	0.0984	0.1277
	AW	117	2.10	2.70	3.05	0.1094	0.1524
	PW	117	1.90	2.25	2.60	0.1280	0.1548
M_1	L	225	2.60	3.03	3.50	0.1064	0.1368
	W	225	1.05	1.54	1.80	0.0656	0.0870

Description: *K. topali*, like other Amblycoptini species, is a very strongly built shrew.

Skull – The bones of the skull are well united, sutures are hardly recognizable. There is a saggital crest along the interfrontal suture. Towards the anterior direction it always reaches beyond the little frontal foramens. On the palate, at the middle of A^1 there are relatively large palatine foramens, and there is a long palatine fossa between them. Its length is always longer than the double diameter of the palatine foramen.

Mandible – It is robust, but its corpus is relatively short, its middle part is widened. The ascending and horizontal rami form a slightly obtuse angle. The top of the coronoid process becomes broad and does not thin out, like in other shrews. On the buccal surface of the coronoid

process, above the sometimes very deep upper part of the external temporal fossa is situated the coronoid spicule, which rather forms an edge with 45° angle to the main direction of the coronoid process than a "thorn" (spicule). The lower part of the external temporal fossa is extended. The internal temporal fossa is extremely tight, it is even more tighter that of *Amblycoptus*. Its complete circular aperture is more like a "foramen" than a "fossa". On the condyloid process both the articular facets are visible in medial view, pterygoid fossa is deep and tight between them. In posterior view the interarticular area is extremely narrow, the upper articular facet forms a perfect triangle, the lower one is oblong or trapezoid, its medio-superior corner is always rounded off. Mandibular foramen is hidden under the condyle and faces forward. Area of the symphysis with its two slats are strikingly projecting from the medial surface of the mandible. The tiny mental foramen is situated under the middle of M_1. The significantly shaped depression of depressor muscle of labia forms an arch not above the foramen, but before it, and starts out from it.

Dentition – There is no pigmentation on the teeth. Fortunately all teeth could be studied in place in many maxillas and mandibles. A^3, M^3 and M_3 is always missing. „A^3" described by REUMER (1984: 112., plate 36. a–b.) is rather A^2 in opinion of the author. Dental formula is 132/122.

I^1 – The tooth is not fissident. The apex is long, sharp, and down-turned. On some of the teeth buccal cingulum, buccal conule and convex basal margin are visible. Other specimens has neither cingulum, nor conule, and their margin is concave.

A^1 – It is a single-rooted, long crowned, big tooth. Because of existing other elements, the main cone of the tooth (the enormous paracone) is not in the saggital plain, but at the buccal margin and there are long edges in front of and before it, forming a united buccal cutting edge. There is a little parastyle on the front edge of the paracone. We can see a very tiny hypocone in the postero-lingual corner and a somewhat bigger protocone before it.

A^2 – This single-rooted, triangular tooth is far smaller than A^1. Its length and width are nearly the same. The paracone here is in more central position than at the A^1, but its anterior and posterior edges are more along the buccal margin of the tooth than in saggital position. The hypocone is not in the postero-lingual corner, but before it.

P^4 – It is a four-rooted tooth with specially structured crown, differing from the ordinary shrew P^4 type. Its ventral profile is much like an oblong. The paracone, the parastyle and the protocone are at the front margin of it, nearly in the same line. The most characteristic feature of the tooth is the long, strong, sharp edge between the paracone and the

metastyle, which probably played important part in cutting food. The metastyle is not too much projecting in buccal and posterior direction. There is a well separated hypocone behind the protocone, at the half of the tooth, separated from the metastyle by the backward widening talon. The posterior margin of the talon is slightly or not notched.

M^1 – Because of the reduction of the talon and shortness of the metastyle of this four-rooted tooth, its PW is far less than AW. The parastyle, the paracone and the protocone are large, but the metacone and the hypocone are somewhat less. The trigone and the talone basis are deep, but the talone one is relatively narrow. The posterior margin of the tooth is not concave.

M^2 – In case of dimylid *Kordosia* species, M^3 is always missing, that is why M^2 is the last tooth of the maxilla. This one is a very reduced tooth like M^3 of other Soricidae species, but its reduction is not so spectacular as we can see at *Amblycoptus*. Its ventral profile is a frustum of a triangle. Its broader front part is formed by the protocone, paracone and the projecting parastyle. On the far narrower back part of the tooth we can see little hypocone and metacone. There is only one basin between the cones.

I_1 – The apex of this big, buccally sharp, acuspulate tooth is a little up turned. The basal part of the crown extends under A^1 not far from its posterior margin.

A_1 – It is a small, single-rooted, unicuspid tooth. The plate, back part of the tooth is under the front part of A2. Its big paraconid has a soft anterior edge.

A_2 – The form of this tooth is very much like the previous one, but this is far bigger. The paraconid is softly turned. The basal part of the crown extends back under M_1 rather buccaly than lingually. On the back part of the basal margin there is a not well developed cingulum, but it is hidden under the outreaching M_1 trigonid.

M_1 – This double-rooted one is the biggest tooth of the mandible. Well developed paraconid, protoconid and metaconid border the perfectly trigonal trigonid basin. Its lingual margin is usually very eroded. Also the talonid basin is deep, the hypoconid and the entoconid are projected. The entostylid is well visible in medio-posterial direction from the entoconid. There is a slight cingulum on the buccal side.

M_2 – It is very similar to the previous tooth, but it is only the half in size. Because of the typical missing of M_3 from all the *Kordosia* species, this is the last tooth of the mandible, thus it is very reduced, like M_3 of other shrews.

Remarks: *Kordosia* gen. n. contains also *Kordosia ? jessiae* described by Doukas (1995), as *Amblycoptus jessiae*. At this species there is an open question, whether this one has A^3 or not. We will make sure about this species to belong to *Kordosia* only when we can find a species with a certainly identificable part of the mandible, without A^3.

According to Doukas (1995) *K. topali* differs from *K. ? jessiae* in the larger size and L/W ratio of M_1. We can emend this differential diagnosis with the different morfology of I^1. It always has a buccal cingulum and its basal margin is concave at *K. ? jessiae*, but at *K. topali* it may be without cingulum and with convex margin as well. It is notably, that in some characters (for example the basal margin of I^1, the buccal notch between parastyle and metastyle of M^1, the AW/PW ratio of M^1) *K. ? jessiae* differs from the Polgárdi 5 *K. topali* material, but is similar to the Osztramos 1 one (Fig. 8).

For comparisons the author studied the following specimens: – *Kordosia topali* (Jánossy 1972) from Osztramos 1: the holotype (Hungarian Natural History Museum, V. 71. 49.), other material: 1 skull fragment, 1 mandible fragment, 3 I^1, 1 A^2, 4 P^4, 5 M^1, 10 M_1 (V. 73. 18.); *Kordosia ? jessiae* (Doukas 1995) from Maramena: the holotype (the collection of Department of Earth Sciences, Nat. University of Athens, MA 3296.), other material: 14 I^1, 53 A^1, 12 A^2, 62 P^4, 59 M^1, 13 M^2, 4 I_1, 5 A_1, 19 A_2, 52 M_1, 20 M_2; *Amblycoptus oligodon* Kormos 1926 from Polgárdi 2: the holotype (Geological Museum of Hungary, OB. 5071.), other material: 2 mandible, 2 M_1, 4 I_1 (Hungarian Natural History Museum).

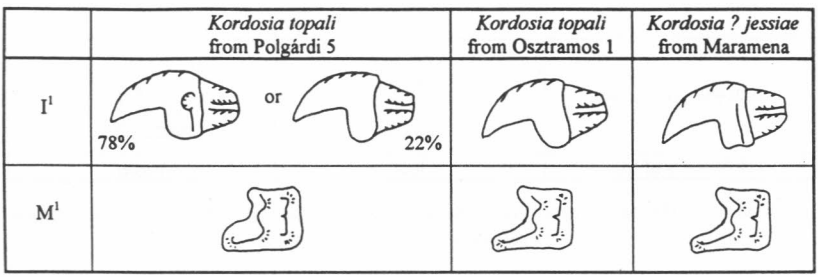

Fig. 8. Comparison of the shape of M^1 and M^1 of *Kordosia topali* (Jánossy 1972) from Polgárdi 5 and Osztramos 1 and *Kordosia ? jessiae* (Doukas 1995) from Maramena.

	Amblycoptus oligodon KORMOS 1926 Polgárdi 2	*Kordosia topali* (JÁNOSSY) 1972 Polgárdi 5
length of the saggital crest of the skull		
length of the palatine fossa		
measurement and form of the internal temporal fossa		
form of the lower condyloid facet		
form of the muscular depression before the mental foramen		
dental formula	142/122	132/122
presence of the parastyle of A^1		
position of the hypocone of A^2		
presence of A^3	+	-
form of P^4 and position of its cones		
AW/PW ratio of M^1		
L/W ratio of M_1	less	bigger

Fig. 9. Main different characters of *Kordosia topali* (JÁNOSSY 1972) and *Amblycoptus oligodon* KORMOS 1926.

Discussion

There are six described Amblycoptini genera by this time (*Amblycoptus* KORMOS 1926, *Anourosorex* MILNE-EDWARDS 1870, *Anourosoricodon* TOPACHEWSKY 1967, *Crusafontina* GIBERT 1975, *Paranourosorex* RZEBIK-KOWALSKA 1975, *Kordosia* gen. n. in this paper). The common characters of Amblycoptini species are as follows: Large dimensions, upwardly widening coronoid process, tight internal temporal fossa, trigonal upper condyloid facet, oblong-shaped lower one, very narrow interarticular area. They have two or three upper antemolars, their lower incisor is acuspulate or bicuspulate. Dental formula may be 142/123, 133/123, 142/122 and 132/122.

While having many similar characters, *Kordosia* and *Amblycoptus* are the same only in the usual Amblycoptini features, except for missing M^3 and M_3 and acuspulate form of I_1. Many differences in the anatomy of *K. topali* and *A. oligodon* (Fig. 9) suggest that these species are not so close relatives as we would have thought because of the formerly same generic name. Mainly in the form of basal margin of parastyle of A^1, presence or missing of A^3, structure of P^4 and M^1, *Amblycoptus* is similar to *Paranourosorex*, but *Kordosia* to Asian *Anourosorex* species. We may suppose that there was a phylogenetic dividing after a hypothetical ancient Amblycoptini species with a relatively not reduced dental formula (143/123) in the Early Neogene. One of the descended lines, leading to *Paranourosorex*, retained the original dental formula, but the other, leading to Asian *Anourosorex* shrews, missed the tiny A^3. From these two phylogenetic lines developed *Kordosia* and *Amblycoptus* genera with similar reduction of the upper and lower M3.

Nevertheless, REUMER (1984: pp. 124 and 126) has written about this species to had been living in forested areas, whereas we should accept *Kordosia topali* as a suggestive of somewhat more open environment. In the opinion of the author, its close relations to *Kordosia* ? *jessiae*, described by DOUKAS (1995) from the Mediterranean area, proofs that *Kordosia topali* would have prefered similar climate. Its occurrences in the Carpathian basin should not indicate macroclimatic, rather – geologically very fast – microclimatic changes. These changes might be caused by the disappearance of the wooded environment from a karst region. Appearing of a more open nature would have resulted somewhat warmer climate, where Mediterranean faunas and floras could live, as we can see recently on some open karst fields in Hungary as well (for example Szársomlyó Hill, Villányian Mountains). So *Kordosia* would have lived in forests in the Mediterranean, but in open invironments in the Carpatian Basin.

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