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A new Fossil Horseshoe Bat *(Rhinolophus variabilis* n. sp.*)* from the Pliocene Sediments of the Osztramos Hill, NE Hungary *(Mammalia: Chiroptera)*

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ABSTRACT: A description of Rhinolophus variabilis n. sp. from the Pliocene of Osztramos Hill, NE Hungary is given.

The localities No. 1 and No. 9 of Osztramos Hill rendered fossil faunas of great importance from the Middle Pliocence of Europe. The mammalian remains other than bats were studied and published by JÁNOSSY (1971, 1974) and some of the bats investigated by TOPÁL (1974). The sediments of these Pliocene localities contained numerous remains of a small horseshoe bat. This fossil species was similar in size to Rh. hipposideros, however, with certain different characters, and it showed primitive features. Because of its importance, it merits description before the full treatment of the whole bat faunas.

Derivatio nominis. The name refers to the extensive variability of the dental characters observed.

Stratum typicum and locus typicus. Middle Pliocene (Estramontian), locality No. 9 of Osztramos Hill at Tornaszentandrás, NE Hungary.

Diagnosis. Size of Rhinolophus hipposideros, or somewhat greater, with longer C-P^4 and C-P_4 rows in the total toothrow lengths, and with other ancestral dental characters.

Holotype. Left mandible (Inventary No. V.75-95, deposited in the collection of the Palaeontological Department of the Hungarian Natural History Museum) with missing ascending ramus and with full dentition except I_1 and P_3, and with a badly injured M_1 (Plate III. fig. 1.)

Other material. All are in the Palaeontological Department of the Hungarian Natural History Museum. From loc. No. 1 F: left upper M^1 (Inventary No. V.75.93), left mandibular fragment with M_1-M_3, right mandibular ramus with P_2-M_3, right mandible with I_2-M_2, right mandibular fragment with M_2 (Inventary Nos. V.75.89, V.75.90, V.75.91). Loc.No. 1 C: Right upper C (Inventary No. V.75.87). Loc. No. 1 E: Right upper C (with abnormally doubled tip), left M^3, right maxillary fragment without teeth (Inventary No. V.75.88). Loc. No. 1 F: 2 distal portions of right humeri (Inventary No. V.75.92). Total number of pieces from locality No. 1 = 11. From locality No. 9: Skull and upper dentition. Full rostrum with P^4-M^3, 2 rostral fragments; nasal swelling, etc. (Inventary No. V.75.110. and V.75.109). Praemaxillae. 4 right ones, 1 left side one;

(Inventary Nos. V.75.123 and V.75.122). Cochleae. 23 right, 13 left side pieces (Inventary No. V. 75.134). Right maxillae with teeth: 1 P^2-M^3, 1 P^4-M^3, 1 P^4 ⋎ M^2M^3, 2 C-P^4, 9 P^4-M^1, 1 P^2-P^4, 1 C ⋎ P^4, 3 M^2-M^3, 4 C, 9 P^4, 1 M^2, 3 M^3, 2 without teeth=38 specimens (Inventary Nos. V.75.111, V.75.112, V.75.116, V.75.119, V.75.109). Left maxillae with teeth: 4 P^4-M^3, 3 C-P^4, 2 P^2-M^1, 4 P^4-M^1, 3 P^4-M^2, 2 P^2-P^4, 1 M^1-M^3, 7 M^2-M^3, 3 M^1-M^2, 1 C, 7 P^4, 1 M^1, 4 M^2, 6 M^3, 3 without teeth = 51 specimens (Inventary Nos. V.75.113, V.75.114, V. 75.115, V.75.117, V.75.118, V.75.120, V. 75.121, V.75.109). Separate right side upper teeth: 18 C, 8 P^4, 21 M^1, 9 M^2, 2 M^3 = 58 pieces (Inventary No. V 75.109). Upper left side teeth: 25 C, 5 P^4, 14 M^1, 6 M^2, 1 M^3 = 51 pieces (Inventary No. V 75.109). Total No. of skull portions and upper dentition = 242, with at least 35-39 individuals in the material. Mandibular fragments and lower dentition. Right mandibular fragments with teeth: 1 I_1, 1 C- P_2 ⋎ M_1, 1 P_2 ⋎ P_4, 1 P_3-M_1, 1 P_4-M_3, 1 P_4 ⋎ M_2-M_3, 2 P_4-M_2, 3 P_4-M_1, 3 P_4, 5 M_1-M_3, 2 M_1-M_2, 5 M_2-M_3, 3 M_1, 9 fore-portions without teeth, 6 ascending rami = 44 specimens (Inventary Nos. V.75.98, V.75.99, V.75.107 and V. 75. 94). Left mandibular fragments with teeth: 1 C-P_2 ⋎ P_4 ⋎ M_3, 2 C ⋎ P_4-M_3, 1 P_3-M_2, 1 P_3-M_1, 1 P_2-M_1, 4 P_4- M_3, 4 P_4-M_2, 3 P_4-M_1, 2 C-P_2, 2 C, 2 P_4, 1 M_1-M_3, 3 M_1-M_2, 6 M_2-M_3, 3 M_1, 2 M_2, 5 M_3, 12 fore-portions without teeth, 7 ascending rami = 62 specimens (Inventary Nos. V.75.103, V.75.97, V.75.102, V.75.100, V.75.101, V.75.106, V.75.96, V.75.104, V.75.105, V.75.108 and V.75.94). Separate right side teeth: 4 M_1, 2 M_2, left side teeth: 4 M_1, 2 M_2, 1 M_3 = 13 pieces (Inventary No. V, 75.94). Total no. of mandibular fragments and lower teeth: 119 (+ Holotype), with at least 40 individuals in the material, and well agreeing with the number of individuals based on upper parts. Humeri: proximal ends: 2 right, 1 left side (Inventary No. V.75.124). Distal ends: 19 right, 19 left (Inventary Nos. V.75.125, V.75.126, V.75.127, V.75.128, V.75.129 V.75.130). Radii, proximal fragments: 7 right, 8 left, distal fragments: 1 left (Inventary No. V. 75. 131, V.75.132). Claviculae 1 left and 1 right fragments (Inventary No. 75.133). Total no. of extremity bones: 59 pieces. Bacula: partly fragmentary bones of ten individuals (Inventary Nos. V.75.136, V.75.137, V.75.135). Up to now there were preserved 387 remains from locality No. 9.

Material for comparison and methods. For detailed comparisons with the fossil material, I used 41 specimens of Rh. hipposideros hipposideros from the whole Carpathian Basin, 6 specimens of Rh. hipposideros minimus from the surroundings of Dubrovnik, Dalmatia, 1 example of Rh. hipposideros (subsp. ?) from Dusambe, Tajikistan, and finally 2 Rh. midas from my collectings in Kashmir. I also compared specimens of a population collected from a Holocene locality[+] (Kiskőhát Cave). (KORDOS 1973) and fossil remains of Rh. hipposideros from the Middle Pleistocene collected at Tarkő and Uppony, (see JÁNOSSY 1962, 1968). Dr. D. JÁNOSSY[++] has kindly studied the type material of Rh. grivensis in Lyon. The Asiatic small Rhinolophi showed a very distant relation to the European material, as well as to the fossil species, so I merely touch on some of the results of comparisons here. I also omit here the conclusions of study on some Vietnamese and Indian exemplars of Rh. cornutus. To show the great variety of

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[+] I am grateful to Dr. L. KORDOS for the loan of subfossil material in his care.

[++] I am very grateful to Dr. JÁNOSSY, my friend and colleague, for his help in studying the type of Rh. grivensis and of an other specimen, and for making original drawings of them.

Measurements of Rhinolophus variabilis n.sp.

	Min.-Max.	N	ΣX	$\overline{X}$
Length of C-M^3	-	-	-	-
Length of C-M^3 (alveolar)	5.17-5.26	4	20.91	5.23
Length of C-P^4 (crowns)	2.31-2.47	6	14.36	2.38
Length of C-P^4 (alveolar	2.03-2.36	13	28.56	2.22
Length of C-P^4 (cusps)	1.22-1.59	5	6.66	1.33
Length of P^4-M^3	4.06-4.36	8	33.90	4.24
Length of M^1-M^3	3.33-3.64	8	28.17	3.54
Width of rostrum between C-C	3.56	1	-	-
Width of rostrum between M^3-M^3	5.84	1	-	-
Length of bony palate	1.77	1	-	-
Basal length of upper C	0.90-1.04	53	52.25	0.98
Basal width of upper C	0.63-0.90	53	41.32	0.78
Length of P^2	0.50-0.59	11	6.05	0.55
Width of P^2	0.47-0.63	11	5.92	0.54
Length of M^3	0.90-1.06	30	28.86	0.96
Width of M^3	1.18-1.50	30	41.15	1.37
Humerus				
Width of trochlea	3.50-3.80	14	50.95	3.63
Baculum				
Total length	3.42-3.52	2	6.94	3.47
Width of base	1.00-1.22	8	8.77	1.09

Table 1. Measurements of upper dentition and skull, humerus, baculum. Min. - Max.= smallest and greatest value of the observed measurements, N = number of specimens, ΣX = sum of measurements, $\overline{X}$ = arithmetic mean.

1. táblázat. A felső fogsor és koponya, a felkarcsont, és a péniszcsont méretei. Min. - Max. = a legkisebb és legnagyobb méretadat, N = a példányok száma, ΣX = a mérési adatok összege, $\overline{X}$ = az átlag.

features in the new species, I include the figures of many specimens and of also some of the recent ones, dental and cranial characters as well as bacula and humeri. When I observed differences between the fossil and the recent species in the mandibular characters, I counted and figured the means, variances and standard errors for each sample as usual. (See fig. 1.).

Measurements. Minimum and maximum values of measurements of the new species as well as the other parameters are shown in the 1. and 2. tables.

Description and comparisons. Skull and mandible. Comparison of the new species, of Rh. grivensis and of Rh. lissiensis. I received drawings of the type-specimen, and of another mandibular fragment with P_2-P_3, of the Miocene species Rh. grivensis. After comparing them, and considering the mesurements given by MEIN (1964), and the drawings and measurements published by ZAPFE (1950, 1952), it became evident that Rh. grivensis is a bigger species than the present new animal. It was clearly seen that P_4 of Rh. grivensis and that of Rh. lissiensis were fully similar in size and therefore these practically identical in this respect. In P_4 length, Rh. variabilis n.sp. definitely differs from both Rh. lissiensis and Rh. grivensis, having smaller P_4. Even the specimen with longest P_4, (Inventary No. V. 75.99) has shorter and narrower P, thus with smaller bulk of crown, than that of Rh. grivensis. The M_1-M_3 length of Rh. lissiensis was bigger than that of Rh. grivensis, mainly because of the greater length of its M_1. The difference in M_1-M_3 lengths of Rh. variabilis. n.sp. and of Rh. lissiensis was similarly great. So, in this respect there was no practical difference between the new species and Rh. grivensis. Two specimens of the new animal (Inventary Nos. V.75. 98 and V 75.99) have a very long P_2, and so their length equal that of Rh. grivensis, but the crowns are somewhat less wide. The other five specimens of Rh. variabilis n.sp. have shorter and smaller P_2. The P_3 premolar of Rh. grivensis partly overlaps the hind margin of crown of P_2, just as in No. V.75.96 Rh. variabilis n.sp., however, its (P_3) basal outline is circular, while it is orocaudally flattened, although somewhat bigger, in No. V 75.96 Rh. variabilis n.sp.

Comparisons with Rh. hipposideros hipposideros and Rh. hipposideros minimus. In many respects, the new species is more primitive than the Central European from of the recent animal. This is shown by some dental characters, as well as a tendency of looseness in the oral portion of toothrows, which is, however, a subject of variation, at least to the same extent, in its way, as in the dental characters of the recent species. There is no doubt that the fore-teeth are generally bigger than in Rh. hipposideros. The upper C - almost without exception - is stronger and wider in Rh. variabilis n.sp. than in Rh.h. hipposideros and in Rh. h. minimus. The fossil material displays a similar or greater P^2, always entirely within the toothrow. The crown of this tooth in some specimens is decidedly bigger than in any of the recent specimens studied. The big crowned P^2 premolars are more or less overlapping the crown of C, or rather, that of P^4. This feature never occurs in recent specimens. The anterior portion of the cingulum in P^4 is very weak as compared to those of recent specimens. The talon of the fossil tooth is more developed than in recent ones, so the protocone is situated at a greater distance from the inner margin of the talon. The available fossil exemplars have forward-pointing upper C, P^2 and P^4. We would need, however, well preserved and a greater number of specimens to decide whether these teeth are really much more orally reaching than in the recent ones. The few existing specimens showed this phenomenon, also observed in a fossil species of the Rh. ferrumequinum group (TOPÁL 1963). This fea-

Measurements of Rhinolophus variabilis n.sp.

	Min.-Max.	N	Σ X	$\overline{X}$
Length of C-M_3	5.79-5.98	4	23.51	5.89
Length of C-M_3 (alveolar)	5.44-5.91	4	22.37	5.59
Length of P_2-M_3	4.94-5.13	3	15.10	5.02
Length of P_2-M_3 (alveolar)	4.94-5.35	5	25.67	5.14
Length of P_4-M_3	4.36-4.68	11	49.32	4.48
Length of M_1-M_3	3.68-4.05	17	65.46	3.76
Length of P_2-P_4	1.31-1.59	7	10.22	1.46
Length of P_2-P_4 (alveolar)	1.27-1.45	8	10.77	1.34
Length of P_2	0.55-0.68	10	6.14	0.62
Length of P_3	0.13-0.31	6	1.21	0.20
Length of P_4	0.63-0.81	32	23.09	0.72
Length of M_1	1.27-1.45	41	55.95	1.36
Trigonid width of M_1	0.72-0.90	45	35.51	0.78
Talonid width of M_1	0.77-1.00	42	35.10	0.84
Length of M_2	1.27-1.40	43	56.71	1.32
Trigonid width of M_2	0.72-0.95	42	34.19	0.82
Talonid width of M_2	0.71-1.04	41	34.77	0.85
Length of M_3	1.13-1.36	33	41.04	1.25
Trigonid width of M_3	0.68-0.90	33	26.18	0.79
Talonid width of M_3	0.63-0.81	30	22.30	0.74
Length of mandible	10.8	1	-	-
Mandibular height under M_1	0.95-1.18	50	51.91	1.03
Mandibular height behind M_3	1.13-1.40	19	24.12	1.37

Table 2. Measurements of lower dentition and mandible. Min.-Max. = smallest and and greatest value of the observed measurements, N = number of specimens, Σ X = sum of measurements, $\overline{X}$ = arithmetic mean.

2. táblázat. Az alsó fogsor és az állkapocs méretei. Min.-Max. = a legkisebb és legnagyobb méretadat, N = a példányok száma, Σ X = a mérési adatok összege, $\overline{X}$ = az átlag.

ture may be connected with the generally observed tendency of tooth-row shortening and - through this - probably with cephalization. In general, the upper molars are somewhat bigger than those in the majority of the recent animals. I found morphological differences only in some M^3. The fossil teeth have a strong tendency of becoming long, because of the long commissure between metacone and metastyle. So the length of M^3 is often greater than in Rh. h. hipposideros. It is true, however, that the molars M^3 in Dalmatian Rh. h. minimus are very similar to those of the new species because of the relatively unreduced length of commissure between metacone and metastyle, hence the length and width ratio in this tooth is very similar to that observed in the fossil species. Regarding the bones of skull, I have seen a few characters only, due to the fragmentary state of the material. The only full rostrum is generally bigger and wider than that of the recent species. M^3-M^3 width is 5.85 mm, while the mean of thirty recent specimens is 5.48 mm (5.3-5.7). The measurements of 52 subfossil specimens from the Kiskőhát Cave are 5.4-5.9 mm (M = 5.75). This full rostrum has an anterior emargination with caudally narrowing inner walls of maxillae instead of the parallel decurrent inner walls in the Carpathian Rh. hipposideros and Rh. h. minimus. The few available praemaxillae are robust and suggest a strong upper incisor. The base of the bone is very wide and large, the reason why the incision between the lateral wing and the base is exceedingly narrow (Plate I. fig. 1). I could find no such form in recent specimens, but some variability was also observable among the available remains of Rh. variabilis n.sp. The praemaxilla probably had a more pronounced role in chewing than in the chewing of the recent species. The strong praemaxillae and the extended surface of the surrounding parts - at least in some specimens - show a decidedly stronger bony palate in the fossil animal as compared to that of the recent species.

The anterior mandibular teeth are generally heavier and greater than the corresponding ones in Rh. hipposideros. This holds especially for C, P_2 and P_4. The basal cross section of C is longer than wide, its hind margin nearly straight, mostly being without medioposterior lobule. P_2 of all fossil specimens are greater than in the recent individuals, where these are orocaudally flattened in many cases, but not so, indeed even elongated in many fossils. The base of its cups is flat and wide in the recent but narrow in the fossil animals, because of the heavy and bulky crown. There is a great variety in

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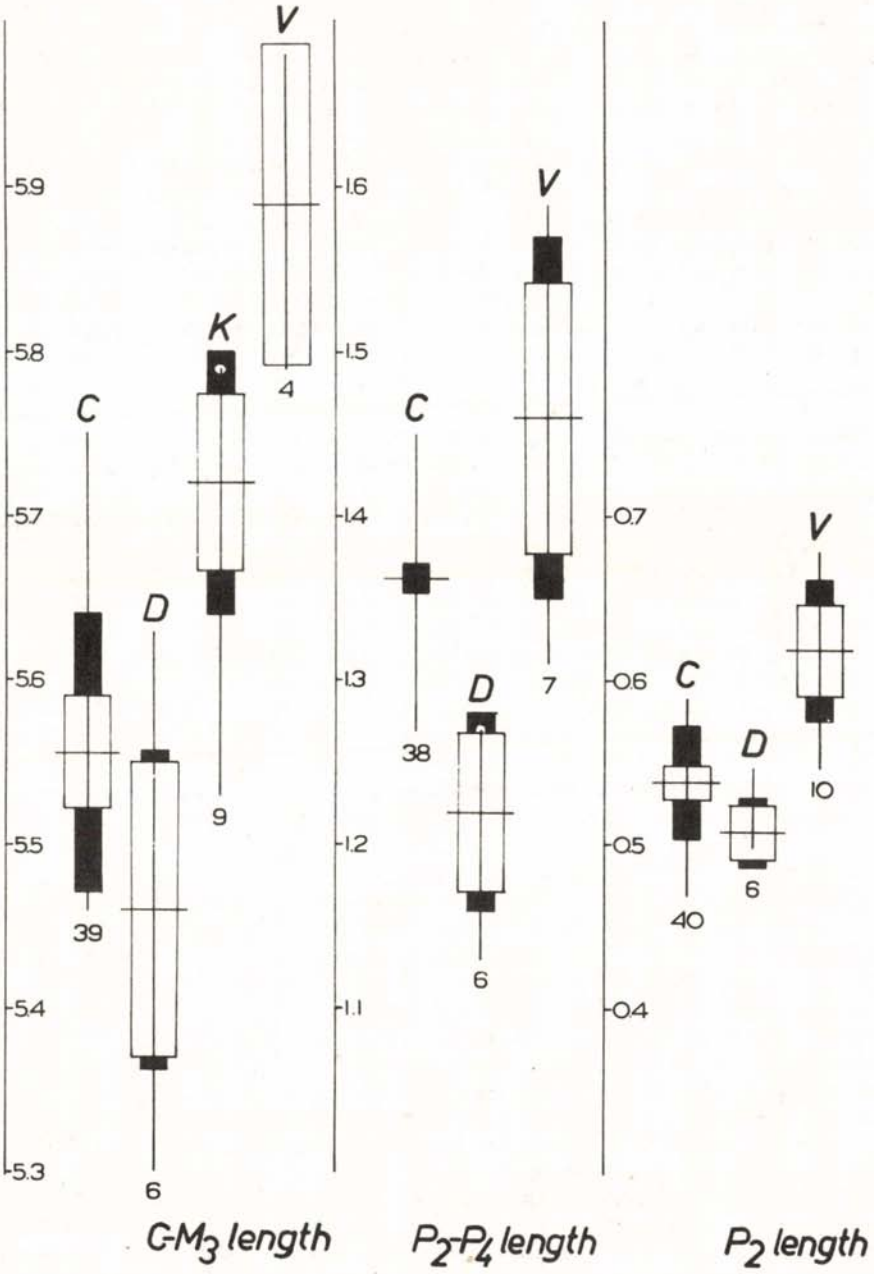
Fig. 1. Graphical comparison of measurements of Rhinolophus h. hipposideros from the Carpathian Basin = C, Rh. h. minimus from Dalmatia = D, a subfossil population of Rh. hippisideros from Kiskőhát Cave = K, and Rh. variabilis n.sp. = V. Vertical line=range of sample; horizontal line = arithmetic mean; empty column = two standard errors of aritmetic mean above and below mean; solid column = one standard deviation above and below mean. Scale in mm. The figures at the base of the diagrams show the number of specimens.

1. ábra. A Kárpátmedencéből származó Rhinolophus h. hipposideros = C, Dalmáciában gyűjtött Rh. h. minimus = D, a Kiskőháti zsombolyból való szubfosszilis Rh. hipposideros = K, és a Rh. variabilis n. sp. = V néhány méretének összehasonlító ábrázolása. Függőleges vonal = a minta terjedelme; vízszintes vonal = az átlag; üres oszlop = a kétszeres standard hiba az átlag felett és alatt; tömör oszlop= egyszeres szórás az átlag felett és alatt. A méretek miliméterben. A részletábrák alatt a példányok száma látható.


V
K
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5.9
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1.3
1.2
1.1
4
9
39
6
C-M3 length
V
C
D
38
7
6
P2-P4 length
0.7
0.6
0.5
0.4
V
C
D
10
40
6
P2 length

position ans size of P_3. It is much bigger than in any recent animal and situated in the toothrow - a relatively rare case among recent (Plate V. figs. 1-13) specimens - in specimen No. V.75.96 (Plate III. fig. 6). In other fossils, this tooth agrees with the recent ones in size. It is missing from most of the fossils, but the alveoli are greater than in the majority of recent specimens. The orocaudal elongation of fossil P_4, though variable, seems rather important. The crown of the fossil tooth is less oblique antero-externally, its hind margin is straight and set perpendicularly to the main axis of the mandible. There is a strong impression by M_1 in Rh. hipposideros, but mostly absent in Rh. variabilis n.sp., as also the medio-posterior lobule of the recent tooth. There appears a highly interesting and strong wear in the postero-external corner of crowns of C and P_4 in most of the fossil specimens, where the cusps of the corresponding upper teeth touch the crowns of the lower ones. The rather fragmentary state of our fossil material does not permit a thorough examination into the reason of this phenomenon. The same kind of wear seems small and less frequent in the recent species, as I found it in less than 10-20 per cent of the specimens, and mainly in P_4. It is worthy of note that I found a more pronounced trend for this kind of wear in the Dalmatian Rh.h.minimus specimens. The primary reason of this evidently disadvantageous wear is most probably the oral protrusion of the upper teeth mentioned above. Another probable explanation is the more crowded state of the frontal teeth because of the orocaudal compression of the tooth-row as if the crowns of C and P_4 were turned lingually and posteriorad in recent Rh. hipposideros, and thus a smaller chance for the disadvantageous meeting observed in Rh. variablis n.sp. As is known, the distance between paraconid and metaconid, that is, the length of trigonid, or the openness of V, is the greatest in M_1 and the smallest in M_3 (observed by MEIN 1964 in Rh. grivensis and Rh. euryale). I found a conspicuous difference in the lengths of trigonids between the recent and fossil specimens. It is generally greater in the fossil species than in Rh.hipposideros, however, M_3 is the most different, its trigonid being especially open in Rh. variabilis n.sp. Without a change in the molar lengths, the ratios of trigonid lengths and talonid lengths are different and also this is probably a manifestation of the shortening trend of the tooth-row from fossil to recent species. The remains of a population from Holocene sediments (Kiskőhát Cave, KORDOS 1973), showed a greater size but appeared otherwise identical with Rh. hipposideros hipposideros in dental characters.

Comparison of Rh. variabilis n.sp., Rh. hipposideros (subsp.? Tajikistan) and Rh. midas (Kashmir). The width of the basal cross section of upper C is much less than in the Tajikistan specimen, so the latter shows an extreme value in this respect; the crown of this tooth is without an anterior cingulum cusp, as in both fossil and European animals. Both the fossil and the European species differ fron the Central Asiatic specimen in having longer P^2 with a one-third bigger crown and also a bigger P_2. P_4 has a smaller base than in the European forms. At the same time, the recent European Rh. hipposideros and the Central Asiatic specimen agree in the oblique antero-external margin and in the form of the posterior margin of P_4, the latter showing an impression for M_1. This molar is wider than in fossil species, but with the same width of trigonid V. All in all, the Tajikistan specimen has in some respects (mosaically) more evolved characters than the European recent form. Incidentally the Kashmir species, Rh. midas, is extremely evolved in many respects - and in some others is more ancestral - as compared even to the European recent form. (Rh. midas with a very small P^2, small and elongated P_2, small P_3, (Plate V. figs. 8-9), extremely wide upper C and elongated P_4). In my opinion, these Asiatic forms show a very distant relation to the new species.

Comparison of Rh. variabilis n. sp. and Rh. hipposideros of the Carpathian Middle Pleistocene. Some fragmentary mandibles from the Middle Pleistocene of Hungary (Tarkő Niche and Uppony Cave, JÁNOSSY 1962, 1968) display the same features as the recent animal, at least regarding the available P_4 premolars and molars.

Osteological features, other than skull and mandible. Humeri. The few fragmentary proximal ends showed a larger caput humeri than the recent bones. The size and strength of the humerus were probably greater and also the width of the trochlea: M = 3.40 mm in Rh. hipposideros and M = 3.63 in Rh. variabilis n.sp. I found the proc. styloideus pointing a little more laterally when viewd dorsoventrally, and more straightly from a lateral view in the fossil species than in Rh. hipposideros. In general, the epitrochlea is more pronounced in Rh. variabilis n.sp., than in Rh. hipposideros. All these features rather resemble the humeri of Rh. grivensis and Rh. euryale. (See: ZAPFE 1950; and FELTEN and al. 1973). Bacula. There were found ten specimens at Osztramos in locality 9., among them two in excellent state and suitable for comparison with recent ones. The baculum of our Kashmir specimen is extremely bent dorsally, so it will be disregarded here. The bacula are much less bent in the new species than in Rh. hipposideros, and though similar in size, still more elongated and longer. (Plate VII, figs. 1-8). The base is narrow and smaller than in recent bones (Plate VII, figs. 3-4), with a very narrow and even, closed and ossified ventral incision. The base is wide and open in Rh. hipposideros. The shaft is cylindrical as in Rh. hipposideros, and without flattened wings which are present in Rh. euryale. Beyond a rather straight portion it is decidedly bent a little dorsally, then turned ventrally. This is pronounced by the widened tip, like a spoon with a ventral impression. This form is not known in Rh. hipposideros. The width of the tip equals with that of the shaft at its two-fifths length from base. The other fossil specimen has a less spoonlike tip, - still decidedly wider than in Rh. hipposideros - where, instead of a spoon there is a laterally flattened knob.

Relationships and historical zoogeography. The species Rh. grivensis (DEPÉRET), described from the Miocene of Grive Saint-Alban, France, is bigger than the present new species (see also measurements given by MEIN 1964). This was shown also by the study of the type-specimen (D. JÁNOSSY, oral communication). Several authors contend therefore its relationship with Rh. euryale, but this is probable an erroneous inferemce.I chowed in my previous paper (TOPÁL 1974) that MEIN' s Rh.grivensis lissiensis, 1964, is a distinct species, and resembles Rh. euryale. While the present new species is in many respect different from Rh. grivensis, it is closer to the Moicene species than to Rh. lissiensis. Still, one cannot regard it as a subspecies of the former. Certainly, the remains of the two species, that is, Rh. lissiensis and Rh. variabilis n.sp. occur together in the Pliocene of Osztramos. The age of these Pliocene localities is much less different from that of Lissieu, the type locality of Rh. lissiensis, than from Grive Saint-Alban. One may infer that the Miocene Rh. grivensis with intermediate features is the common ancestral form of both Rh. lissiensis and Rh. variabilis n.sp. flourishing in the Middle Pliocene. One cannot exclude the possibility that Rh. variabilis n.sp. somehow represents the ancestral form of Rh.hipposideros. At the somewhat older Podlesice, as well as at Weze, Poland, there was discovered a small Rhinolophus described by KOWALSKI (1956) as Rh. hipposideros, and later (1962) as Rh. grivensis. In my view, the remains belong doubtless to the present new species, even if, according to my own observations+, they are a little bigger than the Hungarian specimens. They

+ I express my appreciation to Dr. K. KOWALSKI for his courtesy in permitting the study and loan of the material in his care.

probably show an example of BERGMAN's Rule, rather than differences coming from geological age. As I found similarities between the new species and Rh. hipposideros minimus in numerous characters, except size, the probability of a direct origin of the latter from the once well distributed form in the Europe of Pliocene might be suggested. One can imagine a disappearence or a withdrawal of the original stock to the Mediterranean Region during the glaciations of the Pleistocene. The new population started to conquer the area probably by a few specimens, thus with an increased chance for genetic changes. Hungarian material from the Middle Pleistocene already showed an identity with the recent species. Finally, the study of some Asiatic forms revealed a distant relation to the European animals.

TOPÁL Gy.: **Új fosszilis patkósorrú denevér *(Rhinolophus variabilis* n. sp.) az Osztramos pliocénjéből**

Az észak-kelet magyarországi Osztramos-hegy mészkőbányájában feltárt 1-es és 9-es számú lelőhelyek jelentős középső pliocén emlős- és egyéb gerinces faunákat szolgáltattak. E lelőhelyek anyagából előkerült egy, a kis patkósorrú denevérhez hasonló méretű Rhinolophus faj számos maradványa. A szerző cikkében ismerteti ezt a jó néhány fogazati és csonttani bélyegben ősi jellegeket felmutató denevért, és Rhinolophus variabilis n. sp. néven vezeti be a tudományba. Részletesen foglalkozik az új faj és a miocén-kori Rh. grivensis, valamint az Osztramos lelőhelyein az új fajjal együtt található Rh. lissiensis összehasonlításával. Tárgyalja és számos ábrán mutatja be a Rh. variabilis n. sp. és a két európai Rh. hipposideros alfaj morfológiai sajátosságait, de csak röviden érinti az ázsiai kis Rhinolophusokkal így a Rh. midas-szal és a Rh. cornutus-szal elvégzett összevetés eredményeit. Végül, a dolgozat befejező részében összefoglalja az új fajjal kapcsolatos törzsfejlődéstani és faunagenetikai kérdéseket.

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PLATE I. - I. TÁBLA

Figs. 1-5. Dorsal views of praemaxillae. 1 = Rhinolophus variabilis n.sp. No. V.75. 122.; 2 = Rh. h. minimus No. 66.236.2.; 3 = Rh. midas No. 448.; 4 = Rh. h.hipposideros No. 63.22.1.; 5 = Rh. h. hipposideros No. 56.50.2.

Figs. 6-13. Occlusal views of maxillary fragments. 6 = Rhinolophus variabilis n. sp. (right) No. V.75.119.; 7 = (right) No. V.75.116.; 8 = (left) No. V.75.113.; 9 = (left) No. V.75.117.; 10 = (right) No. V.75.112.; 11 = (left) No. V.75.118.; 12 = (left) No. V.75.115.; 13 = (left) No. V.75.114.

1-5. ábra. Jobboldali állközti csontok felülnézete.

6-13. ábra: Állcsont-töredékek a rágófelület felől nézve.

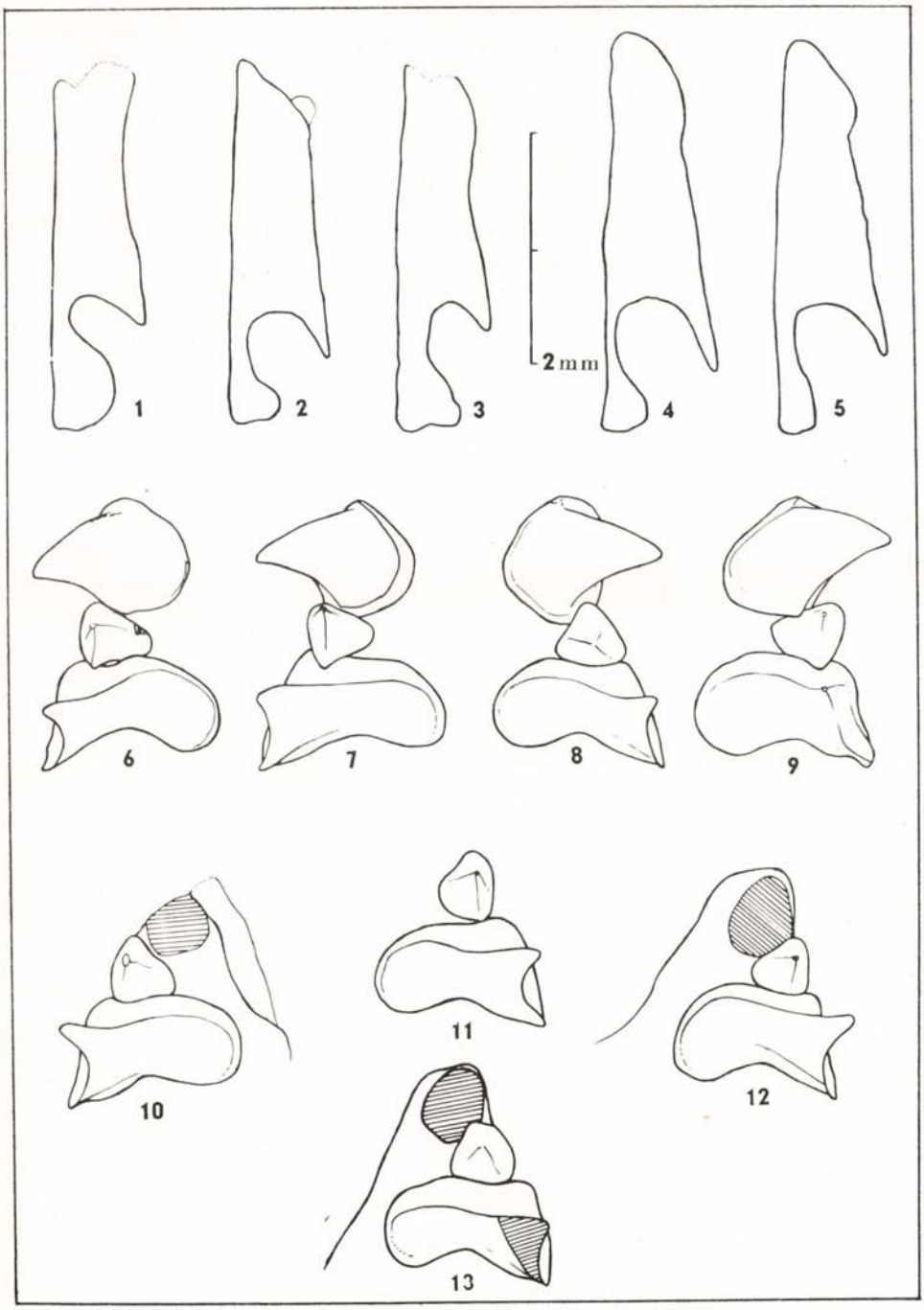
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PLATE II. - II. TÁBLA

Figs. 1-3. Occlusal views of maxillary fragments. 1 = Rhinolophus variabilis n. sp. (right) No. V.75.111.; 2 = (left) No. V.75.121.; 3 = (left) No. V.75.120.

Figs. 4-9. Occlusal views of M^3 teeth. 4 = Rhinolophus variabilis (left) n.sp. No. V. 75.110.; 5 = Rh. h. hipposideros (left) No. 56.50.2.; 6 = Rh. h. hipposideros (left) No. 68.528.2.; 7 = Rh. h. minimus (left) No. 66.236.3.; 8 = Rh. hipposideros (Tajikistan), (left) No. 57.169.1.; 9 = Rh. midas (left) No. 446.

1-3. ábra. Állcsont-töredékek a rágófelület felőli nézetben.
4-9. ábra. Baloldali M^3-ak a rágófelület felől nézve.

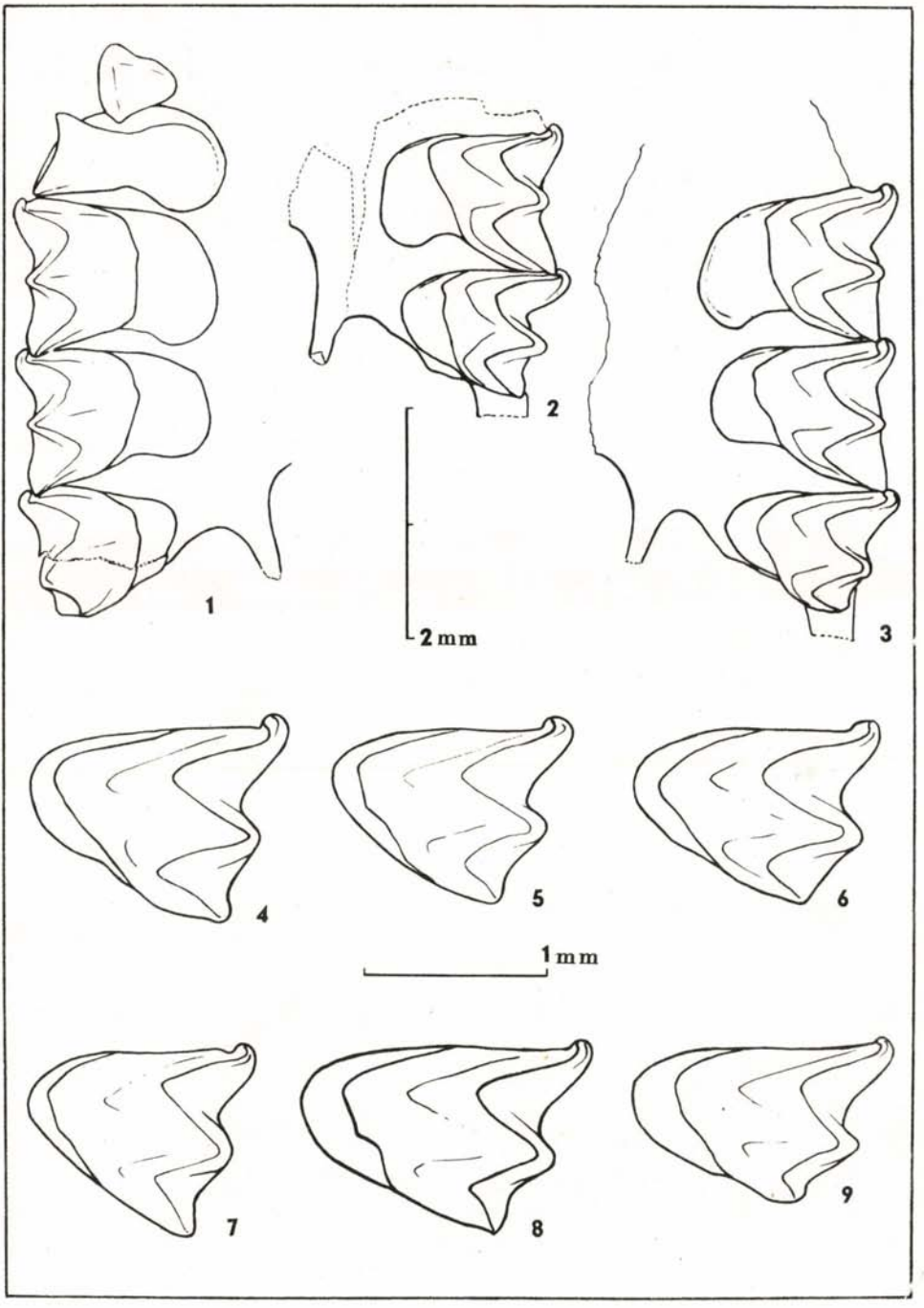
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PLATE III. - III. TÁBLA

Figs. 1-10. Occlusal views of mandibular fragments of Rhinolophus variabilis n. sp. 1 = Holotype (left) No. V.75.95.; 2=(left) No. V.75.100.; 3 = (right) No.V.75.107.; 4 = (right) No. V.75.89.; 5 = (right) No. V.75.90.; 6 = (left) No. V.75.96.; 7 = (left) No. V.75.108.; 8 = (left) No. V.75.104.; 9 = (right) No. V.75.98.; 10 = (right) No.V.75.99.

1-10. ábra. A Rhinolophus variabilis n.sp. állkapocs töredékek rágófelületi nézete.

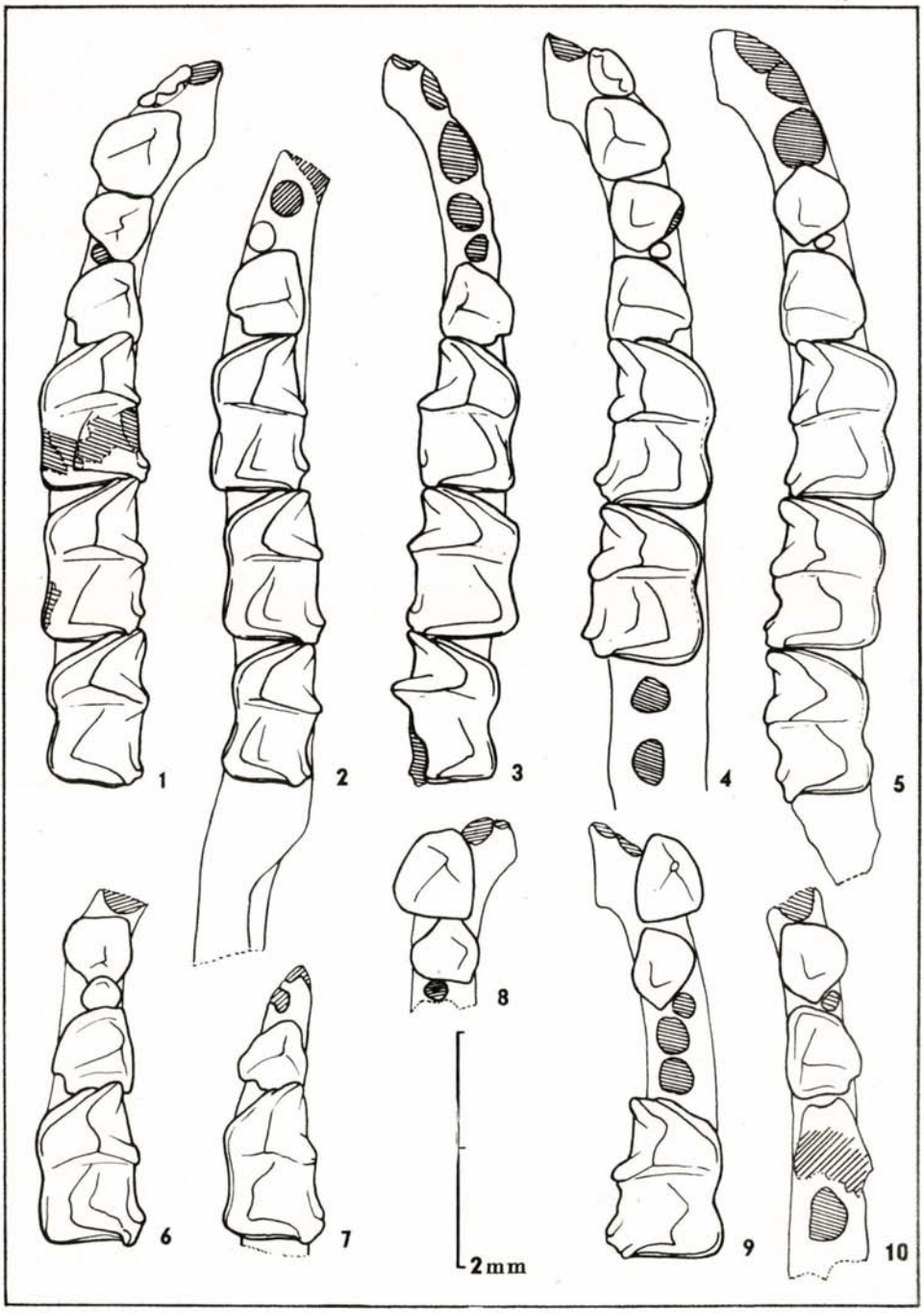
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PLATE IV. - IV. TÁBLA

Figs. 1-6. Occlusal views of mandibular fragments of Rhinolophus variabilis n.sp. 1 = (left) No. V.75.106.; 2 = (left) No. V.75.101.; 3 = (left) No. V.75.97.; 4 = (left) No. V.75.102.; 5 = (left) No. V.75.105.; 6 = (left) No. V.75.103.

Figs. 7-11. Occlusal views of fore-portions of right mandibles in subfossil Rh. hipposideros from Kiskőhát Cave.

1-6. ábra. A Rhinolophus variabilis n.sp. állkapocs töredékek rágófelületi nézete.

7-11. ábra. Szubfosszilis Rh. hipposideros állkapocs részletek rágófelületi nézete a Kiskőháti zsombolyból.

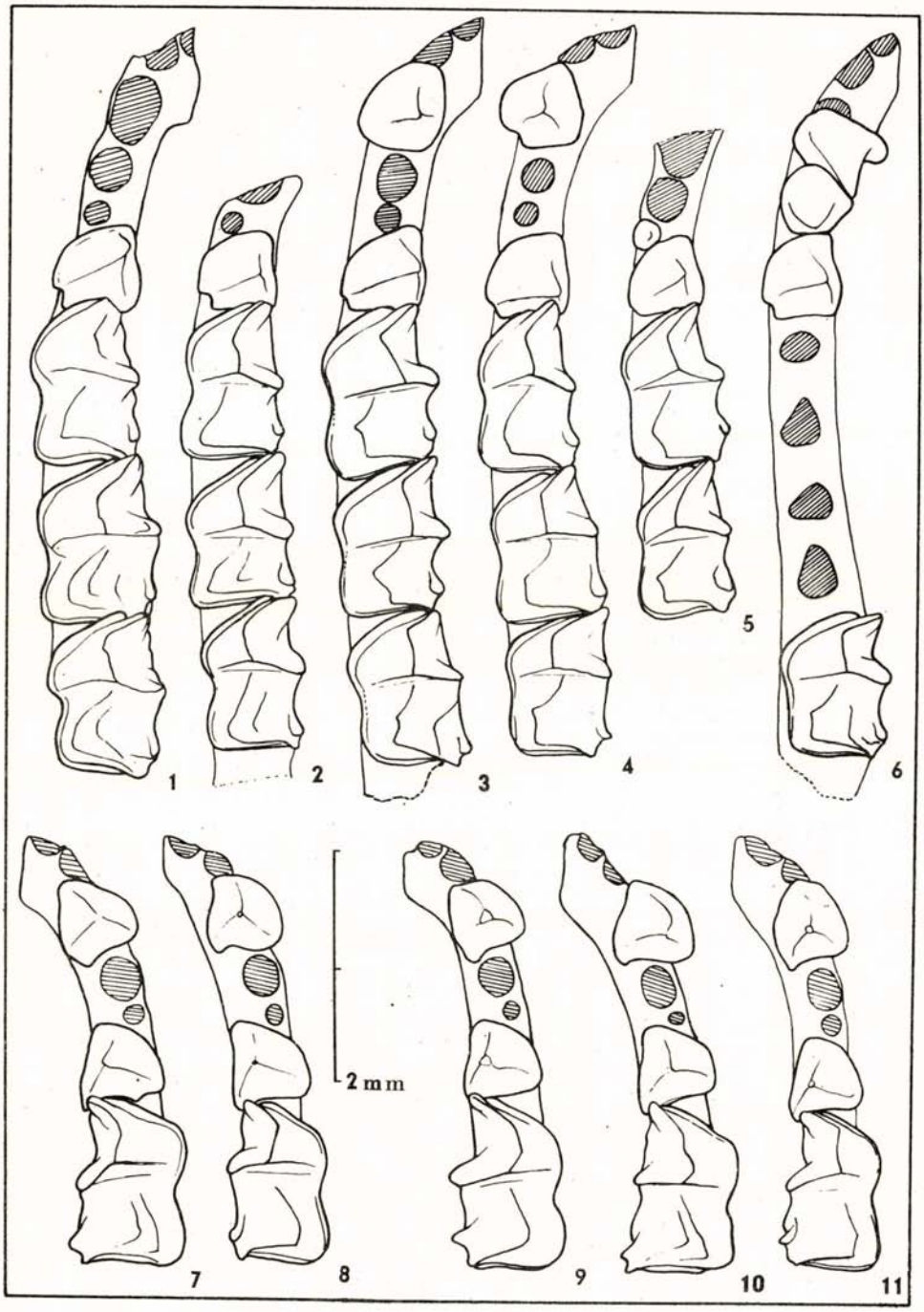
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PLATE V. - V. TÁBLA

Figs. 1-13. Fore-portions of right mandibles of recent small Rhinolophi, occlusal views. 1 = Rh. h. hipposideros No. 56.45.4.; 2 = Rh. h. hipposideros No. 56.45.1.; 3 = Rh.h. hipposideros No. 68.528.1.; 4 = Rh. h. hipposideros No. 72.86.1.; 5 = Rh. hipposideros (Tajikistan) No. 57.169.1.; 6 = Rh. h. minimus No. 66.236.3.; 7 = Rh. h. minimus No. 66.236.4.; 8 = Rh. midas No. 446.; 9 = Rh. midas No. 448.; 10 = Rh. h. hipposideros No. 56.50.2.; 11 = Rh. h. hipposideros No. 56.47.2.; 12 = Rh. h. hipposideros No. 68.528.4.; 13 = Rh. h. hipposideros No. 56.49.1.

1-13. ábra: Recens kis Rhinolophus-fajok jobboldali állkapcsainak elülső része rágófelületi nézetben.

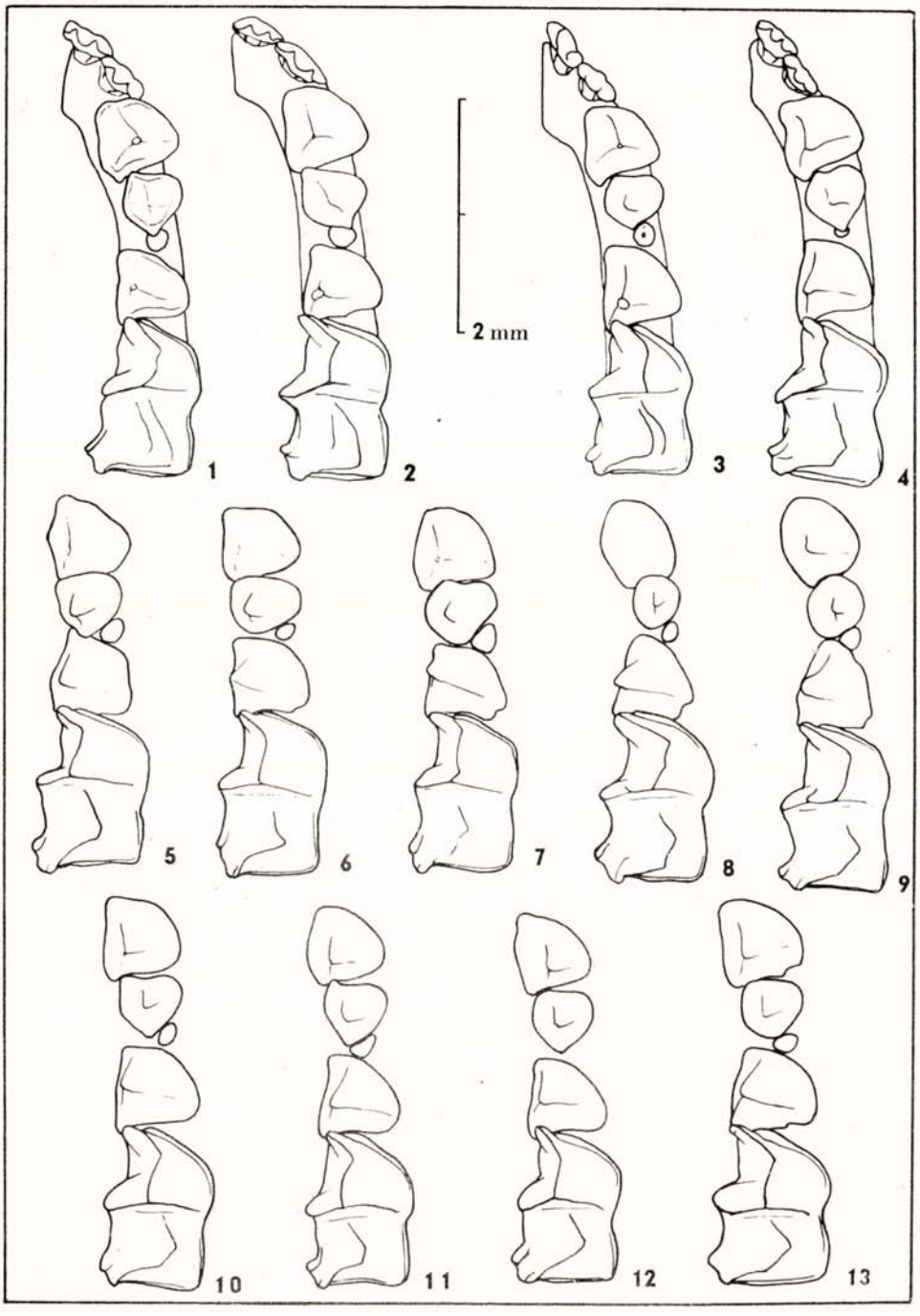
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PLATE VI. - VI. TÁBLA

Fig. 1. Distal end of right humerus of Rh. h. hipposideros No. 59.123.1., ventral view.

Figs. 2-6. distal fragments of humeri of Rh. variabilis n. sp., ventral views; 2 = (right) No. V.75.127.; 3 = (left) No. V.75.129.; 4 = (right) No. V.75.126.; 5 = (right) No. V. 75. 128.; 6 = (left) No. V.75.125. .

Fig. 7. Distal end of right humerus of Rh. h. hipposideros No. 59.123.; lateral view,

Figs. 8-10. Distal fragments of humeri of Rh. variabilis n.sp., lateral views. 8 = (right) No. V.75.128.; 9 = (right) No. V.75.127.; 10 = (right) No. V.75.126.

1. ábra. Az 59.123.1. számu Rh. h. hipposideros jobboldali felkarcsont disztális vége alulnézetben.

2-6. ábra. A Rh. variabilis n.sp. felkarcsontjának disztális töredékei alulnézetben.

7. ábra. A Rh. h. hipposideros jobboldali felkarcsont disztális vége külső oldalnézetben.

8-10. ábra. A Rh. variabilis n.sp. felkarcsontjának disztális töredékei külső oldalnézetben.

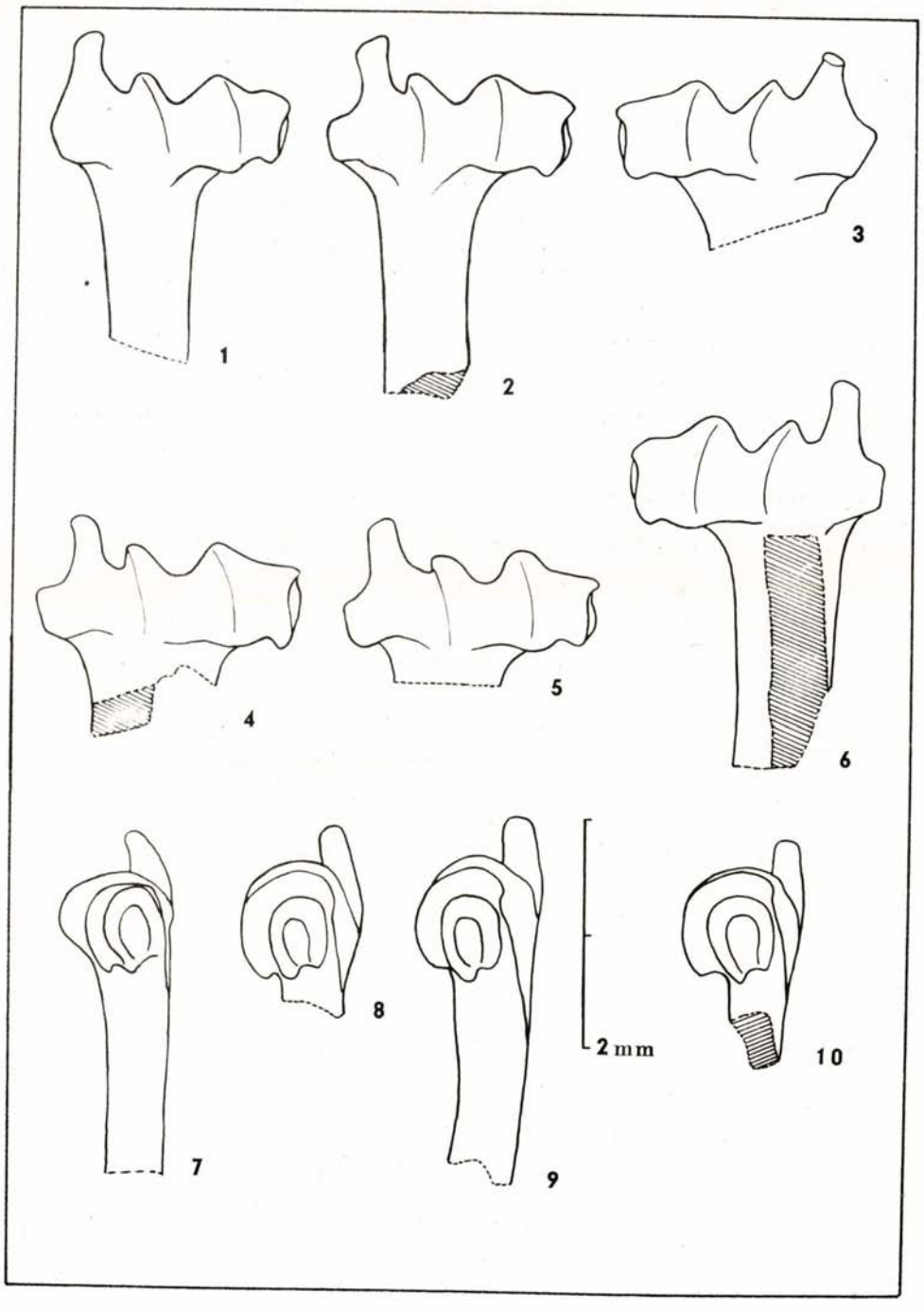
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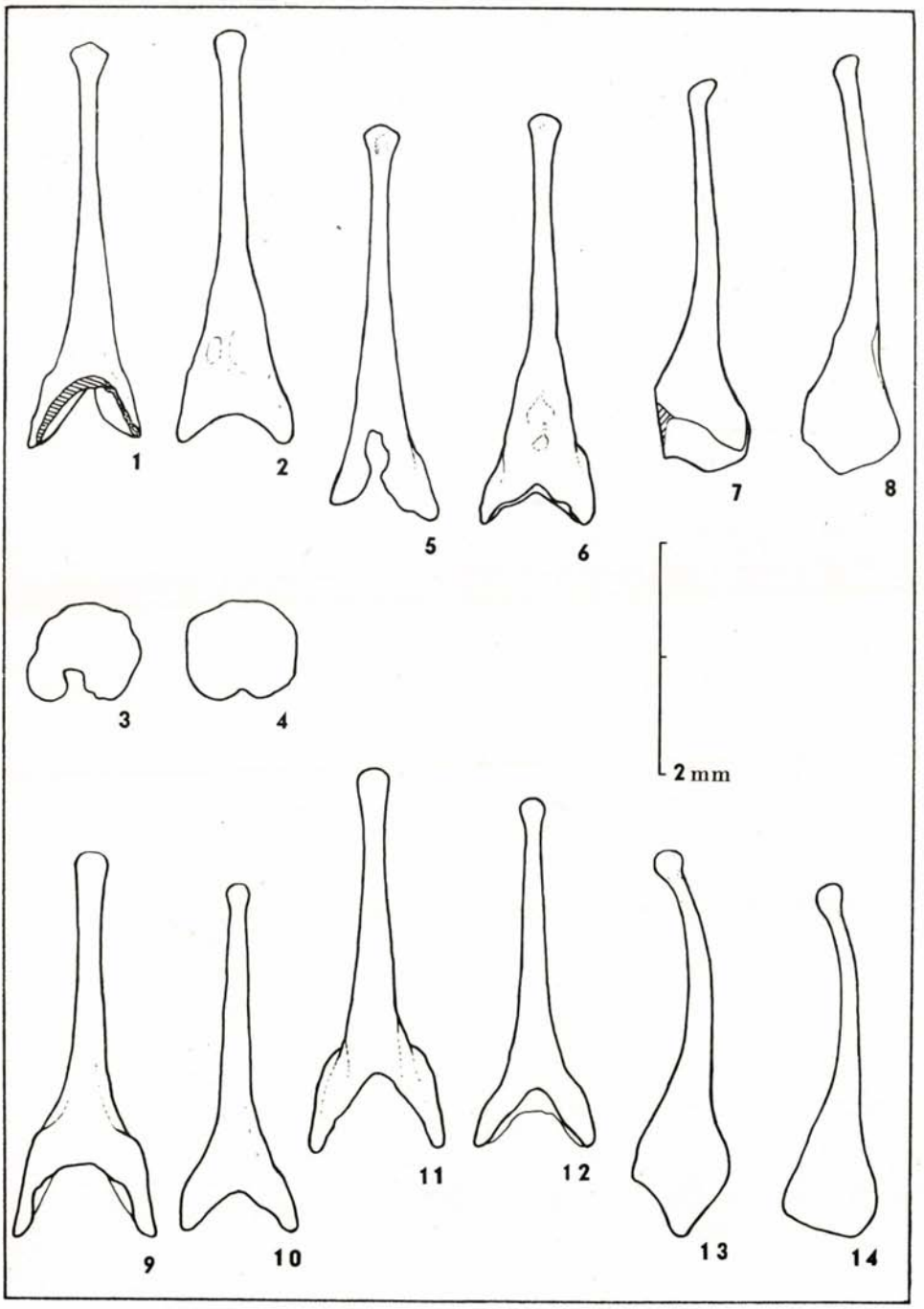
PLATE VII. - VII. TÁBLA

Figs. 1-8. Bacula of Rhinolophus variabilis n.sp. 1 = dorsal view of specimen No. V. 75.136.; 2 = basal cross section of the same; 3 = dorsal view of specimen No. V.75. 137.; 4 = basal cross section of the latter.; 5 = ventral view of specimen No. V.75.136.; 6 = ventral view of specimen No. V.75.137.; 7 = lateral view (right side) of specimen No.V.75.136.; 8 = lateral view of specimen No. V. 75.137.

Figs. 9-14. Bacula of Rhinolophus h. hipposideros. 9 = dorsal view of specimen No. 2957/a; 10 = dorsal view of specimen No. 2895; 11 = ventral view of specimen No. 2957/a; 12 = ventral view of specimen No. 2895; 13 = lateral view (right side) of specimen No. 2957/a; 14 = lateral view of specimen No. 2895.

1-8. ábra. A Rhinolophus variabilis n.sp. két péniszcsontja különböző nézetben. 1. és 3. = felülnézetben; 2. és 4. = az alapi rész keresztmetszete; 5-6. = alulnézet, 7-8. = oldalnézet (jobbról).

9-14. ábra. A Rh. h. hipposideros két péniszcsontja különböző nézetben. 9-10. = felülnézet; 11-12. = alulnézet; 13-14 = oldalnézet (jobbról).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