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Comparative analysis of the characters of the first lower molar in *Microtus* (*Terricola*) *thomasi* (*Rodentia, Arvicolidae*)

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Abstract. Morphometric characteristics of M_1 of *Microtus thomasi* show significant differences from other Mediterranean ground voles (*M. lusitanicus, M. duodecimcostatus, M. pyrenaicus, M. savii)*. The morphological and chromosomal data may indicate that *M. thomasi* should be distinguished as a separate species group of the subgenus *Terricola*.

Key words: dental morphology, *Microtus*, *Terricola*, Greece, Macedonia.

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I. INTRODUCTION

Thomas' vole *Microtus thomasi* (BARRETT-HAMILTON, 1903) is a relatively poorly known species and its taxonomic status is still controversial. It was described on the basis of a male specimen collected from Vranici, Montenegro. Further data obtained from Macedonia and Greece showed some morphological variation, which led MILLER (1912) to distinguish two species: *M. thomasi* (Montenegro) and *M. atticus* MILLER, 1910 (Greece). This opinion was also held by KRATOCHVIL (1971). ELLERMANN & MORRISON-SCOTT (1951) referred this vole to *Microtus duodecimcostatus* (DE SELYS-LONGCHAMPS, 1839) as a subspecies. Most authors suggest that *M. thomasi* and *M. atticus* are conspecific (CORBET 1978; PETROV & ZIVKOVIĆ 1979; NIETHAMMER, 1982; MUSSER & CARLETON 1993). This view is supported by biochemical studies and the lack of reproductive isolation between the two forms (NIKOLETOPOULOS et al. 1992), although particular populations show some karyological differences (GIAGIA 1985).

Thomas' ground vole was traditionally included in the Nearctic taxon *Pitymys* MCMURTRIE, 1831. However, the Nearctic and Palaearctic pitymyine forms evolved independently

and, consequently, the Old World ground voles should be named *Terricola* FATIO, 1867 (CHALINE at al. 1988; ZAGORODNYUK 1989).

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II. MATERIAL AND METHODS

Twenty-three measurements were taken (Fig. 1) on the occlusal surfaces of the first lower molars (M_1). Previous studies (BRUNET-LECOMTE 1990) have shown that the following four parameters are most suitable for distinguishing particular *Terricola* species: the total length of M_1 (measure 6); the relative length of the anteroconid complex [(measure 6 – measure 3)/ measure 6]; the size of inclination of the pitymyian-rhombus (measure 4 – measure 3); and the degree of separation of the M_1 anterior cup (measure 20 – measure 18). The material of *Microtus thomasi* has been compared with six other European species of *Terricola*. The measurement data base assembled by the senior author for *M. lusitanicus, M. duodecimcostatus, M. pyrenaicus, M. savii, M. multiplex* and *M. subterraneus* were used in the present study. Affinities between the species were defined by one-way analysis of variance, for particular parameters, completed by Scheffe's test.

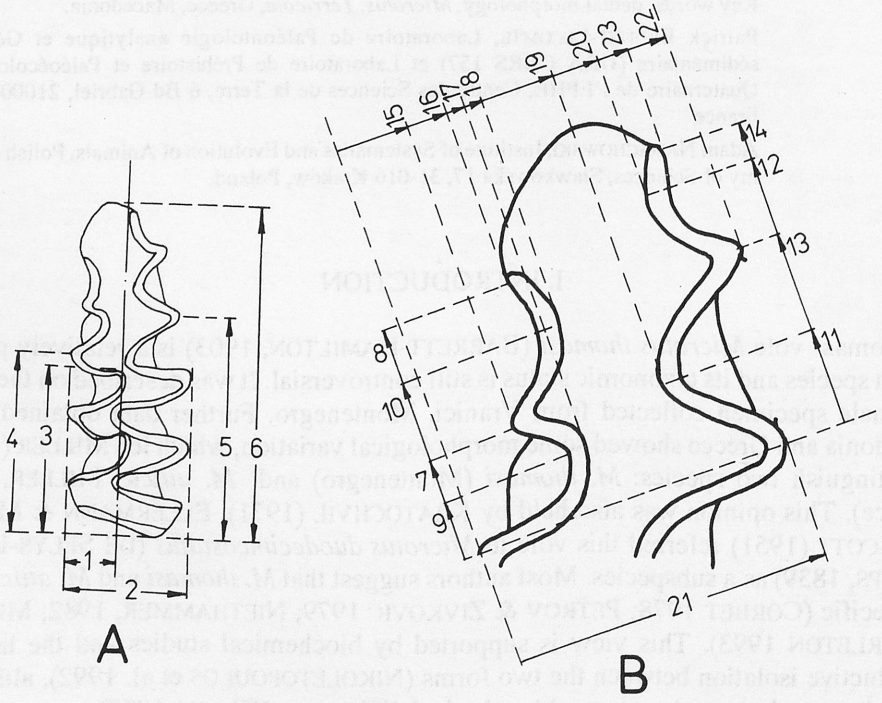

Fig. 1. Morphometry of the first lower molar. A – reference axis of the tooth and general measurements. B – measurements of the anteroconid complex.

The material of *Microtus thomasi* studied in this paper has been collected in the following six localities: (1) Vranici, Montenegro, 2 teeth, Natural History Museum (NHM), London, No. 58426, holotype; (2) Nimfoptera near Volvi Lake, Greek Macedonia, 11 teeth, Forschungsinstitut Senckenberg (FIS), Frankfurt, Nos 55778-55779; (3) Oiti mountain massif in east-central Greece, 2 teeth, Alexander Koenig Museum (MAK), Bonn, Nos 77142 and 77148; (4) Itea, west-central Greece, 2 teeth, FIS, no. 53524; (5) Dirphys mountain massif, Euboea, Greece, 2 teeth, MAK, Nos 77128, 77153; (6) Peloponesus, Greece, 2 teeth, MAK, Nos 77139, 77147.

III. RESULTS

Morphometric characteristics of *Microtus thomasi* in comparison with other recent European species of the subgenus *Terricola* are given in Tables I-IV. The total length of M_1 (Table I) of *M. thomasi* differs significantly from that in all other species, in having the highest values. The anterior part of the tooth (Table II) is relatively short and related

Table I

The length of M_1 (in millimetres) (V6). Means with the same letter do not differ significantly ($p \geq 0.05$)

Species	N	Mean ± SD	Scheffe's test			
M. thomasi	21	3.08 ± 0.19	A			
M. lusitanicus	493	2.59 ± 0.13			C	
M. duodecimcostatus	179	2.63 ± 0.18		B	C	
M. pyrenaicus	306	2.69 ± 0.17		B		
M. savii	132	2.55 ± 0.13				D
M. multiplex	295	2.62 ± 0.21		B	C	
M. subterraneus	310	2.48 ± 0.10				D

Table II

Relative length of anteroconid complex of M_1 (V6 – V3)/V6). Means with the same letter do not differ significantly ($p \geq 0.05$)

Species	N	Mean ± SD	Scheffe's test			
M. thomasi	21	0.504 ± 0.025			C	D
M. lusitanicus	493	0.511 ± 0.015		B	C	
M. duodecimcostatus	179	0.505 ± 0.014			C	D
M. pyrenaicus	306	0.499 ± 0.018				D
M. savii	132	0.507 ± 0.016		B	C	
M. multiplex	295	0.515 ± 0.017		B		
M. subterraneus	310	0.524 ± 0.014	A			

Table III

Size of inclination of the pitymyian-rhombus (in millimetres) (V4–V3). Means with the same letter do not differ significantly (p≥0.05)

Species	N	Mean ± SD	Scheffe's test
M. thomasi	21	0.069 ± 0.050	A
M. lusitanicus	493	–0.045 ± 0.043	E
M. duodecimcostatus	179	–0.025 ± 0.037	D E
M. pyrenaicus	306	–0.034 ± 0.040	E
M. savii	132	0.006 ± 0.034	C
M. multiplex	295	0.026 ± 0.045	B
M. subterraneus	310	–0.053 ± 0.037	C D

Table IV

Degree of separation of the M_1 anterior cap (in millimetres) (V20–V18). Means with the same letter do not differ significantly (p≥0.05)

Species	N	Mean ± SD	Scheffe's test
M. thomasi	21	0.45 ± 0.13	A
M. lusitanicus	493	0.23 ± 0.07	D
M. duodecimcostatus	179	0.28 ± 0.09	C
M. pyrenaicus	306	0.34 ± 0.08	B
M. savii	132	0.28 ± 0.07	C
M. multiplex	295	0.22 ± 0.08	D
M. subterraneus	310	0.16 ± 0.06	E

to the Mediterranean species: *M. lusitanicus, M. duodecimcostatus* and *M. savii*. The pitymyian rhombus (Table III) is significantly less inclined than in all other species, while the anterior cap is evidently more open in *M. thomasi* than in the other taxa (Table IV).

IV. DISCUSSION AND CONCLUSION

Morphological analysis of the first lower molar of *M. thomasi* showed its being distinctly different from other European *Terricola* species. Thomas' vole is characterized by a long M_1; its size is comparable with that of large *Microtus* s.s. species. The shape of the pitymyian rhombus is the most archaic trait in the *Terricola* group. No tendency for the anterior cup to separate from the remaining parts of the tooth is observed, which also seems to be a primitive feature. On the other hand, the variability of the occlusal surface of M_1 is greater than with other *Terricola* species (Fig. 2 and 3). An analysis of the dental pattern confirms the opinion that *M. thomasi* and *M. atticus* are conspecific.

Morphologically, *M. thomasi* is relatively closely related to the Mediterranean species (*M. lusitanicus, M. duodecimcostatus, M. savii)* (CHALINE et al. 1988). However, the phenetic distance is significant enough to make it apparent that *M. thomasi* forms a separate species group of the subgenus *Terricola*, which has already been proposed on the basis of karyological data by ZAGORODNYUK (1990).

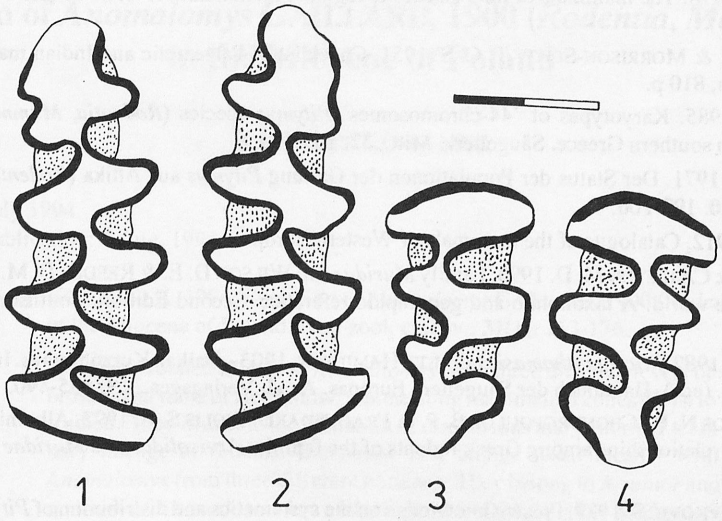

Fig. 2. Dental morphology of the holotype of *Microtus thomasi* (NHM, No. 58426), Vranici, Montenegro. 1 – left M_1, 2 – right M_1, 3 – right M^3, 4 – left M^3. Bar = 1 mm.

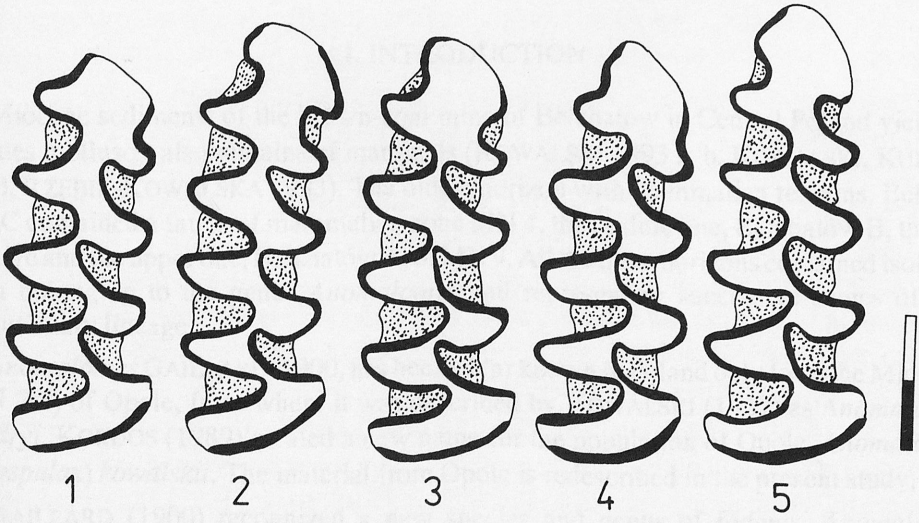

Fig. 3. Morphological variability of M_1 in *Microtus thomasi*. 1 – Nimfoptera, FIS 55778, 2 – Nimfoptera, FIS 55779, 3 – Dirphys, MAK 77153, 4 – Peloponesus, MAK 77139, 5 – Oiti, MAK 77142. Bar = 1 mm.

REFERENCES

BRUNET-LECOMTE P. 1990. Evolution morphologique de la première molaire inférieure des campagnols souterrains d'Europe (*Arvicolidae, Rodentia*). Z. Säugetierkunde, **55**: 371-382.

CHALINE J., BRUNET-LECOMTE P. & GRAF J. D. 1988. Validation de *Terricola* FATIO, 1867 pour les Campagnols souterrains (*Arvicolidae, Rodentia*) paléarctiques actuels et fossiles. C. R. Acad. Sci, série III, **306**: 475-478.

CORBET G. B. 1978. The mammals of the Palaearctic region. A taxonomic review. Cornel University Press, 1-314.

ELLERMAN J. R. & MORRISON-SCOTT T. C. S. 1951. Checklist of Palaearctic and Indian mammals 1758 to 1946. London, 810 p.

GIAGIA E. B. 1985. Karyotypes of '44-chromosomes' *Pitymys* species (*Rodentia, Mammalia*) and their distribution in southern Greece. Säugetierk. Mitt., **32**: 169-173.

KRATOCHVIL J. 1971. Der Status der Populationen der Gattung *Pitymys* aus Attika (*Rodentia, Mammalia*). Zool. Listy, **20**: 197-206.

MILLER G. S. 1912. Catalogue of the mammals of Western Europe.

MUSSER G. G. & CARLETON M. D. 1993. Family *Muridae*. In: WILSON D. E. & REEDER D. M. (eds). Mammal species of the world. A taxonomic and geographic reference. Second Edition. Smithsonian Inst. Press, 501-600.

NIETHAMMER J. 1982. *Microtus thomasi* BARRETT-HAMILTON, 1903 – Balkan Kurzohrmaus. In: NIETHAMMER J. & KRAPP F. (eds). Handbuch der Säugetiere Europas. Acad. Verlagsges., **2/I**: 485-490.

NIKOLETOPOULOS N. P., CHONDROPOULOS B. P. & FRAGUEDAKIS-TSOLIS S. E. 1992. Albumin evolution and phylogenetic relationships among Greek rodents of the families *Arvicolidae* and *Muridae*. J. Zool. Lond., **228**: 445-453.

PETROV B. & ZIVKOVIĆ S. 1979. Present knowledge on the systematics and distribution of *Pitymys* (*Rodentia, Mammalia*) in Yugoslavia. Biosistematica, **5**: 113-125.

ZAGORODNYUK I. V. 1989. Taxonomy, distribution and morphological variation of the *Terricola* voles in East Europe. Vestn. zool., **5**: 3-14 [in Russian, English summary].

ZAGORODNYUK I. V. 1990. Karyotypic variability and systematics of the *Arvicolini* (*Rodentia*). Communication 1. Species and chromosomal numbers. Vestn. zool., **2**: 26-38 [in Russian, English summary].