



Research Article

Roach's mouse-tailed dormouse *Myomimus roachi* distribution and conservation in Bulgaria

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Abstract

The Roach's mouse-tailed dormouse (*Myomimus roachi*) is an endangered mammal in Europe with poorly known distribution and biology in Bulgaria. Cranial remains of 15 specimens were determined among 30532 mammals in Barn Owl (*Tyto alba*) pellets in 35 localities from 2000 to 2008 and 32941 mammals in Eagle Owl (*Bubo bubo*) pellets in 59 localities from 1988 to 2011 in SE Bulgaria. This dormouse was present with single specimens in 11 localities and with 4 specimens in one locality. It is one of the rarest mammals in the region that forms only up to 1% by number of mammalian prey in the more numerous pellet samples. The existing protected areas ecological network covers six out of 15 (40%) localities where the species has been detected in the last two decades. We discuss the necessity of designation of new Natura 2000 zones for the protection of the Roach's mouse-tailed dormouse in Bulgaria.

Introduction

The Roach's mouse-tailed dormouse (*Myomimus roachi*) is a poorly known endemic mammal in the Northeastern Mediterranean region with around 50 animals in collections. It has a limited distribution in Europe - SE Bulgaria, Turkish Thrace, and three localities in western Turkish Anatolia (Kryštufek, 2011; Kurtonur and Ozkan, 1991; Peshev et al., 2004; Temple and Cuttelod, 2009). The species inhabits extensively managed semi-open agricultural habitats with trees or bushes such as orchards,

vineyards, hedgerows and boundaries of fields (Kryštufek, 2011; Peshev et al., 2004). This dormouse is active from the first half of April to the second half of November and produces one litter per year. Copulations are probably around the end of April and the first half of May, with births from late May to June. Young females can have 5-6 young per litter but older ones might have larger litters (Buruldag and Kurtonur, 2001). Its conservation status is "vulnerable" with decreasing population trend according to IUCN (Kryštufek, 2011), but "endangered" at European level, and "data deficient" for European Union (Temple and Terry, 2007). The Roach's mouse-tailed dormouse is

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protected by law in Bulgaria and the areas where it occurs should be preserved through institution of protected areas. It is one of the priority “vulnerable” mammals for the existing Natura 2000 protected zones since 2007 when Bulgaria joined the European Union (Golemanski, 2011).

This study presents new Roach’s mouse-tailed dormouse localities based on its presence in owl pellets and their place within the protected areas ecological network in SE Bulgaria.

Study Area and Methods

The study area (10000 km²) contains hilly and plane territories delimited by the Maritza and Sazliyka rivers in the West, the border with Turkey in the south, the Black sea coast in the east and the foothills of the Hisar Hills (highest peak 515 metres), Bakadzhik Hills (403 metres) and St. Iliyski Hills (416 metres) in the north (Fig. 1). The region lies within the Transitory Mediterranean Climatic Zone (Galabov, 1982). Deciduous forests predominated by oaks *Quercus sp.* cover most of the border Strandzha Mountains (1031 metres in Turkey), and mainly on hilltops and steeper slopes of the Derventski Hills (556 metres) and the Sakar Mountain (856 metres). Uncultivated open lands are dominated by dry grassland formations, often combined with Christ’s thorn (*Paliurus spinachristi*). They had been used by the traditional extensive pasture livestock husbandry which has dropped down sharply since 1991/1992. Most of those lands are abandoned now. Farmland on slopes, between hills and along the river valleys is sown mainly with wheat, barley and sunflower, or occasionally with vineyards, tobacco, vegetables etc. Most infertile land in montane areas along the Turkish border has been abandoned within the past 10–15 years after the restitution of land ownership. Its cultivation has been renovated since Bulgaria became part of the EU. The human settlements are mostly villages, with the exception of few small towns, without any strongly developed industry. There are thermoelectric power plants between the western border of the area and foothills of Mt. Sakar (see also Milchev 1994, 2009a). The human population has steadily decreased especially in the southern border areas. The network of protected areas includes territories designated according to the national Protected Areas Act and protected zones according to the Biodiversity Act which implement the EU Directive 92/43/EEC (Habitats) and the Directive 2009/147/EC (Birds) (Natura 2000, 2007). They vastly overlap and almost cover entirely the Black sea coast, the mountains and hills along the

Turkish border.

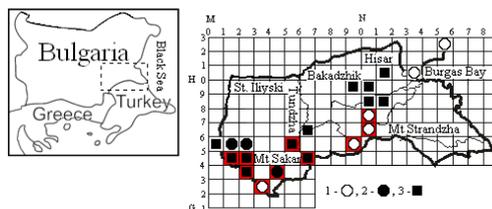


Figure 1 – Distribution of the Roach’s mouse-tailed dormouse (*Myomimus roachi*) in SE Bulgaria. Localities within the protected zones are in red squares. 1: localities to 1985, all unconfirmed (Peshev et al., 2004); 2: localities according to Georgiev (2004); 3: localities from this study.

Dormouse presence was detected from fresh and decomposed pellets, collected from and around the nest and places for day roosting of Barn Owls (*Tyto alba*) and Eagle Owls (*Bubo bubo*) in SE Bulgaria. Barn Owl pellets were collected in 35 localities for a total of 47 site-year samples from 2000 to 2008. Eagle Owl pellets were collected in 59 localities with a total of 540 year-site samples from 1988 to 2011. The mammals are determined after Görner and Hackethal (1987); Peshev et al. (2004) and our comparative collection. Roach’s mouse-tailed dormice were determined from upper and lower jaws and molars following Peshev et al. (2004) and by comparison of cranial fragments with materials of Peshev et al. (1960) in the collection at Faculty of Biology, University of Sofia “St. K. Ohridski”. The minimum number of individuals for mammals in each sample has been estimated mainly based on the remains of crania and cranial fragments, mandibles, pelvic and limb bones. Mapping of localities is on a 10 km UTM grid. The marked squares cover most of the respective Barn Owl’s (1 km range around the locality) or Eagle Owl’s (2 km range around the locality) hunting area.

Results and discussion

The skeletal remains of 15 Roach’s mouse-tailed dormice were determined from among 30532 mammals in Barn Owl diet and 32941 mammals in Eagle Owl diet. The localities fall into 12 UTM squares where the species was not reported in earlier studies (Georgiev 2004; Peshev et al. 2004; Fig. 1). Considering all known locations, the majority are in the zone up to 300

Table 1 – Distribution of the Roach's mouse-tailed dormouse (*Myomimus roachi*) localities according to their altitude, SE Bulgaria. N: number of localities.

Altitude (m)	Number of localities			total N
	Peshev et al. (2004)	Georgiev (2004)	this study	
<100	3		4	7 (32%)
100-200			5	5 (23%)
200-300	3	3	1	7 (32%)
300-350	1		2	3 (14%)
<i>total</i>	7	3	12	22

m a.s.l. (86.4%, N = 22; Tab. 1) out of the woody parts of border hills and mountains.

The population size of Roach's mouse-tailed dormouse is unknown in Bulgaria with the last captured specimen in 1978 (Peshev et al., 2004). In a 4-year study, Dimitrov et al. (2007) have not trapped the species in the old localities reported by Peshev et al. (1960) in the Strandzha Mountains. Georgiev (2004) did not present any quantitative data for mammals in collected pellets. Our pellet analysis suggests the species is rare, since in 11 of 12 localities only a single specimen was found (Tab. 2). The two studied owls are opportunistic nocturnal raptors that prefer open areas for hunting as the habitats of the mainly nocturnal terrestrial Roach's mouse-tailed dormouse (del Hoyo et al., 1999; Mebs and Scherzinger, 2000; Peshev et al., 2004). Obuch (2001) found dormice *Myomimus sp.* only in the Eagle Owl and Barn Owl diets among eight studied owls in the Middle East. The Roach's mouse-tailed dormouse with its body mass around 30 g (19-48 g, Buruldag and Kurtonur 2001) is within preferred prey-mass group of Barn Owl (Miltchev et al., 2004), but it falls out of the preferred group of the Eagle Owl's prey, between 200 and 1900 g (del Hoyo et al., 1999; Mebs and Scherzinger, 2000). Together with Romanian hamster (*Mesocricetus newtoni*) (Milchev, 2006) and Grey Dwarf Hamster (*Cricetulus migratorius*) (Georgiev, 2004; Milchev, 2009b), that inhabit the open steppe habitats in SE Bulgaria, it was one of the rarest small mammals in the diet of the two owl species. Also other two dormouse species were preyed rarely (Tab. 2), but these are wood dwellers. Most Roach's mouse-tailed dormouse were preyed by Eagle Owls in the last decade

(89%, N = 9). This could correlate with the possible positive development of its population as a result of the abandonment of pastures and farmlands in SE Bulgaria.

The existing network of protected areas and protected zones includes 5 old and unconfirmed localities (two in square NG06, Peshev et al. 2004) and 6 of the localities reported by Georgiev (2004) and this study (Fig. 1). However, this dormouse is added to some Natura 2000 zones it does not inhabit, for example the Natura 2000 zone "Skalsko" (BG0000263) more than 100 km to the north from its home range (Natura 2000, 2007). We do not take into account such zones in this study. A total of 9 new localities remain outside protected area ecological network. They are 41% (N = 22) of all known, but 60% (N = 15) from the localities reported in the last two decades. Kryštufek (2011) recommends that each new type locality is to be protected, and the criteria for assessing national lists of proposed sites of community interest at bio-geographical level (Hab. 97/2 rev. 4 18/11/97) requires the inclusion of at least 60% of localities in the Natura 2000 network. Therefore Bulgaria has to expand its protected areas network for Roach's mouse-tailed dormouse preservation. The most suitable areas for this are in the north-west (squares MG05, MG15, MG25) and north (squares MG99, NG09, NH10) from the known species range. The thermoelectric power plants with open pits are located at a distance 10-13 km north of the localities from the first part. They are indicated by Golemanski (2011) as negatively influencing the species and destroying its habitats. However, there is no evidence to support this view. The need for a designation of a Natura 2000 zone in the second region is substantiated by Milchev (2006) after finding the Romanian hamster there. The last locality is incorrectly attributed to the Natura 2000 zone "Sredetzka reka" (BG0000198), which does not cover Roach's mouse-tailed dormouse localities in the region either.

The lack of captured specimens of Roach's mouse-tailed dormouse and a precise study of its habitats, hence a realistic assessment of factors affecting the Bulgarian population severely hampers the effective conservation of this species. However, the annual fires in large

Table 2 – Minimum number of individuals of dormice (Gliridae) in the Barn Owl (*Tyto alba*) and Eagle Owl (*Bubo bubo*) diets, SE Bulgaria. Year: year of detection of *M. roachi*; Years of occupation: number of years with occupation of the owl breeding locality with at least one bird.

UTM square	Year	<i>Myomimus roachi</i> (%)	<i>Dryomys nitedula</i>	<i>Glis glis</i>	Mammals in sample	Years of occupation
<i>Barn owl diet</i>						
MG64	2000	1 (0.1)	3		804	
MG24	2001	1 (1.9)			54	
MG05	2001	4 (0.4)	2		1117	
<i>Eagle owl diet</i>						
MG99	1994	1 (2.4)		1	41	4 (since 1994)
NG09	2003	1 (0.7)		3	141	18 (since 1994)
NG08	2005	1 (0.3)	1		299	20 (since 1989)
MG66	2006	1 (1.0)	1		103	16 (since 1996)
MG14	2007	1 (12.5)			8	10 (since 1995)
NH10	2009	1 (1.1)	1		92	17 (since 1994)
NG18	2011	1 (0.5)		3	215	16 (since 1989)
MG23	2011	1 (2.9)			34	13 (since 1995)
MG55	2011	1 (1.4)	1	11	73	1 (since 2011)

areas of riverside hills along Tundzha River near the border with Turkey (square MG64) apparently negatively influenced species by destroying its habitat. No effective measures halt this practice in the area, regardless of its inclusion in the protected territory named “Gorge of the Tundzha River”, in the homonymous Natura 2000 zone BG0000217 and in the Natura 2000 zone “Sakar” (BG0000212). Real danger of total destruction of the protected area is the realization of the construction of a dam on the Tundzha River between Bulgaria and Turkey. Important measures to protect the species would be economic incentives to maintain traditional extensive agriculture and livestock farming in the protected zones. The disappearance of localities in Turkish Anatolia has been associated with intensification of agriculture (Kryštufek, 2011), a process that also occurred in our study area over the past triennium. 

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