

# Fat Dormouse *Glis glis* (Rodentia: Gliridae) in Albania: Synopsis of Distributional Records with Notes on Habitat Use

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**Abstract:** The fat dormouse *Glis glis* has been a species with little known distribution and habitat use in Albania, with only four literature records. We provide data about 14 new localities distributed throughout Albania, mostly in its northern half. Fat dormice were mostly recorded through their characteristic vocalization but also from direct observations. Although some records come from a habitat considered typical and optimal for that species – old-growth, deciduous (mostly beech) forests, the majority of sites were either in shrubland or almost barren landscape with sparse bushes and vertical rocky walls or very steep slopes. Seven localities devoid of intact, mature woodland, contained underground structures, either man-made (bunkers, tunnels, old mines) or natural (karstic caves) and in five cases active individuals of the fat dormouse were observed inside such objects. For the first time the use of abandoned military structures is reported; such usage may help in maintaining populations of *G. glis* under the heavy ongoing deforestation of Albania.

**Key words:** dormice, Gliridae, rodent, the Balkans, conservation

## Introduction

The fat dormouse *Glis glis* (L., 1766) is an arboreal, nocturnal rodent of European distribution, and a threatened species of conservation concern in the northern part of its geographical range; in the Balkans, the species is considered common and widespread, treated either as a game animal hunted for meat and fur or as a pest in silviculture (STIJEPOVIĆ 2003, KRYŠTUFEK 2010).

Small mammal fauna of Albania appeared, at first sight, to be relatively well studied, with data collected from more than 160 localities, spread across the country (BEGO *et al.* 2008, PASPALI *et al.* 2013, ROGOZI *et al.* 2013). However, these data can be regarded as sufficient only with respect to the taxa that are easily collected with snap traps or constitute the main prey of the barn owl *Tyto alba*. This fact accounts for the good representation of mice (Murinae) and voles (Arvicolinae), while the survey of shrews (Soricidae) and arboreal rodents (such as

dormice Gliridae and red squirrel *Sciurus vulgaris*), which require the application of different sets of methods, is far from being completed. Knowledge on the Albanian distribution and habitat use of the fat dormouse has been scarce, with only four localities reported (BEGO *et al.* 2008, PASPALI *et al.* 2013).

Since 2003, during field trips to different regions of Albania, we have recorded fat dormice. As a result, the newly-obtained distributional data exceeded the previous records more than three-fold and also broadened the known range of the species habitats (KRYŠTUFEK 2010). In the present paper, we review all the available data about geographical distribution and habitat of the fat dormouse in Albania.

## Material and Methods

We collected data at different occasions during the trips in August 2003, September-October 2005,

August 2006, April-May 2010, June-July 2011 and September 2012. The characteristic audible calls of adult individuals at night were the main sign of fat dormice presence and allowed the detection of the individuals, which was further assisted by their noisy foraging activities (JURCZYSZYN 1995, CAPIZZI *et al.* 2003). In some cases, we directly observed active individuals with the help of a spotlight, either at night or during daily survey of underground spaces, e.g. bunkers, military tunnels, adits and caves. The coordinates of localities were obtained using a GPS Garmin receiver.

## Results

In addition to the four known sites (15-18), we found 14 new localities, distributed throughout Albania, although they are concentrated in the northern half of the country (Fig. 1).

### New records:

1) Qafa e Malit (N 42°05'25.5", E 20°06'10.6", ~780 m a.s.l.), intensively harvested old beech forest on a steep slope, 11.08.2003, calls heard;

2) Suç (N 41°34'17.4", E 20°03.16.4", 205 m a.s.l.), a concrete military tunnel with flooded floor, built in vertical rocky outcrops, overgrown by dense shrubs, ivy *Hedera helix* and fig *Ficus carica*, 25.09.2005, 1 individual observed, calls heard;

3) Krrabë (N 41°13.128', E 19°57.594' 280 m a.s.l.), a stand of old *Platanus* trees along a stream, 27.09.2005, calls heard;

4) Goricë (N 41°13'07.7", E 19°57'35.6", 280 m a.s.l.), a narrow stripe of riparian woodland along a river, 18.08.2006, calls heard;

5) Çiflik (N 39°41'10.7", E 20°07'40.4"), an entrance of concrete military tunnel in a slope overgrown by shrubs, 02.05.2010, 1 individual observed;

6) Rahovic (N 42°25'35.2", E 19°31'41.9"), the valley of the Cemit River, limestone walls with shrubs and sparse trees, near the entrance to the karstic cave, 21.06.2011, calls heard;

7) Perlat (N 41°43'32.3", E 19°59'02.1", 267 m a.s.l.), a concrete military tunnel in steep, serpentine slope, overgrown with dense shrub (few mature trees nearby), 26.06.2011, few individuals observed climbing on the ceiling;

8) Lura National Park (N 41°42'54.1", E 20°11'59.9", 1430 m a.s.l.), old beech forest with numerous, hollow trees, 28.06.2011, calls heard, several individuals observed;

9) Qafa e Shtyllës (N 41°22'35.8", E 20°04'51.7", 1554 m a.s.l.), limestone outcrops

overgrown by beech forest, 01.07.2011, calls heard;

10) Nderlyse (N 42°21'20.6", E 19°46'45.3", 462 m a.s.l.), a concrete bridge over the Shalë River, surrounded by a mosaic of low smoketree *Cotinus coggygria* shrubland and pastures, 10.09.2012, 1 individual observed;

11) Prekal (N 42°10'41.0", E 19°43'12.3", 215 m a.s.l.), bare limestone outcrops around a large, karstic cave, 11.09.2012, calls heard;

12) Kir (N 42°12'44.4", E 19°42'12.0", 298 m a.s.l.), the canyon of the Kirit River, steep slopes with rocky walls and dense shrubland, 11.09.2012, calls heard;

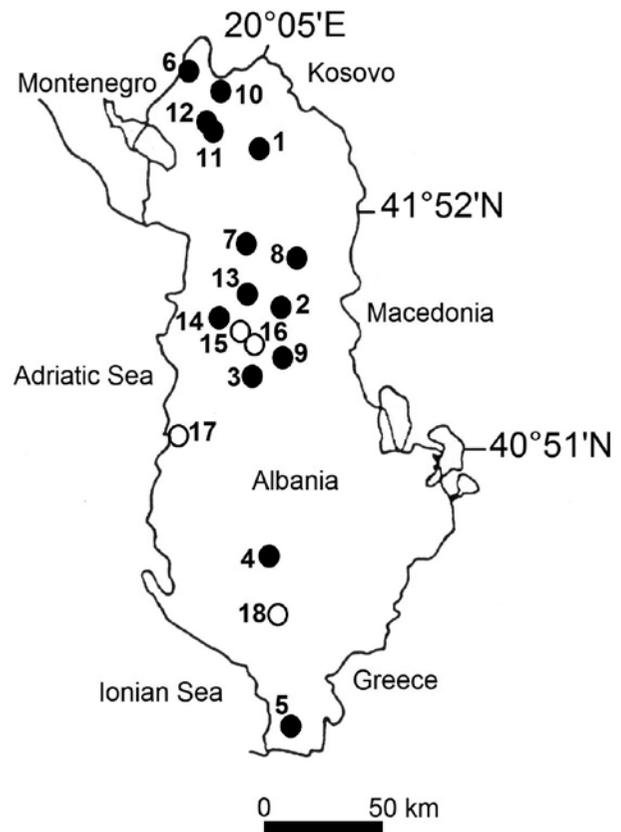
13) Burrel (N 41°35'36.9", E 20°00'05.1", 287 m a.s.l.), a concrete bunker in a sandstone outcrop, surrounded by mosaic of shrubland and pastures, 13.09.2012, 1 individual observed;

14) Nojë (N 41°31'55.9", E 19°48'28.1", 527 m a.s.l.), a concrete tunnel in a treeless, rocky, limestone slope, 14.09.2012, 1 individual observed;

### Literature records:

15) Dajti National Park (1100 m a. s. l.), beech forest, October 1992, 1♀ captured in snap trap (BEGO *et al.* 2008);

16) Qafë Mollë (800 m a.s.l.), chestnut forest,



**Fig. 1.** Distribution of the fat dormouse *Glis glis* in Albania. Open circles – literature records, filled circles – new, own records. Numbers refer to the list of localities in the text



**Fig. 2.** Edible dormouse *Glis glis* on the wall of a concrete bunker, Burrel, Albania, 13.09.2012 (photo K. Sachanowicz)

August 1996, 1 ♀ captured in snap trap (BEGO *et al.* 2008);

17) Divjaka Pine Forest (sea level), pine forest, May 2003, 1 ♂ captured in snap trap (BEGO *et al.* 2008);

18) Gjirokastër district, the valley of the Drinos River (200-500 m a.s.l.), September-November 2010, remains in pellets of *Tyto alba* (PASPALI *et al.* 2013).

Localities of the fat dormouse were distributed throughout the wide altitudinal range – 11 sites were located below 500 m a.s.l. (down to the sea level), 4 localities between 500-1000 m a.s.l., while 3 were found above 1000 m. Only six localities constituted of old-growth forest – four of beech *Fagus sylvatica*, one of chestnut *Castanea sativa*, and one of pines *Pinus* spp.; two sites consisted of narrow, sparse remains of riparian woodlands (plane *Platanus orientalis*), surrounded by shrubland, pastures, settlements and agriculture. The majority of sites were either in shrubland (7) or almost barren landscape with sparse bushes (2) and vertical rocky walls or steep slopes. Seven of localities, which were devoid of intact, mature woodland, contained underground structures, either man-made (bunkers, tunnels, old mines) or natural (karstic caves), and in five cases active individuals of the fat dormouse were observed inside such objects.

## Discussion

Our findings improved the knowledge on distribution and habitat use of the fat dormouse in Albania. The species is known from 18 localities, distributed in most of the major regions and landscape zones of the country, although the majority of records have

been obtained from the north. BEGO *et al.* (2008) suggested – in spite of the scarce material (3 localities) – that the fat dormouse is *very likely widespread in the forested regions of Albania*, but the actual range of habitats used exceeds that expectation. In the neighbouring Montenegro, the species is also considered widespread, but only four localities have been known (STIJEPOVIĆ 2003). The species is also widespread in wooded regions of Macedonia, where it has been recorded at 18 localities, with majority of them being in the western part of the country, close to the Albanian border (KRYŠTUFEK, PETKOVSKI 2003). The fat dormouse is considered as scarce in the northernmost provinces of Greece; the species is confined to the mountains of Epirus and the island of Corfu, where a total of 6 localities have been found (SOFIANIDOU, VOHRALÍK 1991, MITSAINAS *et al.* 2008). *G. glis* is the most common of the four dormice species in Croatia, being recorded at 48 localities after 1970 and inhabiting both Mediterranean and continental parts of the country, including subalpine belt up to 1670 m a.s.l. (TVRTKOVIĆ *et al.* 1995).

In central Europe and in lowland areas of the western Mediterranean, the fat dormouse is restricted to old-growth deciduous forests, particularly beech and oak (*Quercus* spp.) stands, with intact, well-connected canopies, rich understorey and abundance of mast seeds that are the main food of the species; in the vicinity of such core habitats, old abandoned orchards or groves and hedges, which are rich in fruit trees are often used as well (JURCZYŚZYN 1995, CAPIZZI *et al.* 2003, JUŠKAITIS, ŠIOŽINYTĖ 2008, BAKÓ, HECKER 2006, BIEBER, RUF 2009). In the context of landscape, the species appears very sensitive to habitat fragmentation and intensive forest management, and it does not occur in young stands or coppices

with short rotation cycle (CAPIZZI *et al.* 2003). This is not the case in Albania and the Balkans in general. There, the fat dormice occupy various habitats that might be considered suboptimal or marginal, including tall maquis shrub (KRYŠTUFEK 2010) or pine (TVRTKOVIĆ *et al.* 1995, BEGO *et al.* 2008) and spruce forests (STIJEPOVIĆ 2003). Such plasticity may allow the dormice to survive the extensive deforestation of the Mediterranean zone and the Dinaric Karst, which occurred mostly in antiquity and the Middle Ages (WILLIAMS 2000, KRANJC 2012). In Albania, the ongoing deforestation of upper montane (oro- and altimediterranean) zone, associated with the wide-scale illegal logging, reduced country's forest cover from 31% to 25% in 1990s (STAHL 2010).

Reliance of the fat dormouse on high, old-growth, canopy-closed forest is related to its needs for shelter against predators and for suitable roosts for hibernation. Vertical rocky walls with deep crevices, as well as available underground spaces may act as a substitute for the hollow trees. Fat dormice are known to prefer geomorphologically diverse woodland areas with cliffs, caves and sinkholes over lowland forests with flat topography (KRYŠTUFEK 2010). In the Balkans, such habitats are often located in limestone karst with distinct micro-relief (TVRTKOVIĆ *et al.* 1995). As fat dormice regularly use deep caves as shelters (SCARAVELLI, BASSI 1994), they may survive in karstic areas in the absence of any intact forest. Moreover, we found that artificial undergrounds may play similar role for this species. We suppose that the abundance of such objects in Albania (mostly abandoned military and mining infrastructure), may increase chances for the fat dormouse survival in deforested landscape, especially where the underlying rocks (flysch sediments or serpentinites) preclude the development of karst topography. The lack of trees, such as oak or beech, which provide mast seeds (a staple food of the fat dormouse), does not preclude the presence of this species. The species reveals high plasticity in diet, supplemented with various seeds, fruits, bark, buds, invertebrates and even birds (KRYŠTUFEK 2010). In the deforested Mediterranean landscapes, fruits of *Ficus carica* and rowan *Rubus* spp. may act as a main source of high-energy hydrocarbons for the fat dormouse; this possibility, however, requires further studies. On the other hand, even if the distribution of the species is not dependent on the distribution of old-growth forests, its population density probably correlates strongly with the abundance of such habitat.

**Acknowledgements:** We thank Alek Rachwald and Michał Piskorski, who participated in several trips, for help during field works.

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Received: 12.04.2013

Accepted: 13.08.2013