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THE FAT DORMOUSE (GLIS GLIS) IN GAUJA NATIONAL PARK – THE MOST NORTHEN LOCALITY WITHIN THE SPECIES' DISTRIBUTION RANGE?

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This study aimed to summarize and reevaluate Fat Dormouse (*Glis glis*) records in Latvia and in Gauja National Park in particular. Data were collected during the 1990s mainly by inquiry, including personal communications and some field surveys, as part of data collection for both the Latvian Mammal Atlas and Latvian Red Data Book. Results obtained were compared with the limited published data about distribution of the Fat Dormouse in the 19th and 20th centuries. Although historically and recently *Glis* has been recorded in various parts of the country, its current distribution is assumed to be restricted to two river valleys in central Latvia. Each valley probably contains a separate micro-population of the Fat Dormouse. The status of records from outside these areas is discussed: they could represent either vagrant specimens or undiscovered micro-populations, or most likely, misidentified animals. Available written sources suggest that the Gauja River valley is currently the most northern (57°20'N) part of the range of the Fat Dormouse. The very rare encounters with *Glis* and the small number of animals observed suggest that both micro-populations are very scattered.

Key words: *Glis*, Latvia, distribution

INTRODUCTION

Glis glis occurs across most of Central and Southern Europe. It occurs northwards to the Baltic States and the Middle of the Volga River in Russia (AIRAPETJANC 1983), but the northern border of its distributional range is not clearly defined. ROSSOLIMO *et al.* (2001) declared the border between Latvia and Estonia to be the northern edge of this species' distribution. STORCH (1978) indicated an anonymous point on the East coast of the Gulf of Riga, probably referring to the settlement of Lizdeni in North Latvia, i.e. the same point indicated by GREVÉ (1909). However, the status of the species and its distribution within Latvia is still rather obscure as there are no recent records of the Fat Dormouse from most of the localities with previous observations. This study aimed to summarize and reevaluate the data about Fat Dormouse records in Latvia and in the Gauja National Park in particular, from where most of the recent records have originated.

METHODS

Latvia is situated in the boreo-nemoral vegetation zone with a mix of coniferous and temperate deciduous (broad-leaf) trees such as oak, ash, linden and maple, and where the highest number of plant and animal species per area, in the whole of northern Europe, is found (HALLANARO & PYLVÄNÄINEN 2002). A typical Latvian landscape is a mosaic of extensive forests (44.1% of Latvia's territory) alternating with fields, farmsteads, and pastures; birch groves and wooded patches occur within arable land. Latvia has a diverse terrain where plains interchange with hills and river valleys. Latvia's largest river (the Daugava: length within the country: 352 of a total 1005 km) occupies the largest valley which is up to 45 m deep and up to 4.5 km wide.

The Gauja National Park (referred to in the text as the Gauja NP or Park) embraces the ancient valleys of the Gauja River and its tributaries (Fig. 1). The Gauja valley is 85 km long, up to 80 m deep and in places up to 4–6 km wide. Like other national parks in the East Baltic, the Gauja NP includes natural areas relatively untouched by man, as well as historic rural landscapes. Almost half of the Park area is forest, covering mainly those areas adjacent to the Gauja River and its tributaries. The forests are secondary, mainly regenerated naturally after cutting, or by overgrowth on agricultural land. There are also areas of comparatively old forest, with historical continuity and retaining features of natural forests. The most common forests consist of spruce and pine (boreal type), but there are also large mixed oak, linden, ash and elm (nemoral type) stands, especially in the valleys. Most river valleys, the Gauja Valley in particular, lie in sandstone and dolomite bedrock formed during the Devonian period. Sandstone and dolomite outcrops, as well as small caves, are features of the valleys.

Data on current distribution (since 1970) of the Fat Dormouse within Latvia were collected during the 1990s mainly by inquiry, including personal communications, as part of data collection for

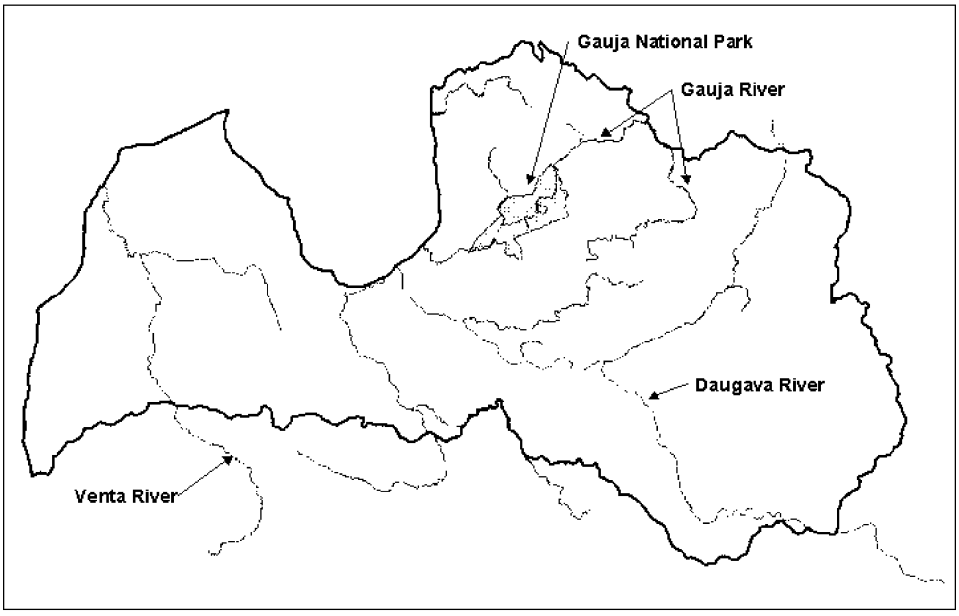

Fig. 1. Study area

both the Latvian and European Mammal Atlases (see also MITCHELL-JONES *et al*. 1999) and for the Red Data Book of Latvia (ANDRUŠAITIS 2000). Most records were of animals actually observed. Field surveys were also carried out to check some current dormouse records and the results were compared with the limited published data about distribution of the Fat Dormouse in the 19th century, and up to 1970. Species presence data for the whole country were mapped using the standard European UTM-grid system, indicating all squares with at least one *Glis* record (Fig. 2).

RESULTS

GREVÉ (1909) reviewed 13 localities where Fat Dormouse was recorded. Three were from the Daugava Valley, and one about 15 km away. Another three localities were quite close to (one at the Gauja River), but none actually from the Gauja Valley (or from the present area of Gauja NP) (Fig. 2). All other old records of *Glis,* except one, are from the north/north-eastern part of Latvia and quite far from both valleys.

The Fat Dormouse was first recorded from the Gauja Valley in 1937, since when the number of known *Glis* records has increased to 22 (Table 1), representing 9 different localities. Elsewhere in Latvia an additional 8 localities have been identified since 1970: two in the Daugava Valley, and another six in different parts of the country. No recurrent observations have been reported from *Glis* localities out-

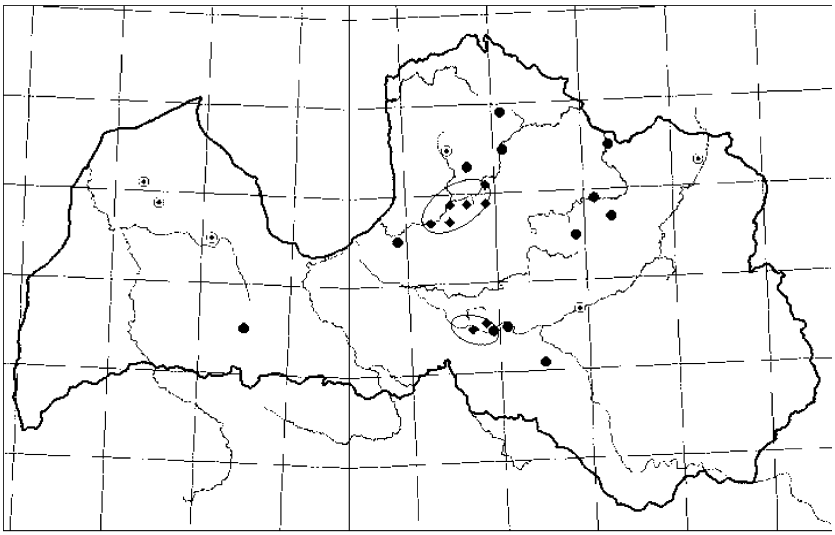

Fig. 2. Distribution of Fat Dormouse in Latvia (in connection with 50 × 50 km grid): black dot = records before 1909, diamond = records after 1970, circled diamond = possible records after 1970, circled area = area with localities bound to Daugava or Gauja Valley

Table 1. Circumstances of *Glis* records within the Gauja NP

Locality	Year	Season/month	Circumstances
Sigulda (surroundings of the town?)	1937	April	not known; animal brought to museum
Surroundings of Amata River outfall into Gauja River	1943	not known	a family (male, female and 4 juvenals) found
Surroundings of Turaida Castle; Sigulda Town	1958	not known	a hibernating family found; animals brought to Riga Zoo
Krimulda parish	1969	not known	a pregnant female caught; animal brought to museum
Turaida Castle; Sigulda Town	1974	autumn	an animal observed in premises of museum
Surroundings of Krimulda Castle; Sigulda Town	1975	not known	an animal found in tree hollow (in forest)
Sigulda Town	1979	January	a hibernating animal found in cellar
Krimulda Castle; Sigulda Town	1980	autumn	an animal observed in premises of sanatorium
Surroundings of Krimulda Castle; Sigulda Town	1980–81	Sept.–March	an animal lived under the flooring
Surroundings of Turaida Castle; Sigulda Town	1983–84	autumn–winter	an animal lived in cellar; eat up the core of apples
Murjani hamlet	1984	autumn	a young animal caught by cat
Spainieki farm	~1985	autumn	an animal observed in the house loft
Surroundings of Krimulda Castle; Sigulda Town	~1987	spring	a dead animal found in the hollow of felt tree (in forest)
Surroundings of Kârďi hamlet	1989–91	winter	a hibernating animal found in cellar
Surroundings of Karľi hamlet	1995	autumn	an animal found drowned in wash-tub under dripping roof
Cepľi farm	1995	October	an animal caught by mouse-trap in the house loft
Klintis farm	1996	autumn	an animal caught by mouse-trap in cellar
Birzes farm; surroundings of Cesis Town	1999	July	an animal observed in premises of the house
Sigulda Town	1999	summer	an animal observed in premises of the house
Surroundings of Karľi hamlet	2001	June–August	3 adults as well as female with 6 juveniles in disused beehive
Surroundings of Ieriki hamlet	2001	August	dead animal found on a road (in forest)
Administrative building at Turaida Castle	2001	autumn	1 adult and 2 juveniles in the house

side the Gauja and Daugava Valleys, including that at Lizdeni, previously indicated as the most northern record of this species. Observations since 1977 are known only from one locality in the Daugava Valley (an orchard with sheds for equipment, used by *Glis*). The maximum number of animals observed was 13 (3 families) (TAURINŠ 1982). In Gauja NP families or small groups of up to 7 individuals have been reported in 5 of 22 cases, while reports of Fat Dormouse in the rest of Latvia refer to single animals. Breeding has been proved only in the Daugava and Gauja valleys. At least five cases of hibernating dormice were reported, mainly in cellars, but only in Gauja NP (Table 1). Most localities within Gauja NP, including those in buildings, are situated in forest areas or near the nemoral type of forest.

DISCUSSION

Taking into account all localities where *Glis* has been recorded, one gets the impression that this species occurs almost all over Latvia. Nevertheless, there are only two areas (Fig. 2) with repeated records over long time periods (more than 60 years for Gauja Valley and almost 200 years for Daugava Valley) and where breeding and hibernation have been proved. Both the Gauja and Daugava river valleys are thought to have separate micro-populations of the Fat Dormouse (TAURINŠ 1982, PILÂTS 1995). Each micro-population seems to be very scattered, since records are so rare and few animals were observed. Moreover, no damage to wild or fruit trees has ever been reported. A similar distribution pattern for *Glis* is found in Lithuania (JUŠKAITIS 1995, 2001) and in Poland, where it is comparatively abundant only in southeastern parts of the country and rare elsewhere (PUCEK & JURCZYSZYN 2001).

The status of all *Glis* localities outside the Gauja and Daugava valleys is unclear, as there are no recurrent records. Moreover, none of the records have been confirmed by material evidence (the animal itself or a photograph). Records of *Glis* away from the Gauja and Daugava Valleys could be vagrants, dormice of undiscovered populations or misidentified animals.

Although the dispersal capability of *Glis* is considered to be quite limited, at least in Great Britain (MORRIS 1997), we cannot exclude the possibility that at least some of the observed animals are vagrants found rather far from known (or undiscovered) micro-populations. Such, for example, might be the animals recorded (one recently and three historically) at a distance of 30 km from the Gauja Valley.

A second possibility is that these animals could belong either to undiscovered (or already extinct) relict populations that represent patchy remains of a for-

merly unbroken population. In Lithuania, the Fat Dormouse now occurs as isolated parts of the formerly widespread population (JUŠKAITIS 1995, 2001).

A third possibility is that the reported animals were misidentified. GREVÉ (1909) pointed out that the Garden Dormouse (*Eliomys quercinus*) could be mistaken for the Fat Dormouse, as might the Yellow-necked Mouse (*Apodemus flavicollis*), another species inhabiting both buildings and hollow trees. It is most likely that *Glis* in Latvia were, in previous centuries, already restricted to the Gauja and Daugava valleys, and all other records, both historic and recent from the rest of the country are of misidentified animals. If so, the record of the Fat Dormouse in Lizdeni, its most northern locality, is of doubtful validity.

Nevertheless, *Glis* probably did have a wider distribution within Latvia, if not during the 19th century, then in former times. According to LEPIKSAAR (1986) this species could have immigrated to the Baltic countries during the postglacial thermal optimum (8000–3000 years BP) in connection with development of the nemoral forest zone. Later, especially since the 13th century, this kind of forest was cleared and partly replaced by boreal type forest, following development of agriculture and manufacturing. Almost all oakwoods had been felled by the end of the 18th century (PRIEDITIS 1999). Nowadays broad-leaved and mixed broad-leaved forests have a patchy distribution and are partly restricted to river valleys. Therefore it seems quite feasible that the population of the Fat Dormouse declined with the felling of mature forest, particularly oak-woods, which removed hollow trees and suitable plant food. JUŠKAITIS (1995, 2001) has pointed out that in Lithuania *Glis* is extinct in two old localities, and probably in some recent localities too, due to the cutting of forests and other human activities. Cases where forest clearance reduced *Glis* populations are also known in southern Europe (CARPANETO & CRISTALDI 1995).

It is not clear whether availability of old growth broad-leaved stands is the only factor limiting distribution of *Glis* in Latvia. TRANSEHE (1936) claimed that *Glis* distribution in Latvia coincided with the distribution of limestone-pits. The main areas with limestone outcrops are in the Daugava and Gauja valleys, but there are no *Glis* records from the Venta River Valley (Western Latvia), which is also rich in limestone outcrops. Anyway, the relationship between this species and river valleys seems obvious. In Lithuania all known localities for the fat dormouse are situated in forests along the valleys of the rivers Nemunas and Neris, and their tributaries (JUŠKAITIS 1995, 2001). In Russia, at the northeast edge of its distribution range, the Fat Dormouse inhabits the valley of the Volga River where there are rock crevices (AIRAPETJANC 1983). In northern latitudes, in addition to hollow broad-leaved trees, both microclimate and microrelief (cavities in the earth surface) probably play important roles in the ecology of the Fat Dormouse.

Nowadays the Gauja River valley, at latitude 57°20'N, can be considered as the most northerly area inhabited by *Glis,* not only in Latvia, but also within its whole distribution range. Another proposed boundary, along the Volga River (AIRAPETJANC 1983), is situated at approximately 56°20'N latitude.

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