

New data on the distribution of the barbastelle bat *Barbastella barbastellus* in Latvia

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Abstract. The barbastelle bat *Barbastella barbastellus* is considered as a rare species with an unclear status of distribution. Only a few occasional winter records, single records, and a few observations during the autumn migration at the SW coast of Latvia have been reported in the literature. A survey on the distribution of the barbastelle bat was conducted in Latvia in 2006 and 2007. Ultrasound detectors with the time expansion sound transformation method, capture with mist nets, and inspection of cellars were used to find barbastelles. In total 20 new sites occupied by barbastelles were found in the central and northern parts of Latvia.

Key words: *Barbastella barbastellus*, distribution, Latvia, ultrasound, survey.

INTRODUCTION

The barbastelle bat *Barbastella barbastellus* (Schreber, 1774) is regarded as one of the most endangered bat species in Europe. It is included in the Annexes II and IV of the Habitat Directive. The threats to populations of barbastelles are largely unknown. However, due to some specific features of this species, particularly feeding almost exclusively on moths and common use of crevices behind the bark of old or dead deciduous trees, barbastelles are probably especially vulnerable against intensive forest management practices (Rydell et al., 1996; Sierro & Arlettaz, 1997; Russo et al., 2004). The barbastelle bat can be found throughout Europe (Rydell & Bogdanowicz, 1997). In the northern and north-eastern parts of Europe it has been recorded in South Norway (Gjerde, 2008), South Sweden (Ahlén & Gerell, 1989), the western part of Belarus (Kurskov, 1981; Demjančik & Demjančik, 2000), South Lithuania (Masing & Busha, 1983; Pauza & Pauziene, 1998; Baranauskas, 2001), and also in Latvia (Buša, 1986; Pētersons & Vintulis, 1998). In Lithuania D. Pauža and his colleagues summarized all data of records on barbastelles and suggested that the northern border of the species range lies in the central part of the country (Pauža et al., 2003). There are no published data on the occurrence of barbastelles in Estonia.

Until the middle of the 1990s, in Latvia there were only a few historical records of single hibernating animals found in caves (2) and in a cellar (Pētersons & Vintulis, 1998). During the study on the migration of bats at the western coast of the Baltic Sea a mass capturing of bats was carried out during the autumn seasons of 1985–1992 (Pētersons, 2004). Barbastelles, although making up only 0.6% (9 ind.) of all captured bats, were registered at the time of their regular migration over the SW coast of the Baltic Sea. This let us suggest that a summer population of this species should occur in Latvia, probably in the SW part of the country (Pētersons & Vintulis, 1998).

In the 1990s and 2000s the use of ultrasound detectors to identify barbastelles proved to be a promising method in the study of the distribution of this species (Ahlén & Baagøe, 1999; Denzinger et al., 2001). While flying barbastelles quite often emit ultrasound calls of two types: louder calls at a peak frequency of 43 kHz and weaker calls at a peak frequency around 34 kHz. Both alternating calls can be easily tracked by means of ultrasound detectors that are equipped with a time expansion sound transformation system (Ahlén, 1981, 1990). An intensive survey with ultrasound detectors in South Sweden resulted in a considerable increase in the knowledge on the occurrence and distribution of this rare bat species (Ahlén, 2003).

In 1997 and 2003 two previously unknown hibernation sites of barbastelles were found in cellars in the central part of Latvia. This was the first evidence on the existence of a population of this species in Latvia (G. Pētersons & V. Vintulis, unpubl. data). Both sites were occupied by barbastelles also in the subsequent winters. In 2006 and 2007 we conducted two survey projects on this species, with a goal of figuring out its distribution pattern in Latvia. The detector survey was used as the main method for this study.

The aim of this paper is to present the data on the distribution of the barbastelles collected in 2006 and 2007 and to discuss the distribution pattern of the species in the north-eastern part of its distribution range.

MATERIAL AND METHODS

We used three methods to prove the occurrence of barbastelles: (1) recording of flying bats with ultrasound detectors in suitable summer habitats, (2) capturing of flying bats in summer or autumn near their underground roosts, and (3) inspection of cellars during the hibernation season.

We considered as suitable barbastelle habitats old manors or castles surrounded by parks, deciduous forests, meadows, and pastures as suggested by Swedish researchers (I. Ahlén and J. de Jong, pers. comm.). In total more than 150 sites all over the territory of Latvia were visited in 2006 and 2007 between the end of May and the end of September (Fig. 1). Echolocation calls of bats were

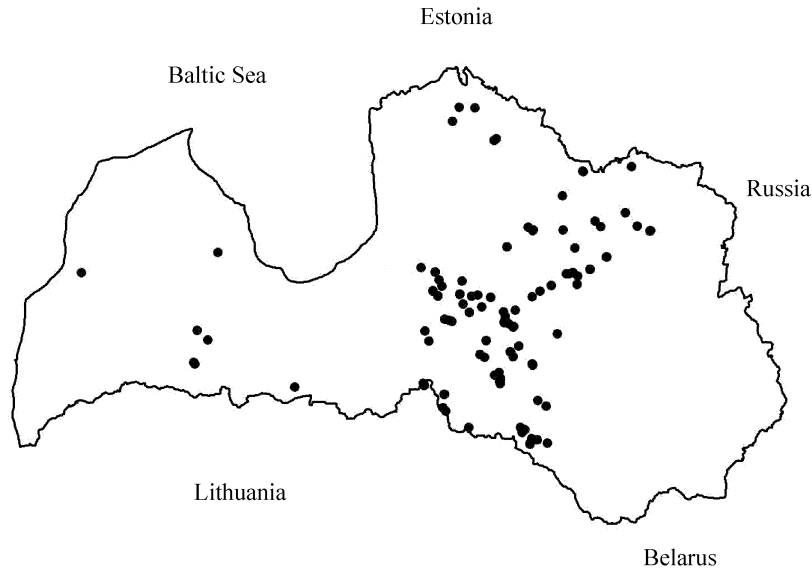


Fig. 1. Location of the sites where the survey on bats by means of ultrasound detectors or mistnetting was carried out in 2006 and 2007.

recorded with ultrasound detectors Pettersson Elektronik D-240 or D-980 with the time expansion function. Recordings were stored on the cam recorder Gmini Archos or mp3 player iAudioU2 and further analysed with the computer program BatSound 3.30. In 2007 three automatic recording units consisting of the ultrasound detector D-240 and a player iAudioU2 were used. Both devices were put in a plastic box and left for a night in suitable foraging habitats. The automatically recorded bat calls were subsequently analysed. Recordings with sequences of two alternative calls with maximum energy at frequencies of 33 and 44 kHz were recognized as barbastelles. All in all, about 8700 sound recordings were analysed.

Flying bats were captured with mist nets near underground roosts during their swarming period in July–September. Two roosts known as hibernation sites of this species in previous years and large cellars with open entrances at 23 other sites were selected to test the presence of barbastelles. We used Ecotone mist nets of different sizes. The captured bats were sexed and their age classes (adults and subadults) were estimated according to the degree of ossification and the form of the metacarpal–phalangeal joints (Anthony, 1988).

Inspection of potential hibernation roosts, mainly large cellars, was carried out in November–February 2006/07 and 2007/08. In total 74 cellars were checked, most of them in the north-eastern part of Latvia (Fig. 2). The winter survey did not cover the whole Latvian territory. Most sites were situated in the eastern part of the country and only six in western Latvia.

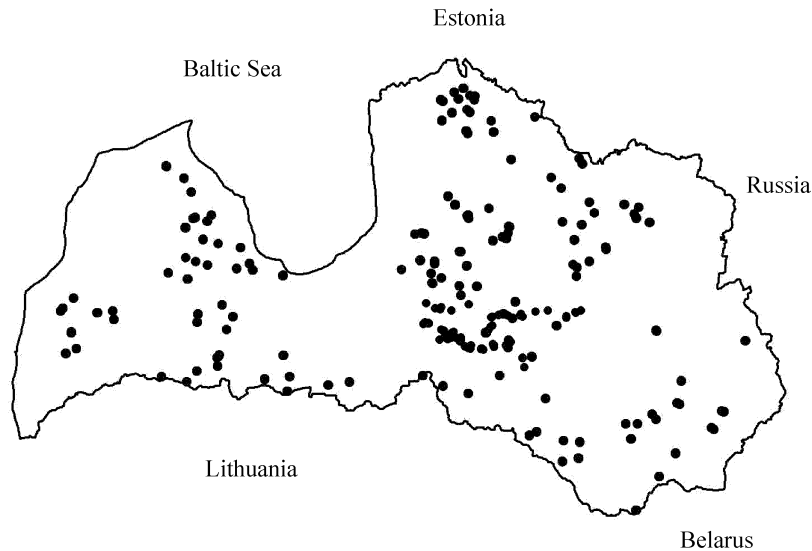


Fig. 2. Location of the cellars visited and checked for hibernating bats in 2006 and 2007.

RESULTS

This study revealed 16 sites with presence of barbastelles during the active period of their life cycle (Table 1). At three sites barbastelles were captured with mist nets. Eight individuals were captured and all of them proved to be adult males.

Table 1. Localities where barbastelles were recorded with ultrasound detectors or captured with mist nets in Latvia in 2006 and 2007

Parish, district	Date	Observation
Jaunbebri, Aizkraukle district	26.07.2006; 25.07.2007	Detector
Koknese, Aizkraukle	24.07.2006; 23.07.2007	Detector
Odziņa, Aizkraukle	25.07.2006; 25.07.2007	Mist net, 5♂♂ ad; 1♂ ad
Saviņa, Madona	26.07.2006	Detector, mist net, 1♂ ad
Stukmani, Aizkraukle	23.07.2006	Detector
Vietalva, Madona	28.07.2006	Detector
Druviena, Gulbene	16.08.2007	Mist net, 1♂ ad
Belava, Gulbene	22.08.2007	Detector
Zalve, Aizkraukle	31.08.2007	Detector
Erberge, Aizkraukle	08.09.2007	Detector
Kurmene, Aizkraukle	08.09.2007	Detector
Cesvaine, Madona	25.09.2007	Detector
Grasi, Madona	25.09.2007	Detector
Dzelzava, Madona	25.09.2007	Detector
Biksere, Madona	25.09.2007	Detector
Jaungulbene, Gulbene	29.09.2007	Detector

In all cases observations of flying barbastelles were short detector recordings of single bats, suggesting that the density of flying barbastelles was low at all sites.

Eight hibernation sites of this species with the maximum total number of 25 individuals in winter 2007/08 were found (Table 2). Seven of the sites were discovered for the first time during this study. All hibernation sites are situated in the area of known summer records.

Summer and winter records from 2006 and 2007 showed presence of barbastelles at 20 localities (Fig. 3). All sites are situated in a relatively small territory in the eastern and northern parts of Latvia, covering only 4 of 26 administrative districts of the country.

Table 2. Hibernation sites occupied by barbastelles in 2006/07 and 2007/08

Parish, district	Type of roost	Number of individuals	
		2006/07	2007/08
Druviena, Gulbene	Abandoned large cellar	NV	3
Jaunbebri, Aizkraukle	Abandoned large cellars	4	7
Koknese, Aizkraukle*	Large cellar	1	4
Odziņa, Aizkraukle	Three large cellars	2	2 + 5 + 1
Ogresmuiža, Ogre	Large cellars	1	2
Ranka, Gulbene	Large cellar	NV	1
Sece, Aizkraukle	Cellar	3	NV
Vērene, Ogre	Large cellars	1	NV

NV – the site was not visited.

* This site was known from earlier studies.

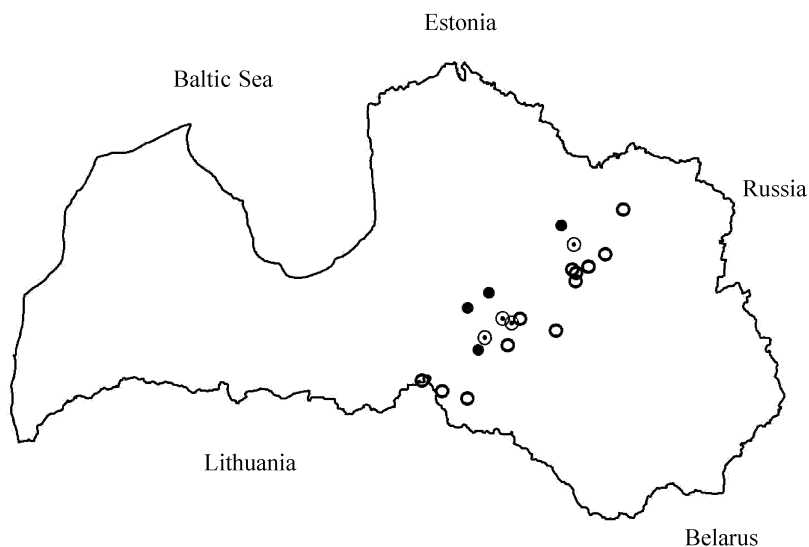


Fig. 3. Observation sites of barbastelles in Latvia in 2006 and 2007 in summer (white circles), in winter (black circles), and in both seasons (white circles with a dot).

DISCUSSION

This study confirmed our prediction on the occurrence of summer populations of barbastelles in Latvia. The number of sites occupied by barbastelles was higher than we expected. There are two possible explanations: (1) barbastelles are newcomers in eastern Latvia and the range of this species is expanding northwards due to climate changes or (2) the species had been simply overlooked in previous studies. The problem is that the researchers used different methods in different time periods. The results of winter censuses at underground sites conducted in Latvia since the middle of the 1970s are more comparable. The monitoring of hibernating bats in Latvia was started in 1992. The number of selected sites increased progressively from 70 to 130 in recent years. However, no barbastelles were found at monitoring sites up to now. Yet if barbastelles increased in numbers over the whole territory of Latvia they should have been recorded. On the other hand, no monitoring sites were located in the barbastelle area discovered in this study. Barbastelles are found mainly in deep crevices of abandoned large cellars, and only in a few cases in cellars used by people. Abandoned large cellars are poorly represented among the hibernacula included in the monitoring. We have never found barbastelles in fortifications, which are the main type of hibernacula of barbastelles in Poland (Lesinski et al., 2005), Lithuania (Masing & Busha, 1983; Baranauskas, 2001; Pauza & Pauziene, 1998), and Belarus (Kurskov, 1981; Demjanichik & Demjanichik, 2000).

The bat detector survey was introduced in Latvia at the beginning of the 1990s. An intensive inventory of bat species all over the territory of the country was conducted in 1993–1998, but no records of barbastelles were proved (Pētersons & Vintulis, 1998). Our present experience suggests that barbastelles can be easily overlooked if the observation is done with a heterodyne ultrasound detector, which was often used in previous studies. When using time expansion detectors, the species can also be missed because of its weak echolocation signals, especially if louder species such as *Eptesicus nilssonii* or *Pipistrellus nathusii* are flying nearby.

We suggest that the barbastelle area found in the present study is of special importance for this species in Latvia. More detailed studies on its diet, habitat use, and roosting ecology are needed to find out what ecological parameters determine the uniqueness of the known distribution area of barbastelles in the central and north-eastern parts of Latvia. Presence of barbastelles in western Latvia is possible as well. We expect that barbastelles occur also in the northern part of Lithuania, in central and northern Belarus, and probably in southern Estonia. Besides the distribution data, more ecological information on the use of habitats and summer roosts in the eastern part of the distribution range of this species is needed to ensure its favourable conservation status.

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Uusi andmeid euroopa laikõrva *Barbastella barbastellus*'e leviku kohta Lätis

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Aastail 2006–2007 uuriti euroopa laikõrva levikut Lätis. Töös kasutati ultraheli-detektoreid, siruvõrke ja keldrite vaatlust. Lāti kesk- ja põhjapiirkonnas leiti 20 uut leiukohta.