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Myotis alcathoe in Poland and Ukraine: new data on its status and habitat in Central Europe

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Abstract. Recently described *Myotis alcathoe* has been recorded in Ukraine for the first time and at eight new localities in three distant and geographically diverse areas of Poland (the mountains, the uplands and the lowlands). This data extends its distribution range in Central Europe and confirms it as a native breeding species in Poland. Specific identification of bats was confirmed by sequencing ND1 gene of mtDNA. In Poland its reproduction has been recorded in Łęczok reserve, Silesian Foothill and in Roztocze National Park. Bats were observed mostly within old broadleaved and mixed forests, near water, at altitude ranging from 112 to 736 m a.s.l. The only known roosting site for the species is a cave which is used both in spring and during the swarming period. In Poland the species co-occurred with both *M. brandtii* and *M. mystacinus* or with *M. brandtii* at all sites.

Key words: Vespertilionidae, cryptic species, distribution, ecology

Introduction

Myotis alcathoe was recently described from Greece and Hungary (von Helvesen et al. 2001). Its separation from morphologically sibling species of the *M. mystacinus* group is possible using either external characters or genetic markers (Dietz et al. 2007, Niermann et al. 2007). Although the species is one of the least known European bats, its range is much larger and less disjunctive than initially thought. The range covers southern and central Europe, from Spain to Turkey, reaching central Germany and southern Poland in the north (Dietz et al. 2007, Niermann et al. 2007). However, the species is known from a few dispersed localities and generally is considered much rarer than sympatric *M. brandtii* and *M. mystacinus* (Niermann et al. 2007, Lučan et al. 2009). Recent data from the Czech Republic significantly improved the knowledge of its ecology (Lučan et al. 2009).

Only four localities have been detected and very little is known about *M. alcathoe* in Poland (Niermann et al. 2007), therefore its conservation status remains unknown. In Ukraine the species has not been found previously, but historical records of *M. ikonnikovi* (probably erroneously identified) are known (Abelentsev et al. 1956) that are suspected to be *M. alcathoe*.

In this study we present the first confirmed record of *M. alcathoe* in Ukraine and its new distributional and habitat data from Poland.

Material and Methods

Bats were caught using mist nets during faunal surveys in 2007–2009. Morphological identification of bats in the field, using major characters given by Dietz & von Helvesen (2004) and Dietz et al. (2007): short forearm, thumb and tragus, small feet and *M. daubentonii*-like

appearance, was confirmed by sequencing ND1 gene from mtDNA (Mayer & von Helversen 2001), using samples from wing tissue biopsy or faeces.

Results and Discussion

M. alcaethoe has been recorded in the western Ukraine for the first time and at eight new localities in three distant and geographically diverse areas in Poland (Table 1, Fig. 1). Its reproduction has been confirmed in the Łęczczok reserve, Silesian Foothill and Roztocze National Park (Table 1).

All but one of the bats were recorded within old broadleaved and mixed forests, near water (rivers and ponds), at low and medium altitude (from 112 to 736 m a.s.l., Table 1). The only known roosting site is a cave used in spring and in the swarming period. In Poland the species co-occurred with both *M. brandtii* and *M. mystacinus* at four sites (Silesian Lowland, Silesian Foothill and Roztocze) and with *M. brandtii* at the remaining four (Table 1). Additional measurements of Ukrainian specimens are as follow: thumb length (♂ subad. – 4.5 mm; ♀ subad. – 4.6), 3rd finger length (51.2; 53.0) and 5th finger length (40.7; 43.0).

Specific morphological identification of all bats was confirmed genetically to support the validity of the external characters used (Dietz & von Helversen 2004, Dietz et al. 2007). The forearm length of *M. alcaethoe* from Poland and Ukraine is within the mentioned range 28.4–33.4 mm (Niermann et al. 2007).

M. alcaethoe is widespread but rare in Central Europe. Its presence has been confirmed already in all but one (Moldova) regional countries: Poland, Germany, Austria, Czech Republic, Slovakia, Hungary, Romania and Ukraine (Benda et al. 2003, Csaba & Dyczy 2007, Niermann et al. 2007, Spitzenberger et al. 2008,

Lučan et al. 2009). The species occurrence in Ukraine has been expected (Bashta & Potish 2007) based on its distribution in Hungary and Slovakia, as well as on former records of *M. ikonnikovi* (erroneously identified, most likely belong to *M. alcaethoe*). One such bat was collected in 1947 from the Otok forest ca 14 km from the Chizay locality. It was an exceptionally small *M. mystacinus*-like bat with well developed post-calcarial lobe, differing by its fur coloration and by the form of penis (Abelentsev et al. 1956). However this tentative identification of the specimen, deposited in the Zoological Museum of the National Natural History Museum in Kiev, should be confirmed. Later field research in the riparian forest in the areas adjacent to Chizay failed to record the species (Krochko 1984, Bashta 2004, Bashta & Potish 2007).

In Poland the species has been found already in 2005–2006 at four swarming sites at cave entrances in central part of the Carpathians (Tatras and Beskids) (Niermann et al. 2007). Our data confirms *M. alcaethoe* to be a native breeding species in Poland and extends its known geographic range in Central Europe. Therefore, we propose to include *M. alcaethoe* among the rarest bat species in Poland until further data will allow definition of its conservation status. In the Czech Republic the species is known from 12 sites in six different regions, including the part of Silesia (Ostrava agglomeration area), close to the Polish localities (Řehák et al. 2008, Lučan et al. 2009).

M. alcaethoe seems to be a forest specialist in Central Europe, preferring old (> 100 years) broadleaved and mixed oak-hornbeam-lime or beech forests with water bodies or riparian vegetation (Niermann et al. 2007, Ohlendorf & Funkel 2008, Lučan et al. 2009). Such forest are characterised by numerous large decaying trees providing roosts for dendrophilous bat species. Some records of *M. alcaethoe* suggest broader habitat niches, including fragmented woods in rural and industrial landscapes (Niermann et al. 2007, Řehák et al. 2008). The species forages mainly in forests, flying among branches at the canopy level, in the riparian vegetation and in more open sites over water (Ohlendorf & Funkel 2008, Lučan et al. 2009). Habitat data from Poland and Ukraine confirm the species to be affiliated with old semi-natural or natural (e.g. Carpathian beech) forests. Although, the currently known sites of *M. alcaethoe* in Poland are located within the natural range of beech forests, most likely the species ranges further to the north, in both countries, wherever are present suitable habitats of mixed oak-hornbeam-lime forest, as it is in the whole southern and part of central Poland and locally even in the north-eastern

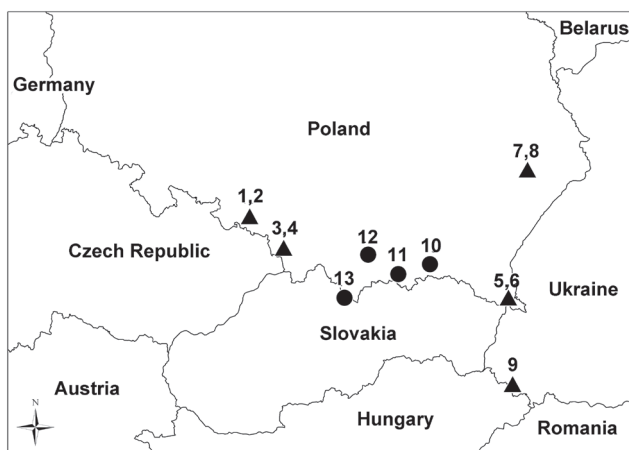


Fig. 1. Locations of *M. alcaethoe* records in Poland and Ukraine. Circles – published data, triangles – own data.

Table 1. New records of *Myotis alcaethoe* in Poland (1–8) and Ukraine (9) with bats forearm length, weight and habitat details. Abbreviations: ad. – adult, subad. – subadult, juv. – juvenile, lact. – lactating, MB – M. brandtii, MM – M. mystacinus.

No	Date	Region/Location	Geographic coordinates	Altitude m a.s.l.	Sex	Age/status	Forearm length [mm]	Body mass [g]	Habitat and syntopic sibling species
1.	2007.07.11.	Silesian Lowland „Łęczok” nature reserve	50°07'36" N 18°15'53" E	182	♀	ad., lact.	32.9	5.5	Small river in the old (> 100 years) oak-hornbeam-lime forest. MB, MM.
2.	2007.07.11.	Silesian Lowland „Łęczok” nature reserve	50°08'14" N 18°16'19" E	182	♂	juv.	33.2	5.0	Embankments of the fishpond at the edge of the old (> 100 years) oak-hornbeam-lime forest. MB, MM
3.	2007.08.23.	Silesian Foothill Górki Mate village, Bucze Mountain	49°46'57" N 18°50'55" E	397	♂	ad.	32.4	4.0	Alley in the mixed forest. MB, MM.
4.	2007.08.23.	Silesian Foothill Górki Mate village, Brennica river	49°46'40" N 18°49'53" E	320	♂	juv.	31.9	4.5	Mountain river in the middle of the village, river banks overgrown mostly by willows and poplars. MB.
5.	2009.05.04. 2009.09.11.	Bieszczady Mountains, Nasiczne Cave	49°10'45" N 22°36'50" E	736	2 ♂ ♂	subad. ad.	32.0; 33.1 31.8	3.5; 3.5 5.5	Netted while leaving the cave at evening or near the cave entrance, cave surrounded by the natural Carpathian beech forest (ca 100 years old). MB.
6.	2009.08.17.	Bieszczady National Park, Hylaty stream	49°11'07" N 22°33'02" E	679	♂	ad.	32.6	4.5	Netted over a small river in the natural Carpathian beech forest (100–150 years old). MB.
7.	2008.07.03	Roztocze Upland, Roztocze National Park	50°34'12" N 23°02'58" E	340	♀ ♂	ad. lact., ad.	32.2 32.1	- -	Small pool in the old (> 100 years) beech forest. MB.
8.	2008.07.11	Roztocze Upland, Roztocze National Park	50°34'30" N 23°01'26" E	295	♀	ad., lact.	31.5	-	Small pool in the old (> 100 years) beech and fir forests and middle age (> 50 years) oak and pine forest. MB, MM.
9.	2009.07.19	Transcarpathian lowland, vicinity of Beregove town, Chizay	48°13'51" N 22°37'01" E	112	♂ ♀	subad. subad.	31.1 33.0	4.1 4.9	Road in the moist old oak forest (ca. 100 years).

region, such as the Białowieża Primeval Forest. In Czech Republic all but one *M. alcaethoe* roosts were found in the crevices and cavities of large trees (mainly oaks), generally high above the ground at the canopy level. Only one colony used an artificial roost (concrete electric pole) (Lučan et al. 2009). This data indicates a rather exceptional among European bats selection of the natural roosts in trees. Records at cave entrances in early spring and during swarming confirm usage of underground shelters from summer to spring, but also for hibernation (Ohlendorf 2009), although almost nothing is known about this species ecology in winter (Dietz et al. 2007, Niermann et al. 2007, Lučan et al. 2009). In Europe *M. alcaethoe* often coexists with the two morphologically sibling species *M. brandtii* and

M. mystacinus (Niermann et al. 2007, Lučan et al. 2009), but the level of the dietary niche overlapping/partitioning among them remains unknown. The syntopic presence of these two or three species was observed at all Polish sites (Niermann et al. 2007, our data – Table 1).

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