

Elevation record for *Myotis daubentonii* (Kühl, 1817) in the Italian Western Alps (Mammalia Chiroptera Vespertilionidae)

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ABSTRACT

Five captures of *Myotis daubentonii* (Kühl, 1817) (Mammalia Chiroptera Vespertilionidae) are here reported at altitudes between 1828 and 2050 meters on the Italian Western Alps in foraging and swarming sites. An immature male was captured at 2050 meters of altitude while looking for food on an alpine wetland, resulting in the altitude record for this species in Italy. Data also confirm the presence of females of the species at altitudes greater than 2000 meters in swarming sites, raising the recorded altitude limit for the females of this species in Italy.

KEY WORDS

Chiroptera; *Myotis daubentonii*; elevation record; Italian Western Alps.

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INTRODUCTION

The Daubenton's bat *Myotis daubentonii* (Kühl, 1817) (Mammalia Chiroptera Vespertilionidae) is one of the most common European vespertilionids (Dietz & Kieffer, 2016), widespread throughout Europe with an areal range spanning from 63°N in Fennoscandia (Ahlén & Gerell, 1989) and Russia (Bogdarina & Strelkov, 2003) to 40°N in Greece (Helvesen & Weid, 1990). This species is closely linked to aquatic habitats, where preys are either caught with the wings or "trawled" from the water surface by using the feet and/or the wing membrane (Jones & Rayner, 1988; Kalko & Schnitzler, 1989; Vaughan et al., 1997; Warren et al., 2000).

The reproductive roost of the species are rare above 900 meters of altitude, although presence records are reported up to 1700 meters during summer (Arthur & Lemaire, 2009). It can be noticed an altitudinal segregation, both between and within

sexes in the several regions of Europe where adult males are disproportionately abundant at a higher altitude, while females are restricted to a lower altitude (Leuzinger & Brossard, 1994; Russo, 2002).

In Italy, the species has been captured up to 1143 meters of altitude on the Apennines in Abruzzo (Issartel, 2001), while has been captured up to 1665 meters on the Alps in the Gran Paradiso National Park (Patriarca et al., 2016). Data on echolocation calls have been documented up to 1900 meters in the Maritime Alps (Toffoli et al., 2016). A subfossilized skull of the species was found in a cave at 1940 meters on the Ligurian Alps (Lanza, 2012).

On the French side of the Western Alps, the species presence is reported up to 2450 meters in the department Alpes de Haute Provence (Drousie & Cosson, 2016), at 2100 meters in Haute Alpes (Parc National des Ecrins and le Centre de Recherches Alpin sur les Vertébrés, 1995) and at 1936 meters in the Rhône-Alpes region (Groupe Chiroptères de la LPO Rhône-Alpes, 2014). For all these records,

however, it is not specified whether it was a capture or an echolocation call survey leading to a consequent uncertainty of the data. Furthermore, the echolocation data cannot determine the sex, considering the different altitude segregation between males and females (Russo, 2002).

This short note contains capture records of *M. daubentonii* on the Western Italian Alps above 1800 meters.

MATERIAL AND METHODS

Some bats were captured in the alpine area of Piedmont (North West Italy) (Fig. 1) with nylon mist-nets with a mesh size between 16 and 19 mm (Agnelli et al., 2004). Mist-nets were placed along flight paths, foraging areas, water bodies and near underground sites. All the nets were checked every 10 minutes and any captured bat was immediately put in cloth bags awaiting to be examined for species identification and biometric measurements. Before release, the bats have been marked with a non-toxic paint. If recaptured, they have been immediately released to minimize stress and avoid double counting. Species identification was carried out according to Dietz & Helversen (2004).

It was possible to classify individuals as juveniles, immature or adults by examining the degree of calcification of the phalanx epiphyses (Dietz & Helversen, 2004). Females were further classified as lactating and not lactating, based on the nipples conditions. Males were classified based on the development of their buccal glands and the degree of swelling of epididymis and testes (Haarsma, 2008).

All animals captured were always released within few minutes to minimize stress. The captures have been carried out with the permission of the Italian Ministry of the Environment (Refs. DPN/2008/0001053; DPN/ 2010/0011879; 000882/ PNM/08052014).

RESULTS

Between 2009 and 2016, five *M. daubentonii* were captured at an altitude above 1800 meters during bat surveys on the Italian Western Alpine region (Table 1). Three captures involved male in foraging activities in alpine wetlands in the SCI IT1140016 (Alpi Veglia Devero-Monte Giove) on the Leontine Alps at 1828 and 2050 meters of altitude respectively. Two referred to females in swarming

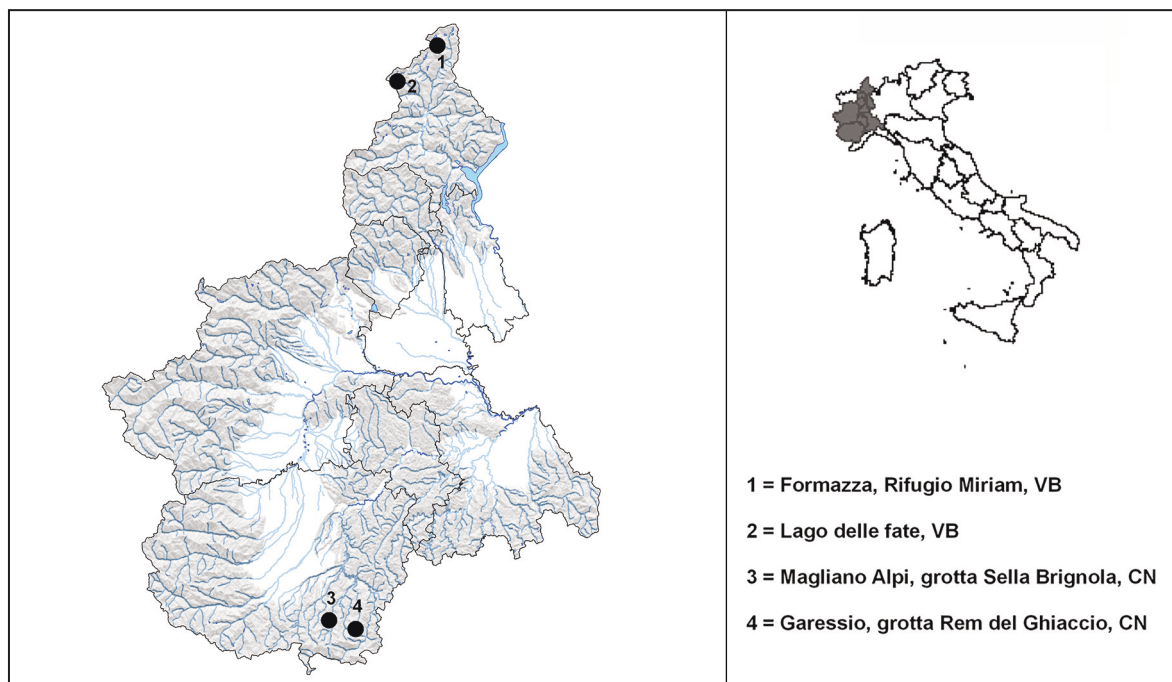


Figure 1. Location of capture of *Myotis daubentonii* in the Italian Western Alps.

ID Place	Place	Date	Activity	Sex	Age	Forearm mm	5 finger mm	Body mass gr	Elevation
1	Formazza, Rifugio Miriam, VB	05/08/2009	foraging	Male	Immature	37.53	47.0	7.5	2,050
2	Varzo, Lago delle Fate, VB	20/08/2010	foraging	Male	Adult	36.91	46.5	7.5	1,828
2	Varzo, Lago delle Fate, VB	20/08/2010	foraging	Male	Adult	37.62	47.5	7.6	1,828
3	Magliano Alpi, grotta Sella Brignola, CN	28/08/2016	swarming	Female	Immature	35.84	45.5	7.5	2,022
4	Garessio, grotta Rem del Ghiaccio, CN	20/09/2016	swarming	Female	Adult	37.87	49.5	11.1	1,946

Table 1. Locality, altitude and measures of *Myotis daubentonii* captured in the Italian Western Alps.Figure 2. An immature male of *Myotis daubentonii* captured at 2050 meters of altitude in Lepontine Alps (Formazza, Rifugio Miryam, VB), 5.VIII.2009.

sites on the Maritime Alps at 1946 metres and 2022 meters above sea level.

All captures took place during the post-reproductive period between August and the second half of September.

DISCUSSION

Data confirm the presence of *M. daubentonii* above 1800 meters up to over 2000 meters of altitude on the Italian Western Alps for both sexes. An immature male was captured during foraging activity in alpine wetlands at an altitude of 2050 meters above sea level (Fig. 2), resulting in the altitude record for this species in Italy. This altitude record exceeds all the previous ones, namely, a capture at

1640 meters above sea level in the Gran Paradiso National Park (Patriarca et al., 2016), some echolocation calls records at 1900 meters of altitude in the Maritime Alps (Toffoli et al., 2016) and the finding of a subfossilized skull of the species in a cave at 1940 meters of height on the Ligurian Alps (Lanza, 2012).

These observations confirm the foraging activity of *M. daubentoni* males at high altitude similarly to what observed on the Apennines in central Italy (Russo, 2002).

The captures of the two female individuals in two swarming sites at 1946 and 2022 meters of altitude respectively are of particular interest. These altitude are significantly higher compared to what observed on the Appennines in central Italy, where female individuals have never been captured over 970 meters of altitude (Russo, 2002). However, in other European mountainous areas such as the Carpathians, no differences were observed between sexes distribution in *M. daubentonii*, as swarming sites and females have been reported up to 1907 meters of altitude (Piksa et al., 2011).

The data presented here represent the highest altitude records for *M. daubentonii* on the Italian Alps, even if they do not reach the altitudes observed on the French side where this species is reported up to 2450 meters above sea level (Drousie & Cosson, 2016). It is still unclear whether these data were the result of a capture or an echolocation call record. However, it should be considered that the climate of the two side of the Western Alps present some differences, with the average temperatures being lower at equal altitude on the Italian side compared to the French side (Bartaletti, 2004),

resulting in a possible presence of the species at different heights.

Further investigations are needed to verify the presence of the species in foraging or swarming activities at an altitude higher than those reported here for the Italian side of the Alps.

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