

## NOTES

### New records of bats (Chiroptera) for Minorca, Balearic Islands, Western Mediterranean Sea

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#### *Introduction*

Easternmost of the Balearic archipelago, Minorca (40°00'N-04°05'E) is the second largest island (700 km<sup>2</sup>) after Majorca, and the 12th in the Mediterranean Sea. The literature on Minorca's chiroptera fauna has generally referred to the same few bats collected decades ago. Alcover and Muntaner (1986) published an exhaustive review of bibliographical and museum material including unpublished collections and their own field data. Since then, no paper based on field work on Minorca, and only two on the other islands of the archipelago (Pons *et al.* 1993; Noblet 1995) have appeared. The aim of this work is to complete and update the list of species present on Minorca.

#### *Material and methods*

This study was carried out from June 1995 to September 1996 on Minorca. The search for bats was conducted using several systems, in a multidisciplinary approach:

– prospecting caves, tunnels and other bat roosts. During the study a total of 171 visits have been made to 123 different potential or known roosts, starting from the draft of a Minorcan caves catalogue (UEM 1995).

– trapping with mist nets (6-12 m), harp traps (trapping surface 1 × 1 m) at the roost exit, line traps over water surfaces (nylon line Ø 0.35 mm, 6.5 kg), and fishing with bait. Those techniques have been employed in 46 occasions, mainly in spring-autumn and on all the island. Fishing with bait have been tried twice but results were negative.

– ultrasound detection (bat detector: Ultrasound Advice S-25, 23 Aberdeen Rd., London N5 2UG, UK; tape recorder: Professional Walkman Sony WM-D6C; analy-

zing device: Kay DSP 5500 sonograph). At the same time other trapping activities were carried out, up to 16 hours were recorded, with individual recording length varying from a few to 90 minutes. Bat recordings were taken at all seasons.

– inspection of bird-nesting boxes. Only a few nesting boxes had been placed on Minorca.

– inspection of barn owl pellets for skull remains. Considering a former work (de Pablo, unpublished data) that studied 7427 prey from barn owl pellets, special effort has been made in other aspects.

### Results and discussion

Twelve species have been found (table 1) of which seven had already been reported for Minorca by several authors and compiled by Alcover and Muntaner (1986). Specimens of ten species have been identified from hand-held bats. The presence of two others, *Eptesicus serotinus* and *Tadarida teniotis*, was supported through ultrasound recording analysis complemented by observation in flight.

TABLE 1. – Presence of Chiroptera on the Balearic islands. The finding of *M. emarginatus* is a first record for the archipelago. MA: Majorca; I: Ibiza; FO: Formentera; CA: Cabrera; DRA: Dragonera. \*: Species never recorded or confirmed on Minorca before this study; E: Extinct; PE: Probably Extinct; ? Probably present. (Data source: Alcover and Muntaner 1986, Pons *et al.* 1993, Noblet 1995, and present work. Systematic order after Benzal *et al.*, 1991).

	MINORCA	MA	I	FO	CA	DRA
Rhinolophidae						
1.- <i>Rhinolophus ferrumequinum</i>	●	●	E	PE		
2.- <i>Rhinolophus hipposideros</i>	●	●	●	?		
3.- <i>Rhinolophus mehelyi</i>		●				
Vespertilionidae						
4.- <i>Myotis capaccinii</i>	★	●				
5.- <i>Myotis nattereri</i>	★	●	●			
6.- <i>Myotis emarginatus</i>	★					
7.- <i>Myotis myotis</i>		●	E			
8.- <i>Barbastella barbastellus</i>		●				
9.- <i>Plecotus austriacus</i>	★	●	●		●	●
10.- <i>Pipistrellus pipistrellus</i>	●	●	●	●		
11.- <i>Pipistrellus kuhlii</i>	●	●				
12.- <i>Hypsugo savii</i>	●	●	●		●	●
13.- <i>Eptesicus serotinus</i>	●	●				
14.- <i>Nyctalus leisleri</i>		?				
15.- <i>Miniopterus schreibersii</i>	●	●			●	
Molossidae						
16.- <i>Tadarida teniotis</i>	★	●	?		●	

The best methods have been those where the animals were hand-held because of direct identification. Results/effort ratio for ultrasound recordings was low, because of low number of sequences clearly recorded, and, of those profitable, no clear differences in the signals have been found for most of the species. About bird-nesting boxes, no bat has been found. Only bone remains from the genus *Pipistrellus* or *Hypsugo* and

*Miniopterus schreibersii* were found in barn owl pellets (collected by F. de Pablo).

Five species not previously clearly documented or not reported at all on Minorca are herewith recorded: *Myotis capaccinii*, *M. nattereri*, *M. emarginatus*, *Plecotus austriacus*, and *Tadarida teniotis*. All those species had been recorded on other islands of the archipelago, except *Myotis emarginatus*, for which it is the first finding for the Balearic archipelago. The presence of *Myotis capaccinii* and *Plecotus austriacus* had been suspected but never verified on Minorca yet (Alcover and Muntaner 1986). A brief comment about the new findings is given below:

*Myotis capaccinii*. – A few individuals of both sexes were usually caught while harp trapping *Miniopterus schreibersii* at cave entrances.

*Myotis nattereri*. – This species was found at three locations on the island: A year round roosting cave of about 30-50 individuals in the west; A single female – trapped at another cave 9 km to the south-east from the roost; An isolated male – mist-netted on the easternmost coast of the island in a evergreen-oak wood (*Quercus ilex*).

*Myotis emarginatus*. – The first individual found was a torpid female in a small cave with no guano. Soon afterwards the species was found in a cave complex where it breeds as does *Rhinolophus ferrumequinum*. Another point is a winter roost for *Miniopterus schreibersii*, employed in summer as night roost by *Myotis emarginatus*, *M. capaccinii*, *Pipistrellus pipistrellus* and *Miniopterus schreibersii*.

*Plecotus austriacus*. – It was captured only once, inside a small cave during the night. Unidentified long eared bats had previously been detected in ornithological mist nets (S. Catxot and J. Mascaró, personal communications).

*Tadarida teniotis*. – Scattered bats were heard all around the island, with the highest concentration found in Ferreries, a hill-surrounded village in the center of the island.

With this new information the check-list of Chiroptera of the Balearic Islands is now composed by a total of 15 species plus one not confirmed (table 1).

Of those Balearic species three of them are to be found only on Majorca (table 1). At least *Rhinolophus mehelyi* and *Myotis myotis* are surely not present on Minorca. They were never sighted during the intensive roost visiting program, even though this cave-dwelling species would have been easy to detect. On the other hand, *Barbastella barbastellus*, first reported in the Balearic archipelago by Noblet (1995), could have been missed due to its tree roosting preferences, which complicate its location. Finally *Nyctalus leisleri*, an easily detectable species with ultrasound recordings, has not been located. Noblet (1995) says that *N. leisleri* was probably present in Majorca.

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**Grizzly bear (*Ursus arctos*) attacks  
and nanny-kid separation on mountain goats (*Oreamnos americanus*)**

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Predation by large carnivores is one of the most important causes of juvenile mortality for North American ungulates (Bergerud 1971; Skogland 1991; Gasaway *et al.* 1992; Kunkel and Mech 1994). Predators can negatively affect prey populations by directly removing animals, but they may also indirectly increase the mortality rate of juveniles if predator attacks lead to mother-offspring separations. Abandoned young of several ungulates have been reported to have lower survival than unabandoned ones (Livezey 1990; Côté *et al.* 1997, but see Foster and Rahe 1982 and references therein). Offspring that remain with their mother may receive protection from predators (Packer 1983; Smith 1987; Côté *et al.* 1997) and learn how to find food resources and use escape routes more efficiently (Avital and Jablonka 1994, Galef 1995). Therefore, separated young may suffer high mortality. To our knowledge, the relationship between predator attacks and mother-young separation has not been addressed. Here, we present observations of grizzly bear (*Ursus arctos*) attacks on mountain goats (*Oreamnos americanus*) (Table 1) and report nanny-kid separations following an unsuccessful grizzly bear attack. We then discuss the survival of kids separated from their mothers by different causes.

Grizzly bears inhabit most of the mountain goat range in Alberta (Jonkel 1978; Rideout 1978). They prey upon the young of several species of ungulates [caribou (*Rangifer tarandus*), Miller *et al.* 1988; elk (*Cervus elaphus*), Hamer and Herrero 1991; moose (*Alces alces*), Ballard *et al.* 1981, Larsen *et al.* 1989; mountain goat, Festa-Bianchet *et al.* 1994; muskoxen (*Ovibos moschatus*), Clarkson and Liepins 1993]. We observed goats at Caw Ridge (54°03'N, 119°27'W), in the foothills of west-central Alberta, during a long-term study of a marked population.

On 1 July 1996, an adult grizzly bear was observed attacking a group of goats foraging in an open spruce (*Picea engelmanni*) forest at about 1880 m a.s.l. The bear