

## FIRST RECORD OF FOUR SPECIES OF BATS FROM THE NATIONAL PARK OF EL FEIDJA (NW TUNISIA) WITH A NOTE ON THE NON-FLYING MAMMALS OF THE KHROUMIRIA REGION

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**ABSTRACT** - During a field study carried out in the Tunisian National Park of El Feidja (Khroumiria region, NW Tunisia) in May 2000, we captured four species of bats never previously recorded in this area: the Mediterranean horseshoe bat *Rhinolophus euryale*, the greater horseshoe bat *R. ferrumequinum*, the Mehely's horseshoe bat *R. mehelyi* and the Geoffroy's bat *Myotis emarginatus*. Considering the already well-known diffusion of the Schreibers' bat *Miniopterus schreibersi*, the common pipistrelle, *Pipistrellus pipistrellus*, the lesser mouse-eared bat *Myotis blythi* and the greater mouse-eared bat *Myotis myotis*, these new records raise to 8 the species of bats known for the region. The mammalians' checklist of the Khroumiria region includes 27 species.

**Key words:** Khroumiria, El Feidja, Tunisia, *Rhinolophus euryale*, *Rhinolophus ferrumequinum*, *Rhinolophus mehelyi*, *Myotis emarginatus*

**RIASSUNTO** – *Prima segnalazione di quattro specie di chiroteri nel Parco nazionale di El Feidja (NO Tunisia) con note su altri mammiferi della regione Khroumiria.* Nel corso di uno studio condotto nel Parco Nazionale tunisino di El Feidja (maggio 2000) sono state catturate 4 specie di chiroteri non segnalate in precedenza per l'area: il ferro di cavallo euriale *Rhinolophus euryale*, il ferro di cavallo maggiore *R. ferrumequinum*, il ferro di cavallo di Mehely *R. mehelyi* ed il vespertilio smarginato *Myotis emarginatus*. Considerata la già nota diffusione di miniottero *Miniopterus schreibersi*, pipistrello nano *Pipistrellus pipistrellus*, vespertilio minore *Myotis blythi* e vespertilio maggiore *Myotis myotis*, per la chiroterofauna della regione sarebbero state segnalate fino ad oggi 8 specie. La mammalofauna della Khroumiria tunisina annovera un totale di 27 specie.

**Parole chiave:** Khroumiria, El Feidja, Tunisia, *Rhinolophus euryale*, *Rhinolophus ferrumequinum*, *Rhinolophus mehelyi*, *Myotis emarginatus*.

## INTRODUCTION

A part from the North African red deer or Barbary stag, *Cervus elaphus barbarus* Bennett, 1833 (cf. Dhoub, 1998; Amadou, 2002; Oumani *et al.*, 2004), and perhaps few other *taxa*, the mammalian fauna of the Tunisian National Park of El Feidja seems still to be imperfectly known. In the previous state of knowledge, for example, only three species of bats were reported in literature for this area: the Schreibers' bat *Miniopterus schreibersi* (Kuhl, 1817) (Dhoub, 1998), the common pipistrelle *Pipistrellus pipistrellus* (Schreber, 1774) (DGF, 1988; Dhoub, 1998), and the lesser mouse-eared bat *Myotis blythi* (Tomes, 1857) (DGF, 1988; Dhoub, 1998).

The aim of the present work is to outline the occurrence of new bat species within the area of the National Park of El Feidja, in order to offer a starting point for future studies. The examination of the extant knowledge on the flying and non-flying mammals of the Khroumiria region, as well as the concentration of the existing bibliography on them are additional aims of this study.

## STUDY AREA AND METHODS

The National Park of El Feidja is situated in the region of Khroumiria, which represents the easternmost spurs of the Saharan Atlas mountains, stretching between northern Algeria and Tunisia. The National Park extends over the Medjerda mountains and is part of the Tunisian Kroumiria (Figure 1). Administratively it belongs to the Gouvernorat of Jendouba, and more precisely to the Délégation of Ghardimaou (Dhoub, 1998). The park site,

a series of uplands of Numidian Flysch dating to the Upper Oligocene, ranges in height from 800 to 1150 m a.s.l. It is characterised by mature pluvial forest formations, dominated by the Lusitanian oak, *Quercus faginea* Lam., and the cork oak, *Q. suber* L. The forest of El Feidja occupies a total area of 7673 hectares. The national park was created in 1989 for the protection of the local flora and fauna, and in particular for the conservation of the North African red deer (Burthey *et al.*, 1991). The nature reserve of the El Feidja National Park, within which a small nucleus of these deer is protected, extends over 417 hectares and was already set up in 1966 (Bousquet, 1992; DGF, 1994).

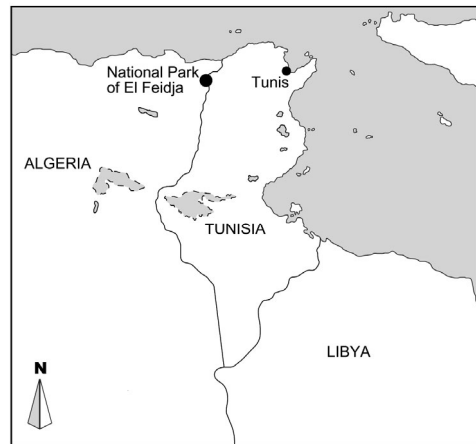


Figure 1 - Geographical location of the National Park of El Feidja, in north-western Tunisia.

The field survey was carried out from 25 to 31 May 2000. Information on the distribution of mammals was gathered from personal observations (capturing of live individuals, sightings, dead specimens and field signs), as well as from museum records (the Alexander König Zoological Museum, Bonn [ZFMK] and the Natural History Museum, London [BMNH]), and from available literature. For the capture of

bats, hand nets with adjustable-length handles as well as mistnets were used. The forearm length and the weight were taken using a vernier calliper and a dynamometer respectively.

## RESULTS AND DISCUSSION

A Mediterranean horseshoe bat female (*Rhinolophus euryale*) was captured in the attic of the guesthouse of the National Park (forearm = 46.0 mm, weight = 13.0 g). The individual was hanging from the ceiling in close contact with two females and three males of the Geoffroy's bat (*Myotis emarginatus*), of which one male and one female were captured (♂: forearm = 41 mm, weight = 6 g; ♀: forearm = 41, weight = 5.5 g).

An isolated adult female of greater horseshoe bat (*Rhinolophus ferrumequinum*) was found in a rural warehouse located a few hundred metres from the park management building (forearm = 57.5 mm, weight = 22.5 g). A colony, made up of about 80 individuals of *R. ferrumequinum* and about 50 *M. emarginatus* was observed from 27 to 31 May inside a building dating to 1903, used as accommodation for the park management. The individuals of the greater horseshoe bat were found in various attic rooms. Using hand nets, 3 males and 6 females were captured and measured (♂♂: forearm min-max = 54-55 mm, weight = 20 g; ♀♀: forearm min-max = 52-54.8 mm, weight min-max = 17-20 g). Using hand nets and mistnets, 10 Geoffroy's bats were captured, enabling the measurement of 5 males and 5 females (♂♂: forearm min-max = 40-41.5 mm, weight min-max = 7-7.5 g;

♀♀: forearms min-max 39.9-40.6 mm, weight min-max = 7-7.5 g).

Two Mehely's horseshoe bats (*R. mehelyi*) – one male (forearm = 50 mm, weight = 15 g) and one female (forearm = 50 mm, weight = 15 g) – were captured in a cleft in the Numidian Flysch in the vicinity of the rock of Kef En Negcha.

The four species of bats recorded during the present study had never been reported before in El Feidja. *R. mehelyi* and *M. emarginatus* have been recorded for the first time in the Tunisian Khroumiria, whilst *R. ferrumequinum* and *R. euryale*, together with *Myotis myotis*, had already been reported from north-western Tunisia, since Trouessart (1906) recorded them among the mammals collected by Gadeau de Kerville (1908) during his scientific expedition in Khroumiria in 1908.

Including the data collected in the present study, to date a total of 8 bat species have been reported from Khroumiria.

The lesser horseshoe bat *R. hipposideros* was reported by Gadeau de Kerville (1908) in the area of Ain Draham, north of Feidja, whilst Deleuil and Labbé (1955b) reported the Kuhl's pipistrelle *Pipistrellus kuhli* from Bulla Regia (Aellen and Strinati, 1969). From the same locality, Dhouib (1998) recorded *M. blythi oxygnatus* Monticelli, 1885 and Deleuil and Labbé (1955a) reported *M. schreibersi schreibersi* (Kuhl 1819) (Aellen and Strinati, 1969).

The observations and captures performed inside the human settlements of the park confirmed the anthropophile habits of *R. ferrum-*

*equinum* and *M. emarginatus* (cfr. Kuzjakin, 1950; Brosset, 1966; Zava and Catalano, 1986).

Apart from bats, we confirmed the occurrence within the borders of the forest of El Feidja of the Algerian hedgehog *Atelerix algirus*, the black rat *Rattus rattus*, the red fox *Vulpes vulpes*, the wild boar, *Sus scrofa* and the North African red deer *Cervus elaphus*, recorded to date in the region of Khroumiria.

The mammals' checklist of this region includes 27 species (Table 1); for some non-flying mammals more details are here reported.

According to Sarà and Zanca (1992), in Tunisia the Greater white-toothed shrew *Crocidura russula* appears to have a north-eastern distribution in wooded (Khroumiria, Medjerda: Tabarka, Aïn Draham, Bulla Regia, Lac Mellègue) and agricultural landscapes, where the yearly rainfall ranges from 200 to 400 mm and the climate is mild. Recent genetic analyses confirm the occurrence of the subspecies *C. russula agilis* (Loche, 1867) at Aïn Draham (a few dozen kilometres north of El Feidja) (Cosson *et al.*, 2005).

The taxonomy of the North African representatives of the genus *Lepus* is still debated. According to Lavauden (1924) and Palacios (1998), hares of northern and central Tunisia might be referred to *L. mediterraneus* Wagner, 1841, whilst recent genetic analyses (Ben Slimen *et al.*, 2004) revealed close relationships between the Tunisian hares and the Anatolian and central European brown hares.

Though the short-tailed mouse *Mus spretus* has been captured in northern Tunisia (Medjerda valley) (Cheniti *et al.*, 1985), there is not confirmation of its occurrence in Khroumiria region.

The serval *Leptailurus serval* was widespread in northern Tunisia (Khroumirie, Tabarka) at least up to 1924 (Lavauden, 1924). According to Dupuy (1966 and 1967), the latest observations of this felid are from 1930 between Annaba (Algeria) and the Tunisian border. A program for its reintroduction in the National Park of El Feidja was launched in 1994 (Ministry of Agriculture, Directorate General of Forestry, 2000; Ben M'Hamed *et al.*, 2002). A few individuals have been observed in the forest of El Feidja and in the adjacent part of Algeria since the start of the reintroduction program (Ministry of Agriculture, Directorate General of Forestry, 2000).

The North African red deer is the only African representative of the genus (Salez, 1959; Meyer, 1972; Dolan, 1988; Masseti and Zava, 2002a and 2002b; Oumani *et al.*, 2004). Originally dispersed along the mountainous and forested territories of north-eastern Algeria and north-western Tunisia (Lavauden, 1926), this ungulate appears today to survive only in the forested area comprised within the geographical triangle bordered by the urban centres of Bone, in Algeria, and Tabarka-Ghardimaou, in Tunisia (Salez, 1959; Schomber and Kock, 1960; Van Dijk, 1972; Dhouib, 1998; Oumani *et al.*, 2004).

*Bat species in NW Tunisia*

Table 1 - Checklist of the mammals recorded from Khroumiria (north-western Tunisia), including the National Park of El Feidja.

Species	References
<i>Atelerix algirus</i>	Trouessart, 1906; Lehmann, 1972; DGF, 1988; Bousquet, 1992; Dhouib, 1998; present work
<i>Crociodura russula</i>	Trouessart, 1906; Lehmann, 1972; DGF, 1988; Sarà and Zanca, 1992; Dhouib, 1998; Lo Brutto <i>et al.</i> , 2004; Cosson <i>et al.</i> , 2005
<i>Suncus etruscus</i>	Baziz <i>et al.</i> , 2002
<i>Rhinolophus euryale</i>	Trouessart, 1906; present work
<i>Rhinolophus ferrumequinum</i>	Trouessart, 1906; present work
<i>Rhinolophus mehelyi</i>	present work
<i>Miniopterus schreibersi</i>	Dhouib, 1998
<i>Pipistrellus pipistrellus</i>	DGF, 1988; Dhouib, 1998
<i>Myotis blythi</i>	DGF, 1988; Dhouib, 1998
<i>Myotis myotis</i>	Trouessart, 1906
<i>Myotis emarginatus</i>	present work
<i>Lepus</i> sp.	DGF, 1988; Bousquet, 1992; Dhouib, 1998
<i>Rattus rattus</i>	Trouessart, 1906; present work
<i>Mus musculus</i>	Trouessart, 1906; Lehmann, 1972
<i>Apodemus sylvaticus</i>	Trouessart, 1906; Lehmann, 1972; Gemmeke <i>et al.</i> , 1987
<i>Elyomys quercinus</i>	Niethammer, 1959; DGF, 1988; Dhouib, 1998
<i>Hystrix cristata</i>	Lehmann, 1972; DGF, 1988; Bousquet, 1992; Dhouib, 1998
<i>Canis aureus</i>	ZFMK, 81.439; DGF, 1988; Bousquet, 1992; Dhouib, 1998
<i>Vulpes vulpes</i>	DGF, 1988; Dhouib, 1998; present work
<i>Mustela nivalis</i>	BMNH 19.7.7.2635; DGF, 1988; Dhouib, 1998
<i>Lutra lutra</i>	Lehmann, 1972; Bousquet, 1992
<i>Genetta genetta</i>	Trouessart, 1906; DGF, 1988; Bousquet, 1992; Dhouib, 1998; Lehmann, 1972
<i>Herpestes ichneumon</i>	Trouessart, 1906; DGF, 1988; Bousquet, 1992; Dhouib, 1998
<i>Felis sylvestris</i>	Trouessart, 1906; DGF, 1988; Bousquet, 1992; Dhouib, 1998
<i>Leptailurus serval</i>	ZFMK 85.238; Lavauden, 1924; DGF, 1988; Dhouib, 1998; Ben M'Hamed <i>et al.</i> , 2002
<i>Sus scrofa</i>	Lavauden, 1924; DGF, 1988; Bousquet, 1992; Dhouib, 1998; Lehmann, 1972; present work
<i>Cervus elaphus</i>	Lavauden, 1924; Van Dijk, 1972; DGF, 1988; Bousquet, 1992; Dhouib, 1998; Lehmann, 1972; Burthey <i>et al.</i> , 1991; DGF, 1994; Amadou, 2002; Masseti and Zava, 2002a and 2002b; Oumani <i>et al.</i> , 2004; present work

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