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ON THE DISTRIBUTION OF *MYOTIS BECHSTEINII* (KUHL, 1817) IN ITALY (CHTROPTERA: VESPERTILIONIDAE)

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ABSTRACT - The following paper reviews the distribution of *Myotis bechsteinii* (Kuhl, 1817) in Italy through an examination of museum specimens, available literature, and unpublished data which provided information on the biometry, ecology and conservation of the species.

Key words: Chiroptera, *Myotis bechsteinii*, Distribution, Italy.

INTRODUCTION

The bat *Myotis bechsteinii* (Kuhl, 1817) is a European species, found from the Iberian peninsula to the Caucasus and Iran (Lanza and Finotello, 1985; Koopman, 1993). In Europe it is considered a rare species, and in some of its countries is classified vulnerable or endangered (Stebbings, 1988). In Italy it is one of the rarest species, the very few specimens having been collected mainly in central and northern Italy (Lanza, 1959; Vernier, 1988).

M. bechsteinii seems to prefer woods and forests. It roosts in hollow trees or old buildings during the summer, in caves and artificial tunnels during the winter (Wolz, 1986); it is generally solitary but occasionally lives in small groups (Schober and Grimmberger, 1993). Recently it has been found in bat-boxes in Germany (Taake and Hildenhagen, 1989) and in the Czech Republic (Cerveny and Burger, 1989).

Its rarefaction seems correlated to the decrease in natural roosts due to the felling of hollow trees, to the marked disturbance to which they are subjected in caves during hibernation, and to possible climatic changes (Stebbings and Griffith, 1986; Richarz and Limbrunner, 1993). During the Pleistocene *M. bechsteinii* was very frequent (Kowalski, 1956) and Stebbings and Griffith (1986) affirm that archaeological data indicate a greater abundance of the species in historic times (3000 years ago).

This paper rewieved the distribution of Bechstein's bat in Italy and examines its present status.

MATERIAL AND METHODS

The UTM (10x10 Km) grid maps were adopted to produce distribution map of *M. bechsteinii* in Italy. Original data and historical information were considered. Information on bat's ecology was obtained from data accompanying the museum specimens, from the literature and personal observations.

RESULTS AND DISCUSSION

The first bibliographic reference for Italy is by Catullo (1838) who reported it in Veneto together with four other species.

One of the first reviews of Italian museum specimens and of the available literature on

bats was by Gulino and Dal Piaz (1939) who reported the presence of *M. bechsteinii* in seven regions: Campania (Costa, 1839), Veneto (Ninni, 1876, 1878) where a Pleistocene fossil has also been found (PASA, 1953), Lombardy (Doria, 1877; Senna, 1892), Piedmont, Emilia Romagna (Forsyth Major, 1877), Tuscany (Regalia, 1879) and Abruzzo.

The report for Campania is very doubtful because there are no museum specimens and no precise description of any findings (Monticelli, 1886); Gulino and Dal Piaz (1939) overlooked two records: a specimen captured in Florence at the end of 1800 by Giglioli and a specimen in the Altobello collection captured at Collelongo (Province of L'Aquila) in 1920 and cited by Zava and Violani (1995).

Twenty years later Lanza (1959) added three other localities: San Severino Marche in the Marche, cited by Regalia (1878), Pisa and Milan - where two specimens were caught in the Duomo (Cathedral).

Regarding the report from the Marche, Regalia (1878) writes that: "*E' fino ad ora il secondo individuo preso* in *Italia, e lo debbo alla cortesia del* sig. *Conte Pacifico Parteguelfa* di *Sanseverino Marche*" [This is the second specimen captured thus far in Italy, and I owe it to the courtesy of Count Pacifico Parteguelfa di Sanseverino Marche] which makes the origin of the specimen uncertain; however, as confirmed later by Regalia (1879), it was undoubtedly from Marche.

The report from Pisa in fact concerned Florence: Regalia (1879) reported the discovery of seven specimens in a house about one mile outside Porta a San Gallo, without specifying the city. Four of this bats were captured, one of which is conserved in the Giglioli Italian collection in the Zoological Museum "La Specola" in Florence. The tag of the specimen states the locality as 'La Pietra. Firenze'. Checking the map clearly shows that such a site is exactly one mile from Porta San Gallo in Florence.

No further reports appear until Amelio (1973) who collected one skull of *M. bechsteinii* in a cave in the Province of Imperia, in Liguria. Silvestri (1985) cited it for the territory of Marradi (Florence) without furnishing any indication; probably he was repeating the indication by Zangheri (1957) which indicated a specimen cited by Forsyth Major (1877), which was captured in Rimini.

Some observations on the distribution of the species in Italy are given by Vernier (1988) who adds two new localities for Veneto: Padua and S. Tomio di Malo (Province of Vicenza), and the first report for Friuli Venezia Giulia where a skull was found in the Grotta dell'Angelo (Province of Pordenone).

SINDACO *et al.* (1992) report capturing the species in Piedmont in 1978, thus confirming the doubtful data of Gulino and Dal Piaz (1939).

In Umbria, where the species had not been previously reported, a skull was recently collected in a cave (Vernier, 1994).

In Emilia Romagna. Ruggieri A. reports four new localities, three in the province of Piacenza and one in the province of Parma. In May 1993 he found a male in a hole meant for an explosive in a mine near Cerreto (Ferriere, Piacenza); the specimen, which had a forearm length of 41.3 mm and weighed 7.1 g, was captured, photographed, banded and replaced in the roost.

In August 1994 another male was found in a gallery crevice near S. Salvatore (Bobbio, Piacenza); the specimen, which had a forearm length of 42.8 mm and weighed 7 g, was captured, photographed, banded and replaced in the roost.

In July 1995 a specimen roosting in a mine crevice near C. Montegiogo (Lugagnano, Piacenza) was filmed, but not captured.

Finally, i0n June 1995, near Lago della Navetta in the Parco Regionale Boschi di Carrega (Sala Baganza, province of Parma), a colony of about ten specimens was found in an old woodpecker nest in a tree (*Tax-*

odium distichum). It was possible to film the individuals, but not capture them.

In province of Ravenna, at Pineta di Classe. in the spring of 1995, a bat-detector picked up the presence of *M. hechsteinii* as it flew over the water of a canal (Zava *et al.*, 1996; Zava, ***in*** *litt.*).

Another recent report comes from Tuscany where in the Wildlife Reserve of Pian di Novello, Vergari S. and Dondini G. found the same male of *M. bechsteinii* in two different bat-boxes in June an July 1995, July 1997 and August 1998 (Dondini and Vergari, 1995). The specimen was measured, photographed and replaced in the roost: forearm 41.7 mm, ear 23 mm, lance-shaped tragus 11 mm and weight 8.1 g (June 1995) and 8.2 g (August 1998).

Recently two specimens of *M. bechsteinii* were photographed in a cave in the province of Grosseto in Tuscany (Sforzi and Ragni, 1997). Russo and Mancini (in press) collected a skull in the Province of Caserta, confirming the presence of the species in Campania, though the date of its presence is unsure.

A female was captured in the carsic system of Campo dei Fiori Mountain in Lombardy, the first record of this species in that area (Fornasari *et al.*, in press), and a skull has been found in a cave on Monti della Grigna in the Province of Lecco (Scaravelli, in press). The latest report comes from Calabria where this species is recorded for the first time (Garofalo et al., 1998).

The reports for Sicily are somewhat contradictory; Kahamann and Goerner (1956) mentioned *M. bechsteinii* but did not indicate where it was found. Brink (1957) expressed his doubt about this, but later reports the presence of *M. bechsteinii* in south-east Sicily (Brink, 1967). Corbet (1978) excludes its presence in his review of palearctic mammals. In their research on the Pleistocene bats of Sicily. Kotsakis and Petronio (1980) document the presence of the species in the lower Wiirmian, when the climate was colder than it is today. Instead, Lanza and Finotello (1985) exclude Sicily from the presumed range' of *M. hecksteinii*. Stebbings and Griffith (1986) map the presence of *M. bechsteinii* in southern Sicily, while Vernier (1988) does not mention the species. Recently, in the province of Siracusa in south-eastem Sicily, Zava and Violani (1992) picked up its presence with a bat-detector. Thus the only reliable record is that of Zava and Violani (1992) but hopefully in the future, the presence of *M. hechsteinii* will be confirmed with the definite sighting of a specimen.

Bechstein's bat has been reported in fourteen Italian regions, mainly in the center and north, from the plain through the hills and up to the mountain, but not above 1950 m s.l.m. (Tab. 1). The most recent reports (made after 1960) concern eleven regions (Fig. 1).

Due to the scarcity of specimens a complete biometric comparision with other European areas is not possible. Male mean forearm length 41.1 mm (f0.352 SE) (n=10; min=39.6; max=42.8); female 41.9 mm (f0.255 SE) (n=6; min=41; max=42.6). These measurements indicate no significant difference (t= 1.739, df=14; P=n.s.) between the mean forearm length of male and female *M. bechsteinii*, and data from Great Britain (Stebbings, 1989). Other authors report a sexual dimorphism for *M. hechsteinii* (Haensel, 1979; Cerveny and Burger, 1989) and for other vespertilionid species (Myers, 1978; Williams and Findley. 1979).

Out of the twenty-seven localities reported for the species a distinction should be made between roosts and areas where foraging or some kind of activity presumably takes place. Roosts include: caves or artificial tunnels for which there are 12 reports; man-made constructions 2 reports; bat-boxes and tree holes 2 reports. Activity areas include: forest for which there are 3 reports; urban egvironments 2 reports: uncertain 8 reports. The fact that only two forest roosts have been found (bat-boxes are considered good substitutes for natural hollows tree) reflects the difficulty of locating specimens in such an environment, while the large number

Table I. Available data on the distribution of Bechstein's bat. Specimens for which there are no forearm measurements or indication of sex refer either to skull fragment found in caves or to bat-detector reports. MSNF=Museo di Zoologia "La Specola", Universita di Firenze; MSNG=Museo Civico di Storia Naturale "G. Doria", Genova; MSNV=Museo di Storia Naturale di Venezia; MSNM=Museo Civico di Storia Naturale, Milano; MSNC=Museo di Storia Naturale di Carmagnola; INFS=Istituto Nazionale Fauna Selvatica.

Locality	Altitude	UTM	Date	Sex	forearm (mm)	Enviroment	Source
Veneto ?	?	?	1838 ?	?	?	?	Catullo (1838)
Naples ?	?	33T VF32	1839 ?	?	?	?	Costa (1839)
Rimini	sea level	33T UJ08	VII.1875	1M	41.2	?	MSNF
Refrontolo (TV)	150 m	33T TL88	c.a.1876	1F	42	cave	MSNV (Ninni 1878)
S.Severino Marche (MC)?	?	33'1 UH58	c.a.1878	1?	?	?	Regalia (1878)
Florence	110 m	32T PP85	16.VI.1879	1F	41.4	building	MSNF
Florence	110 m	32T PP85	16.VI.1879	3F	?	building	Regalia (1879)
Florcncc	110 m	32T PP85	16.VI.1879	3?	?	building	Regalia (1879)
Varzi (PV)	420 m	32T NQ16	VIII.1883	1M	41.4	?	MSNG
Milan	120 m	32T NR13	1887	1F	42.6	building	MSNF
Milan	120 m	32T NR13	1887	1F	42.4	building	MSNF
Florence	50 m	32T PP85	10.VII.1899	1M	39.9	urban area	MSNF
Villetta Barrea (AQ)	990 m	331' VG12	30.VII.1914	1M	42.6	?	MSNM
Villctta Karrea (AQ)	990 m	33T VG12	VIII.1915	1M	40.3	?	MSNM
Villetta Barrea (AQ)	990 m	33T VG12	VIII.1915	1?	39.1	?	MSNM
Collelongo (AQ)	915 m	331' UG83	3.VIII.1920	1F	41	?	INFS
S.Tomio di Malo (VI)	120 m	32T PR85	X.1973	1M	40	gallery	Coll. Rigoni P.
Padua	15 m	32T QR23	12.IX.1977	1F	42.3	urban area	Vernier (1988)
Baldissero d'Alba (CU)	400 m	321' MQ25	IX.1978	1M	39.6	forest	MSNC
Pantalica (SR)	430 m	33S WBOO	1990	1?	?	forest	Zava & Violani (1992)
Cerreto (PC)	820 m	32T NQ34	3.v.1993	1M	41.3	mine	Ruggieri **A.**
S.Salvatore (PC)	320 m	321 NQ35	28.VIII.1994	1M	42.8	gallery	Ruggieri **A.**
Boschi di Carrcga (PR)	200 m	32T NQ95	2.VI.1995	10?	?	forest	Ruggieri A.
Pineta di Classe (RA)	sea level	33T TK71	3.VI.1995	1?	?	forest	Zava *et al.*(1996)
C. Montegiogo (PC)	350 m	32T NQ66	27.VII.1995	1?	?	mine	Ruggieri A.
Pian di Novcllo (PT)	1300 m	32T PP38	VI-VII.1995	1M	41.7	forest	Vergari S. & Dondini G.
Massa marittima (GR)	260 m	32T PN56		2?	?	cavc	Sforzi & Ragni (1997)
M.te Campo dei Fiori (VA)	?	327'MR87	1997	1F	?	cave	Fornasari ***et al.*** (in press)
Pigna (IM)	1950 m	32T LP96	30.VII.1972	1 skull		cave	Amelio (1973)
S. Gregorio Matese (CE)	1140 .m	33T VF48	3.VIII.1997	1 skull		cavc	Russo & Mancini (in **press)**
M.ti della Grigna (LC)	1800 m		22.x1.1997	1 skull		cave	Scaravelli (in prep.)
Aviano (PN)	1450 m	33T UM10	?	1 skull		cave	Vernier (1988)
Sigillo (PG)	490 m	33T UH19	?	1 skull		cave	Vernier (1994)
Soverato (CZ)		33s XC38	1996/97	?		?	Garofalo *et* al. (1998)

Figure 1. Distribution of *Myotis bechsteini* in Italy. ° = reports before 1960; • = reports after 1960.

found in caves indicates the greater ease with which specimens can be discovered in such habitats.

Out of the twenty-seven localities reported in Italy, a total of eighteen specimens were captured in eight localities between 1875 and 1920 while, none between 1920 and 1960; between 1960 and the present. seven specimens were captured, a single plus a colony of ten individuals were observed, two were detected ultrasonically, five skulls were collected (for which there is no information as to when the bats actually lived), one specimen filmed and two photographed were reported from the remaining seventeen localities (Tab. I). The only indication of a nursery is found in Regalia (1879) who, in a house on the outskirts of Florence in June. discovered a colony composed of seven specimens of which at least four were females (the other three were not captured). Two of these aborted. the period in which the colony was found by Ruggieri suggest that it may have been reproductive.

Undoubtedly this species is very rare and vulnerable to habitat alteration. The main problem in conserving this species is to prevent its population reduction to a point which would compromise its reproduction. Such an event, coupled with the scarcity of specimens from other areas due to the limited tendency of the species to travel outside its territory (Haensel, 1978; Lina, 1990), could determine the disappearance of small local populations in Italy. For this reason the identification of new winter and summer roosts is very important so they can be protected. The number of nursies should be increased. At the same time artificial roosts should be installed, an expedient which is proving to be ever more helpful in re-colonizing degraded forests and which facilitates the survival of forest bat species in areas which have still not excessively exploited by man.

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