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On occurrence of *Myotis capaccinii* (Chiroptera: Vespertilionidae) in western Iran

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Myotis capaccinii has only been reported from southern Iran in five localities close to each other within a radius of approximately 100 Kilometers. Five males and two females collected from two new localities for this bat are recorded. Among these bats one pregnant female reared in a flight cage for 9 month provided data for postnatal growth and life history characteristics of the species. Various external and cranial measurements obtained from these specimens have been compared with specimens taken from southern Iran and indicate that *M.capaccinii* reported from western Iran belong to *M.capaccinii bureschi*.

Key words: *Myotis capaccinii*, life history, postnatal growth

INTRODUCTION

Myotis capaccinii is one of six species belonging to the genus *Myotis* reported from Iran. *M.capaccinii* has been reported from only five localities in southern Iran (DeBlase, 1980). These areas include Pol-i-Abgineh (Etemad, 1963), Perspolis, Shahpur Cave, Canae Gabru cave in north Jahrom in Fars Province (DeBlase, 1971) and also two specimens from south east Kazeron (DeBlase, 1971). At global scale this bat has been reported from North Africa in Morocco and Algeria, Mediterranean Europe, Turkey, Iraq and Israel (Harisson, 1964), Lebanon, south of Aral Sea east to Vladivostok (Bobrinski et al, 1965). This bat in Asia has also been reported from Japan, Korea and China (Wallin, 1969). Since global distribution of this bat is vast and extends from south Europe, Middle East and Far East in Asia, DeBlase (1980) has suggested that it may exist in other parts of Iran as well. Unlike vast geographic range of this bat only one subspecies has been described from a specimen obtained in Bulgaria as *Myotis capaccinii bureschi* (Heinrich, 1936).

Available data regarding reproductive biology of *M.capaccinii* is scarce. Atallah (1977) has suggested that the mating season for this species may be in the fall after which time males and female segregate to separate quarters. It has been speculated that the large feet of these animals are used to capture insects on surfaces of water where these bats can be frequently seen.

The main aim of the present study is to report new records of distribution for this species in western Iran. We also describe timing of reproductive events in a pregnant female which gave birth to a pup in a flight cage.

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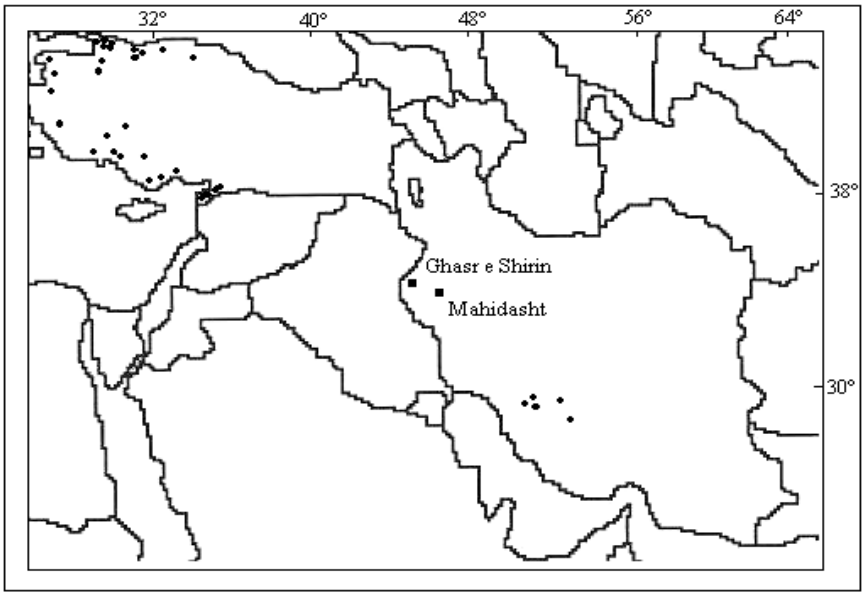

FIG.1.-Distribution map for *M. capaccinii* reported fro southern Iran (•), western Iran (■) and Turkey (•).

MATERIAL AND METHODS

One pregnant female, one non-pregnant female and three males were taken alive by a harp net in Mahidasht cave (33°, 23ʾN and 47°, 30ʾE) in Kermanshah Province. Another male *M.capaccinii* was captured using a mist net over a fish pond in Qasre-e Shirin (34°, 31ʾN and 45°, 35ʾE) in Kermanshah Province. The capture was licensed by the regional office of the environment. Seven standard external measurements including weight, head and body length, total length, tail length, ear length, forearm length and hind foot length were taken with caliper from fresh specimens. All specimens from two localities were prepared as standard study skins and skulls. Following preparation, specimens were labeled and kept in a scientific collection under the RUBC serial numbers (Razi University Bat Collection). Eleven cranial characters including greatest length of skull, condylobasal length, zygomatic breadth, interorbital constriction, braincase breadth, maxillary toothrow length, mandibular toothrow length, mandible length, total skull length, skull height and mastoid breadth have been taken form skulls of these specimens. The characteristics measured are correspond to those described by Benda and Horacek (1995) and Deblase (1980).

Bats collected were transferred to ecology laboratory at Razi University where a flight cage is used for postnatal and behavioral studies. The pregnant female bat gave birth to a male bat which grew up in the cage for 9 months after which it was sacrificed for cranial measurements. Postnatal study was conducted on the single *M.capaccinii*. The bat had unlimited access to fresh water in shallow dishes and to mealworm in plates placed at the floor of the cage and also on a desk at the heights of 1m. One day after birth the young bat was gently removed from its mother and body mass was measured to the nearest 0.1 gram using an electronic balance. The forearm was measured with a Venire caliper. The length of the total epiphyseal gap in the fourth metacarpal phalangeal joint was measured to the nearest 0.1 mm using a binocular microscope equipped with an ocular micrometer and sub-stage illumination to view the transilluminated wing. This study received ethical approval from the Ethics committee of the faculty of science, Razi University.

TABLE 1.- External and cranial measurement for seven *M.capaccinii* collected from western Iran and those reported from southern Iran (DeBlase, 1980) and Turkey (Albayrak and Asan, 2002). Data include number of individuals (n), range (r), average (m) and standard deviation (± sd).

Character	Turkey				Southern Iran				Western Iran			
	n	R	m	± sd	n	r	m	± sd	n	r	m	± sd
Total length	26	87-104	95.5	4.19	37	78-95	86.5	4.87	7	81.9-95.2	87.2	4.33
Head and body length	26	50-70	59.1	5.34	37	42-60	49.8	4.68	7	44-51	48	2.2
Tail length	26	32-39	36.4	2.23	37	33-46	36.7	2.83	7	36-44	39	2.9
Ear length	26	13-15	13.8	0.61	36	11-17	13.9	1.22	7	12-15	14	0.8
Hindfoot length	26	12-15	13.5	0.82	36	11-14	12.2	0.92	7	9.9-11.8	10.9	0.63
Forearm length	15	37.5-41	39.2	1.01	37	37-43	40.5	1.24	7	40.6-42	41.4	0.45
Weight	24	6-9	7.3	0.80	-	-	-	-	7	8.1-9.3	8.8	0.4
Greast skull length	25	15.1-16.1	15.5	0.27	11	14.8-15.9	15.4	0.37	7	15.1-15.6	15.4	0.17
Total skull length	26	14.8-15.8	15.3	0.26	-	-	-	-	7	14.7-15.9	15.37	0.39
Condylobasal length	26	13.7-14.6	14.2	0.25	12	13.7-14.6	14.2	0.25	7	13.9-14.5	14.2	0.22
Zygomatic breadth	18	9.1-9.7	6.2	0.15	12	8.6-9.5	9.1	0.24	7	8.2-9.3	8.84	0.37
Interorbital constriction	26	3.5-3.9	3.7	0.11	14	3.5-4.2	3.68	0.16	7	3.2-3.9	3.44	0.23
Braincase breadth	26	7.3-8.1	7.8	0.24	14	7.5-8.1	7.69	0.17	7	7.4-8	7.74	0.19
Mastoid breadth	26	7.2-8.2	7.9	0.18	-	-	-	-	7	7.7-8	7.9	0.1
Skull height	23	6.6-7.4	7	0.20	-	-	-	-	7	6.5-7.2	6.8	0.25
Maxillary toothrow length	24	5.4-5.9	5.7	0.12	13	5.3-5.8	5.55	0.15	7	5.4-6.1	5.68	0.21
Mandibular toothrow length	25	5.8-6.2	6	0.11	13	5.7-6.2	5.91	0.14	7	5.6-6.3	5.9	0.27
Mandible length	26	10.5-11.3	10.8	0.21	13	10.3-11.2	10.7	0.25	7	10-11	11	0.2

TABLE 2.- Results of a statistical comparison (t-test) for seven *M.capaccinii* collected from western Iran and those reported from southern Iran DeBlase, 1980). Data include number of individuals (n), and Average (m),

Character	Southern Iran		Western Iran			
	N	m	n	m	F	P
Total length	37	86.5	7	87.2	0.13	0.72
Head and body length	37	49.8	7	48	0.92	0.34
Tail length	37	36.7	7	39	4.34	0.04
Ear length	36	13.9	7	14	0.09	0.76
Hindfoot length	36	12.2	7	10.9	13.42	0.00
Forearm length	37	40.5	7	41.4	4.18	0.05
Great skull length	11	15.4	7	15.4	0.08	0.78
Condylobasal length	12	14.2	7	14.2	0.31	0.58
Zygomatic breadth	12	9.1	7	8.84	3.99	0.06
Interorbital constriction	14	3.68	7	3.44	0.31	0.58
Braincase breadth	14	7.69	7	7.74	0.46	0.51
Maxillary toothrow length	13	5.55	7	5.68	8.19	0.01
Mandibular toothrow length	13	5.91	7	5.9	0.27	0.61
Mandible length	13	10.7	7	11	0.36	0.55

RESULTS

The species was identified on the basis of the noticeable whitish belly and also a relatively large hindfoot normally over 11 mm. The pattern of wing membrane attachment to the leg was also used to identify the specimens as in this bat the membrane connects to the leg at or above the ankle (DeBlase, 1980). Average, standard deviation, range and number of specimens for seven external and eleven cranial measurements for seven *M.capaccinii* collected from two localities in western Iran are shown in Table 1. Similar data for this species collected from various localities in Turkey and also five localities in southern Iran are also presented in this table. A statistical comparison using t-test between major cranial and external characteristics in *M.capaccinii* specimens from southern and western Iran shows very close affinities between these two groups of specimens (Table 2). From six

external and eight cranial characters only one (hindfoot length) shows a significant difference at 0.01 confidence limit. Two other characters (tail length and maxillary toothrow length) demonstrate differences at confidence limits between 0.01 and 0.05.

The pregnant female *M.capaccinii* gave birth to a male pup. At birth, young *M.capaccinii* was naked with closed eyes and folded pinnate. By the first week of age, the ears became erected and a few spare hairs were present on their bodies. The eyes opened during the first week and the pup began to move. The short and soft hair of the pups was distinguishable between 6 and 10 days. The young bat ability to flight improved when they were about 30 days old. At this time the pup began independently to bite and lick the mealworms. The mass of the litter reported in present study represents 25 percent of the mothers post-partum mass. This value is in the range of values reported for relative neonate mass for other members of the Vespertilionidae.

DISCUSSION

All *M.capaccinii* sampled by DeBlase (1971a) and by Street expedition (DeBlase, 1980) were found in caves or in man made structures such as well and old buildings. However the species from Qasre-e Shirin was captured over a fish pond. Number of individual occupying each roost ranges from single individual (DeBlase, 1980) to over 30 (Lay, 1967). In Iran *M.capaccinii* has been found with other bats such as *R.blasii, R.euryale, R.hipposiderous* and other members of *Rhinopoma.* In Mahidasht cave *M.capaccinii* was found with at least three other bats including *Myotis blythii, Miniopterus schreibersii* and *Rhinolophus mehelyii*.

Geographic variation in *M.capaccinii* is apparently very low. The only subspecies described on the basis of specimens collected from Karamlek, Stranja Mts in Bulgaria (Heinrich 1936) has been accepted by many authors. Corbet (1978) has defined *M.capaccinii* as a monotypic species. While many workers including DeBlase (1980), Benda and Horacek (1998), Harrison and Bates (1991), Koopman (1994) and Albayrak and Asan (2004) agree that *M.capaccinii* is a monotypic others such as Kahman and Caglar (1960) believe that there may be some variation at sub specific level. Specimens collected from area close to western Iran including Turkey and Israel (Harisson 1991) have been referred to as *M.capaccinii bureschi* (Heinrich 1936). DeBlase (1980) has referred to the Iranian specimens collected from southern Iran as *M.capaccinii bureschi* on the basis of their whiter bely and also on the basis of their external and cranial measurements. Present information regarding external and cranial characteristics of *M.capaccinii* collected from western Iran indicates that this species in western Iran is similar to the other populations in southern Iran (DeBlase, 1980).

The pattern of growth and development obtained for a single *M.capaccinii* pup is similar to other species of bats in showing linear growth of length of forearm and body mass during the preflight period. Similarly, the epiphyseal gap increases during this period and decreases until the closure of the gap at about 36 days of age. At the end of the second month after parturition the length of the forearm was 90 per cent of the adult length while the mean body mass was 88.75 per cent of adult mass. The young *M.capaccinii* showed a growth rate for body mass and forearm of 0.3 g/d and 1.35 mm/d respectively. Values obtained for postnatal growth for *M.capaccinii* are lower than those obtained for bats living in Mahidasht cave. Rate of body mass increase in *Rhinolophus mehelyii* which is a heavier bat (13 gr) is 0.058 g/day (Sharifi 2004).

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