

## The structure of baculum in *Myotis myotis* and *Myotis blythi* (Chiroptera: Vespertilionidae) from Turkey

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**Abstract:** A comparison was made of the shape and size of the bacula of 32 *Myotis myotis* (Borkhausen, 1797) and 26 *Myotis blythi* (Tomes, 1857) collected from Turkey. It was determined that baculum size does not distinguish the two species but baculum shape distinguishes them.

**Key Words:** Baculum, *Myotis myotis*, *Myotis blythi*, Turkey

### Türkiye'deki *Myotis myotis* ve *Myotis blythi* Türlerinde Baculum'un Yapısı (Chiroptera: Vespertilionidae)

**Özet:** Türkiye'den toplanan 32 *Myotis myotis* (Borkhausen, 1797) ve 26 *Myotis blythi* (Tomes, 1857) örneğinin baculum'ları şekil ve büyüklük bakımından karşılaştırılmıştır. Baculum büyüklüğünün Türkiye'de bu iki türü ayırt etmediği ancak daha çok baculum şeklinin ayırıcı olduğu saptanmıştır.

**Anahtar Sözcükler:** Baculum, *Myotis myotis*, *Myotis blythi*, Türkiye

#### Introduction

*Myotis myotis* (Borkhausen, 1797) and *Myotis blythi* (Tomes, 1857), distributed widely in the Palaearctic region, are known to be sibling species. However, the separation of them is not clear-cut in some regions (1-11). Turkey, where these closely related species are common, ranging throughout, is no exception to the problem of separation (12).

The purpose of this study was to explore whether the baculum distinguishes the two species in terms of the baculum shape and size.

#### Materials and Methods

The bacula were taken from 32 *Myotis myotis* (Borkhausen, 1797) and 26 *Myotis blythi* (Tomes, 1857) specimens, caught from different parts of Turkey between 1974 and 1994. Age determination was made according to Anderson (13) and Baagoe (14). Some external and cranial measurements of the specimens were recorded in tables as the diagnostic characters of the species. The

bacula were prepared according to Topal (15) and measured. The species were compared to each other and those described in the literature in terms of the bacular structure. Subadult specimens were not used in this study because of the under-development of the bacula.

#### Result

*Myotis myotis* (Borkhausen, 1797)

1797. *Vespertilio myotis* Borkhausen, Deutsche Fauna, 1: 80.

Type locality: Germany

1897. *Myotis myotis*, Miller, Ann. Mag. Nat. Hist., 20 (6): 383.

Bacular characteristics: The study of 32 bacula from *M. myotis* revealed that the majority of indentations between the two projections in adults were markedly deep and narrow (Fig. 1). In 32 bacula, the lengths were between 0.83 and 1.14 mm and the widths were between 0.51 and 0.74 mm. Bacular variations in *M. myotis* are shown in Figure 1.

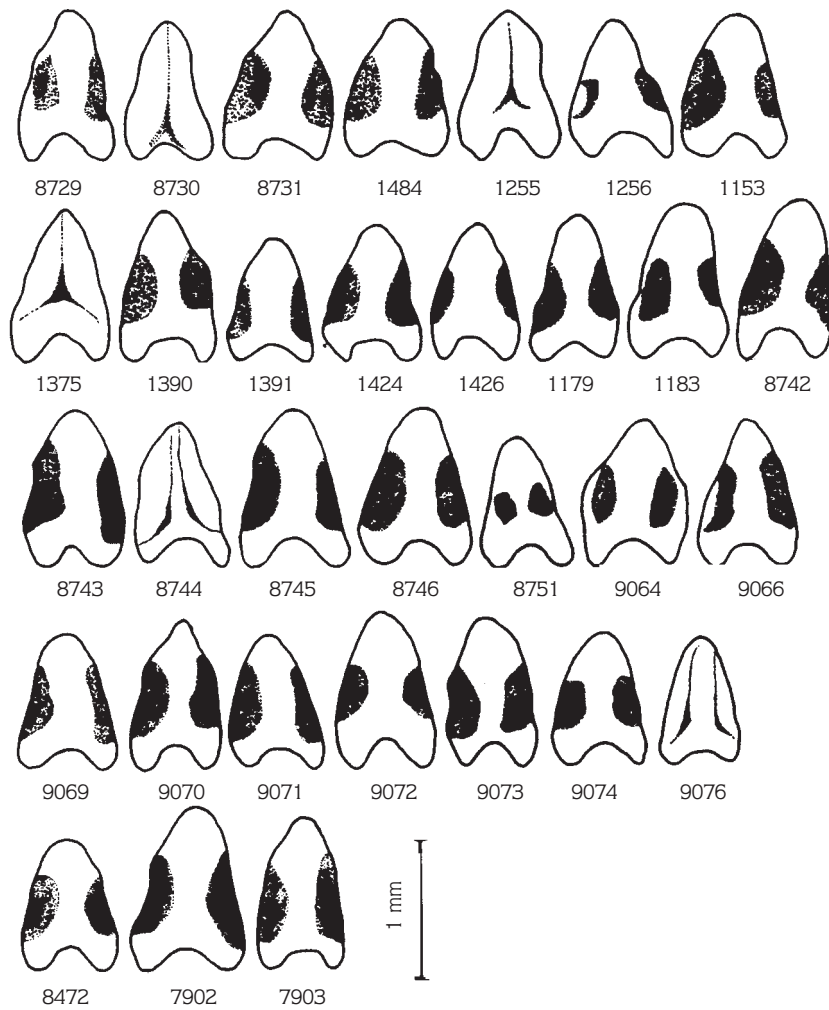


Fig. 1. The bacular variations in *Myotis myotis* collected from Turkey. (Numbers indicate the collection nos. of the specimens from which the bacula were removed).

Measurements: Measurements of some distinguishing characteristics are given in Table 1.

Table 1. Some external and cranial measurements (mm) of 31 adult specimens of *Myotis myotis* from Turkey: number of individuals (n), range (r), mean (m) and standard error ( $\pm$  se).

Measurements	n	r	m	$\pm$ se
Forearm length	31	56.0-64.7	61.1	0.069
Greatest skull length	31	24.4-26.8	25.8	0.019
Condylbasal length	31	22.8-24.9	23.9	0.017
Zygomatic breadth	30	15.0-16.5	15.8	0.013
Upper toothrow length	28	10.0-11.2	10.6	0.009
Lower toothrow length	27	11.0-11.9	11.4	0.014

Specimens examined: 32 specimens were collected from the following localities: Ankara, Kalecik, Çandır, 1; Antalya, Kaş, Limanağzı, Hıdırellez Mağarası, 2; Diyarbakır, Çermik, Kalecik Köyü Mağarası, 2; Edirne, Lalapaşa, Sinanköy Mağaraları, 3; Eskişehir, Alpu, Kelkaya Göleti, 1; Hatay, Narlıca, Karanlık Mağara, 15; Konya, Sızma Köyü, Kuzey Mağara, 1; Pamukçu Köyü Hanı, 2; Mersin, Tarsus, Say Köyü, Delikli Mağara, 2; Nevşehir, Derinkuyu, Yerebatan Şehir, 1; Gülşehir, Açksaray Harabeleri, 1; Tokat, Turhal, Pazar, Ballica Köyü, İnderesi Mevkii, 1 (Fig. 2).

*Myotis blythi* (Tomes, 1857)

1857. *Vespertilio blythi* Tomes, Proc. Zool. Soc., London, 53-54.

Type locality: Nasirabad, Rajputana, India

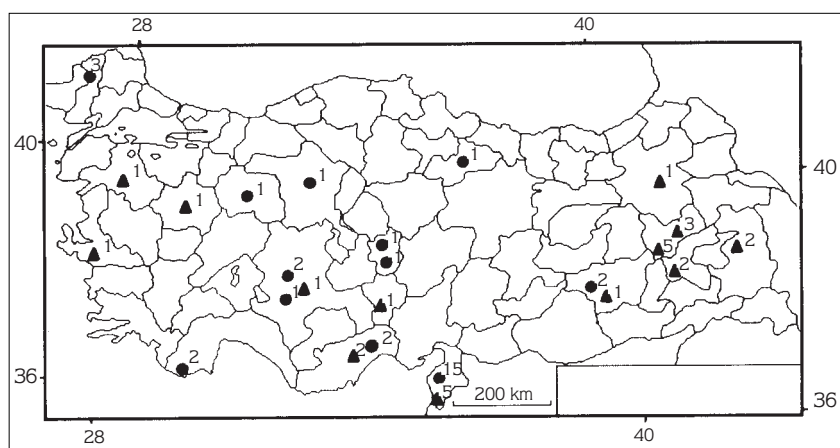


Fig. 2. Collection localities of *Myotis myotis* (●) and *Myotis blythi* (▲) from Turkey.

1951. *Myotis blythi*, Ellerman and Morrison-Scott, Checklist of Palearctic and Indian Mammals. 1758-1948. Brit. Mus. (Nat. Hist.) 144-145.

**Bacular characteristics:** The study of 26 bacula from *M. blythi* revealed that the majority of indentations between the two projections in adults were shallow and wide (Fig. 3). In 26 bacula, the lengths were between 0.77 and 1.12 mm and bacular widths were between 0.45 and 0.83 mm. Bacular variations in *M. blythi* are given in Figure 3.

**Measurements:** Measurements of some distinguishing characters are given in Table 2.

Table 2. Some external and cranial measurements (mm) of 26 adult specimens of *Myotis blythi* from Turkey; number of individuals (n), range (r), mean (m) and standard error ( $\pm$ se).

Measurements	n	r	m	$\pm$ se
Forearm length	25	51.8-58.4	55.7	0.060
Greatest skull length	24	21.9-23.7	22.9	0.018
Condylbasal length	25	20.3-21.8	21.2	0.015
Zygomatic breadth	25	13.8-14.8	14.2	0.010
Upper tooththrow length	26	8.9-9.6	9.3	0.007
Lower tooththrow length	24	9.6-10.3	9.9	0.014

**Specimens examined:** 26 specimens were collected from the following localities: Balıkesir, Dinkçiler

Mahallesi, 1; Bitlis, Eleman Hanı, 2; Diyarbakır, Çermik Kalecik Köyü Mağarası, 1; Erzurum, Hasankale, Köprüküy, Çobandede Köprüsü, 1; Hatay, Narlıca, Karanlık Mağara, 5; İzmir, Gümüldür, İncirli Maden Ocağı, 1; Konya, Sızma Köyü, Obruk Mağarası, 1; Kütahya, Sabuncupınar, Yenice Çiftliği, 1; Mersin, Tarsus, Say Köyü Mağaraları, 2; Muş, Dere Mahallesi, 5; Sütluce Köyü, Köprüsü, 3; Niğde, Ulukışla, Niğde 1; Van, Van Kalesi, 2 (Fig. 1).

## Discussion

Topal (15) stated that the indentations between the two projections at the proximal end of the baculum in *M. myotis* are deep and narrow; lateral margins taper towards the end, forming a rounded tip. In *M. blythi*, the indentations between the projections are shallow and wide; the lateral margins are either parallel up to almost the middle and narrowing with a rounded tip as in *M. myotis* or convergent just after the proximal part and tapering to the distal end with a wider rounded tip.

Of the 32 bacula from *M. myotis*, the indentations between the projections of 31 bacula were similar to those described by Topal (15). The remaining specimen (No: 9076) had similar indentations to that of *M. blythi*. The lateral margins in 32 specimens tapered gradually and 30 of them formed a rounded tip at the end, whereas two had a somewhat pointed tip at the distal end (No: 1375, 9070). The bacular dimensions of *M. myotis* examined in this study fit well with those described by Topal (15) (Table 3).

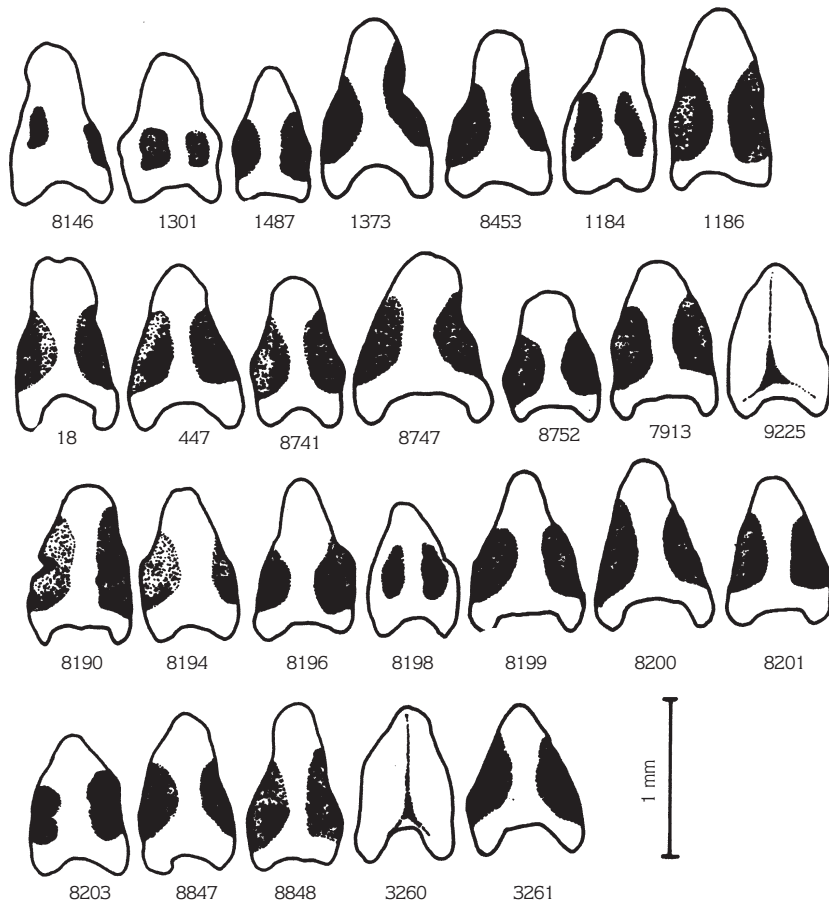


Fig. 3. The bacular variations in *Myotis blythi* collected from Turkey. (Numbers indicate the collection nos. of the specimens from which the bacula were removed).

Table 3. Comparison of dimensions of bacula in *Myotis myotis* collected from Turkey and Hungary (Topal, 1958); number of individuals (n), range (r), mean (m) and standard error ( $\pm$  se).

Characters	n	r	m	$\pm$ se
Baculum length (Turkey)	32	0.83-1.14	0.98	0.002
(Hungary)	19	0.88-1.12	0.98	-
Baculum width (Turkey)	32	0.51-0.74	0.63	0.001
(Hungary)	19	0.50-0.68	0.57	-

Of the 26 bacula from *M. blythi*, the indentations between projections of 23 bacula were similar to those described by Topal (15), but three showed similarity to *M. myotis* (No: 18, 1373, 3260). The lateral margins ended with a rounded tip in all. The bacular dimensions of *Myotis blythi* in this study were greater than those described by Topal (15) (Table 4). These differences might be due to the fact that Topal (15) used some subadult specimens.

Table 4. Comparison of dimensions of bacula in *Myotis blythi* collected from Turkey and Hungary (Topal, 1958); number of individuals (n), range (r), mean (m) and standard error ( $\pm$  se).

Characters	n	r	m	$\pm$ se
Baculum length (Turkey)	26	0.77-0.12	0.95	0.003
(Hungary)	37	0.76-0.88	0.83	-
Baculum width (Turkey)	26	0.45-0.83	0.58	0.002
(Hungary)	37	0.36-0.40	0.38	-

Although the shape and size of the bacula in these two species appear to be diagnostic characters in European specimens, they are not enough to distinguish them in Turkey. The differences between the results might be because these two species are represented by different subspecies in Turkey and Europe (12,16).

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