

Original research

The Bats (Mammalia: Chiroptera) of the Central and Eastern Mediterranean Region, with description of two new subspecies

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Abstract: The study was based on a total of 200 specimens of the bats, distributing on the central and eastern Mediterranean Region of Turkey. As a result of this investigation, *Rousettus aegyptiacus* from the family Pteropodidae of the suborder Megachiroptera and *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. euryale*, *R. blasii*, *R. mehelyi* from the family Rhinolophidae, *Myotis blythii*, *M. capaccinii*, *M. emarginatus*, *M. myotis*, *M. mystacinus*, *M. nattereri*, *Eptesicus anatolicus*, *E. serotinus*, *Pipistrellus kuhlii*, *P. pipistrellus*, *Plecotus macrobullaris*, *P. kolombatovici* from the family Vespertilionidae, *Miniopterus schreibersii* from the family Miniopteridae and also *Tadarida teniotis* from the family Molossidae of the suborder Microchiroptera were established to distribute in this region. In addition, each of *Myotis capaccinii* and *Eptesicus serotinus* has a different form can be separated from their other populations. Therefore, two new subspecies, *Myotis capaccinii abidinbudaki* ssp. nov. and *Eptesicus serotinus anatolicus* ssp. nov. were described here.

Keywords: Turkey, Mediterranean, Chiroptera, bats, systematics.

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Introduction

The Mediterranean Region, one of seven geographic regions of Turkey, consists of the provinces Adana, Antalya, Burdur, Hatay, Isparta, Kahramanmaraş, Mersin (İçel), and Osmaniye. Also southern parts of the provinces Karaman, Konya, and Niğde are partly located in this region, with a humid Mediterranean climate. Bat species recorded in this region have been reviewed by Benda & Horáček (1998), adding some species newly recorded. They reported 23 bat species from the central and eastern Mediterranean. However, several species were changing by their sibling species after some systematical changings in the genus *Plecotus* and the superspecies *Myotis*

mystacinus (Spitzenberger et al., 2003; Juste et al., 2004; Benda and Karataş, 2005).

This study is a part of a large project on bat fauna of Turkey and it aims to determined bat species and their distribution in southern Anatolia.

Materials and Methods

The study was conducted in the Turkish Mediterranean Region, with exception of western part and bordered by a line between Alara Stream (Antalya: Alanya) and Yalvaç (Isparta) in the west (Fig. 1).

In total, 200 specimens were captured using mist net or hand net during the period between 1994 and 1999. Additionally, some individuals were released after measuring. The voucher samples were prepared in a

standard way, the skins, skulls, bacula, tissue, and parasites were deposited in the Mammal Collection of the Department of Zoology, Niğde University, Turkey (ZDNU).

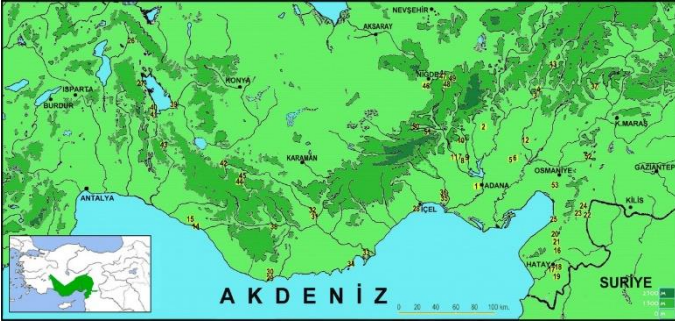


Fig. 1. The topographic map of the central and eastern parts of the Mediterranean Region with the localities mentioned on the text: 1. Adana (centrum), 2. Aladağ, Meydan High Plateau, 3. Feke (centrum), 4. Feke Castle, 5. İmamoglu (centrum), 6. Koyunevi, 7. Karaisali Teacher's Lodge, 8. Başkif, 9. Çocuklar, 10. Kapıkaya, 11. Karaisali, Kızıldağ High Plateau (Ca. 1600 m.), 12. Kozan, Cumhuriyet Quarter, 13. Saimbeyli (centrum); 14. Antalya: Alanya, Çakallar, Alarahani, 15. Alanya, Avsallar; 16. Hatay: Antakya, Alahan Castle, 17. Harbiye Cave, 18. Narlıca, Karanlık Cave, 19. Altınöz, Kozkalesi, 20. Belen, Sarıma, 21. Ötençay, Bakras Castle, 22. Hassa, Demrek, Dipsiz Cave, 23. Söğüt, 24. Hassa, Turkish-Syrian border, 25. İskenderun, Payas, Sokullu Building Complex; 26. Isparta: Yalvaç, Antiochia Ruins, 27. Yenişarbademli; 29. Mersin (İçel): centrum, 30. Anamur, 30. Buğu Cave (Öğü Deliği), 31. Mut, Kadıköyü, Göksu Bridge, 32. Hacıilyaslı, Ilıca, 33. Silifke, Tekir Ambarı, 34. Taşucu, 1 km W of Boğsak, 35. Tarsus Teacher's Lodge, 36. Sayköy, Delikli Cave; 37. K. Maraş: Döngel, Döngel Caves; 38. Karaman: Ermenek, Üçbölük (Görmeli) Village, Dipsiz İn (cave); 39. Konya: Beyşehir (centrum), 40. Between Yeşiladağ and Kurucaova, Büyük Gözettepe, Ağıldamı, 41. Yeşiladağ, 42. Bozkır, Armutlu, Derehanı, 43. Derebucak, Çamlık, 44. Hadım (centrum), 45. Gülpınar, Kirpi İni (cave); 46. Niğde (centrum), 47. Gümüşler, Epçik Cave, 48. Gümüşler, Gümüşler Monastery & Eskiğümüş, 49. Uluağaç Village, 50. Ulukışla, Öküz Mehmet Paşa Caravanserai, 51. Çiftehan, Gümüş Village; 52. Osmaniye: Bahçe, Yeni Quarter, 53. Toprakkale Castle.

Results and Discussion

We recorded 20 bat species in the central and eastern parts of Turkish Mediterranean region totally.

Family 1: Pteropodidae

Rousettus aegyptiacus (E. Geoffroy, 1812):

Hatay: Antakya, Harbiye Cave, 26.VII.1998: 3 (1 dried and 2 subfossil) (ZDNU 1998/118-120), Hassa, Demrek, Dipsiz Cave, 27.VII.1998: 2 Ad. ♀ (ZDNU 1998/33-34); **Mersin (İçel):** Anamur, Ca. 3-4 ind. (obs.), gardens of Tarsus Teacher's Lodge (obs. 1 ind.), Tarsus, Sayköy,

Karadelik (Delikli) Cave, 25.IX.1999: 2 Ad. ♀ (ZDNU 1999/105-106) (cf. Karataş et al., 2003).

Family 2: Rhinolophidae

Rhinolophus ferrumequinum (Schreber, 1774)

Adana: Karaisali, Kapıkaya (old mosque), 19.VIII.1999: 2 Ad. ♂, 1 Ad. ♀ (ZDNU 1999/34-36); **Antalya:** Alanya, Çakallar, Alarahani (caravanserai), 08.VII.1998: 1 Ad. ♂ (ZDNU 1998/12); **Hatay:** Altınöz, Kozkalesi, Kürşad Castle, 23.VII.1998: 2 Ad. ♀ (ZDNU 1998/27-28), Belen, Ötençay, Bakras Castle, 22.VII.1998: 2 Ad. ♀ (ZDNU 1998/22, 26), Hassa, Turkish-Syrian border, between Suveren and Akbaba harbour patrols (cave), 27.VII.1998: 3 Ad. ♂, 4 Ad. ♀ (ZDNU 1998/ 35-36, 39, 65-66, 78-79); **Karaman:** Ermenek, Üçbölük Village, Dipsiz İn (cave), 17.IX.1999: 1 Ad. ♀ (ZDNU 1999/90); **Konya:** Hadım, Gülpınar, Kirpi İni (cave), 16.IX.1999: 3 Ad. ♂, 1 Ad. ♀ (ZDNU 1999/81-84); **Mersin (İçel):** Mut, Hacıilyaslı, Ilıca vicinity, 23.IX.1999: 1 Ad. ♀ (ZDNU 1999/92).

Rhinolophus hipposideros (Bechstein, 1800)

Adana: Karaisali, Başkif, 20.VIII.1999: 2 Ad. ♀ (ZDNU 1999/53-54); **Hatay:** Antakya, Harbiye (cave), Ca. 5-6 ind. (obs.); Isparta: Yenişarbademli, near Lake Beyşehir (cave) 2 ind. (obs.); **Konya:** Beyşehir: between Yeşiladağ and Kurucaova, Büyük Gözettepe, Ağıldamı, 11.VIII.1998: 1 Ad. ♀, 1 Ad. ♀ (ZDNU 1998/106-107); **Niğde:** Ulukışla, Çiftehan, Gümüş Village 1 ind. (obs.).

Rhinolophus euryale Blasius, 1853

Hatay: Altınöz, Kozkalesi, Kürşad Castle, 23.VII.1998: 1 Ad. ♀ (ZDNU 1998/29), Hassa, Turkish-Syrian border, between Suveren and Akbaba harbour patrols (cave), 27.VII.1998: 7 Ad. ♂, 16 Ad. ♀, 2 Ad. undet. sex (ZDNU 1998/37-38, 41, 43-49, 51, 53-55, 62, 68, 69, 71, 73, 75-77, 80-81).

Rhinolophus blasii Peters, 1866

Mersin (İçel): 8 km north of Anamur, Buğu Cave (Öğü Deliği), 1999: 1 (obs.).

Rhinolophus mehelyi Matschie, 1901

Hatay: Harbiye, Narlıca, Temaşa Cave, 26.VII.1998: Ca. 5-6 birey (obs.), Hassa, Turkish-Syrian border, between Suveren and Akbaba harbour patrols (cave), 27.VII.1998: 1 Ad. ♂, 3 Ad. ♀ (ZDNU 1998/40, 42, 50, 52); **Karaman:**

Ermenek, Üçbölük Village, Dipsiz İn, 17.IX.1999: 1 Ad. ♂, 1 Ad. ♀ (ZDNU 1999/88-89).

Family 3: Vespertilionidae

Myotis (Myotis) myotis (Borkhausen, 1797)

Hatay: Hassa, Demrek, Dipsiz Cave, 27.VII.1998: 1 Ad. ♂ (ZDNU 1998/31); **Mersin (İçel):** Tarsus, Sayköy, Delikli (Karadelik) Cave, 25.IX.1999: 1 Ad. ♀ (ZDNU 1999/99); **K. Maraş:** Döngel, Döngel Caves, 26.VIII.1999: 1 Ad. ♂ (ZDNU 1999/72); **Niğde:** Uluğağ Village (edge of the reservoir), 02.V.1996: 1 Ad. ♀ (ZDNU 1996/40), Ulukışla, Öküz Mehmet Paşa Caravanserai, 15.VIII.1999: 2 Ad. ♂ (ZDNU 1999/32-33); **Osmaniye:** Toprakkale Castle, 27.VIII.1999: 1 Ad. ♂, 1 undet. sex (ZDNU 1999/75-76).

Myotis (Myotis) blythii (Tomes, 1857)

Adana: Karaisalı, Kapıkaya, old mosque, 19.VIII.1999: 1 ind. (dried) (ZDNU 1999/37); **Hatay:** Narlıca, Karanlık Cave, 26.VII.1998: 5 Ad. ♂, 3 Ad. ♀ (ZDNU 1998/56-61, 83-84), Demrek, Dipsiz Cave, 27.VII.1998: 1 Ad. ♂ (ZDNU 1998/70); **Isparta:** Yalvaç, Antiochiae Ruins, 28.VII.1998: 1 Ad. ♂ (ZDNU 1999/09); **Konya:** Bozkır, Armutlu, Derehanı Inn, 14.IX.1999: 1 Ad. ♂ (ZDNU 1999/77); **Mersin (İçel):** Tarsus, Sayköy, Delikli (Karadelik) Cave, 25.IX.1999: 1 Ad. ♂ (ZDNU 1999/100); **Niğde:** Ulukışla, Öküz Mehmet Paşa Caravanserai, 15.VIII.1999: 1 Ad. ♂ (ZDNU 1999/31).

Myotis (Myotis) nattereri (Kuhl, 1817)

Adana: Fekke Castle, 24.VIII.1999: 2 Ad. ♂, 2 Ad. ♀ (ZDNU 1999/65-68); **Antalya:** Alanya, Çakallar, Alarahani (caravanserai), 08.VII.1998: 2 Ad. ♂, 1 Ad. ♀ (ZDNU 1998/11, 12, 16); **Hatay:** Belen, Ötençay, Bakras Castle, 22.VII.1998: 3 Ad. ♀ (ZDNU 1998/21, 24-25).

Myotis (Myotis) emarginatus (Geoffroy, 1806)

Adana: Karaisalı, Kapıkaya, old mosque, 19.VIII.1999: 8 Ad. ♀, 1 ind. (possibly ♀) (ZDNU 1999/38-46); **Hatay:** Hassa, Turkish-Syrian border, between Suveren and Akbaba harbour patrols (cave), 27.VII.1998: 1 Ad. ♂, 3 Ad. ♀ (ZDNU 1998/67, 72, 74, 82) (cf. Karataş & Özgül, 2003).

Myotis (Selysius) mystacinus (Kuhl, 1817)

Konya: Beyşehir (centrum), Eşrefoğlu Bridge on Çarşamba Stream, 09.VIII.1998: 1 Ad. ♂ (ZDNU

1998/101), ibid., 10.VIII.1998: 1 Ad. ♀ (ZDNU 1998/103) (cf. Benda & Karataş, 2005 as *M. auraszens*).

Myotis (Leuconoe) capaccinii (Bonaparte, 1837)

Taxonomic remarks: In addition to the nominate race in Europe, Heinrich (1936) described a new subspecies, *Leuconoe capaccinii bureschi*, with 6 samples including holotype from Bulgaria (Terra-typica: Karemlak, Stranja Mountains) and he gave some measurements and coloration for the type material (see Fig. 2). The dorsal of the subspecies bureschi was reported as a nice pale dove gray “*einer schönen hell taubengrauen Färbung*”, ventrally brownish-white. Ellerman and Morrison-Scott (1951) reported that this form described in Bulgaria was conspecific with *Myotis capaccinii bureschi*. Kahmann and Çağlar (1960a, 1960b) recorded *M. capaccinii* from Hatay as the first record from Turkey. Çağlar (1961, 1965), Osborn (1963) and DeBlase and Martin (1973) gave some new distribution records of the species from various localities of the Marmara, Aegean, and Mediterranean regions. Kahmann and Çağlar (1960a, 1960b) stated that there was no significant difference between *bureschi* and their materials in measurements, except for coloration; the difference in coloration of the subspecies *bureschi*'s type can be related to the juvenile specimens. They also reported that their samples were similar to all the characteristics of *M. capaccinii* individuals from Greece, Sardinia and Corsica. However, most of the morphometric sizes given by van Laar and Daan (1964) from Greece were quite smaller than both those from Hatay and those of Table 1. Nevertheless, Kahmann and Çağlar (1960a, 1960b) did not classified the Hatay materials under any subspecies.

Although Kumerloeve (1975) reported Turkish Thrace form was similar to the subspecies *bureschi* from Bulgaria; 20 samples from Burdur, Hatay, and İstanbul examined by Albayrak (1990a), one individual from Manisa by Karataş (1996) were identified as *M. c. capaccinii*. Both sample from Manisa and Helversen (1989)'s materials from various parts of Anatolia are smaller than forearm sizes in Table 1. On the other hand, results of some other researchers, such as DeBlase (1980) and Koopman (1994) are consistent with Kumerloeve (1975); unlike Corbet (1978), who regarded doubtful the validity of *bureschi* and reported only the nominate form in the region. The population of Arabia was paler than the nominate in dorsal coloration, included to *bureschi* with

whiter in ventral by Harrison and Bates (1991). The samples from Israel were smaller than the measurements in Table 1; whereas sample from İnsuyu Cave (Burdur), with a forearm length of 42.0 mm was at the measurement range.

As Albayrak (1990a) mentioned, it is different from Europe in some skull measurements of the Iranian and Israeli populations investigated by Etemad (1963) and Harrison (1964), respectively. As a result of the morphometric comparisons in Fig. 2, the subspecies from south of Turkey is regarded as a new form with paler in

coloration and relatively larger measurements in the present study. According to the data in Fig. 2; the differences of the form described here with the subspecies *capaccinii* or *bureschi* are more than those between the subspecies *capaccinii* and *bureschi*. Similarly, Bilgin et al. (2008) analysed the mitochondrial and nuclear genetic structure of *M. capaccinii* in the Eurasian transition and they found the two mitochondrial clades and noted that taxonomically, these clades cannot be treated as separate species.

Table 1. Measurements taken from samples (1 ♂ + 6 ♀♀) of *Myotis capaccinii* obtained in the present study.

features	sample	mean	range	±Standart Deviation	Standart Error
Total lenght	5	90.90	80.0-104.0	10.26	4.59
Tail lenght	5	41.80	32.0-50.0	7.82	3.50
Hindfoot lenght	5	12.80	12.0-13.5	0.57	0.25
Ear lenght	5	13.54	13.0-14.0	0.46	0.20
Tragus lenght	2	7.75	7.5-8.0	0.35	0.25
Forearm lenght	7	42.33	41.5-43.0	0.58	0.22
Tibia lenght	4	17.43	17.0-18.0	0.51	0.25
Greatest lenght of skull	5	15.90	15.60-16.30	0.26	0.12
Condylbasal lenght	5	14.70	14.40-14.95	0.24	0.11
Mandible lenght	5	11.68	11.25-12.00	0.29	0.13
Mandible tooththrow lenght	5	6.27	6.20-6.30	0.04	0.02
Maxillar tooththrow lenght	5	5.85	5.70-5.95	0.11	0.05
Rostral breadth	5	3.92	3.65-4.15	0.21	0.09
Interorbital breadth	5	3.82	3.75-4.00	0.10	0.05
Zygomatic breadth	5	9.48	9.20-9.70	0.21	0.09
Mastoid breadth	5	8.26	8.00-8.50	0.18	0.08
Braincase breadth	5	7.96	7.70-8.15	0.18	0.08
Skull heigth	5	7.22	7.05-7.35	0.13	0.06
Weight (gr)	5	6.30	5.50-7.50	0.76	0.34

***Myotis capaccinii abidinbudaki* ssp. nov. Karataş**

Holotype: ♀ Ad. (ZDNU 1998/105; skin+skull).

Terra-typica: Konya: Beyşehir (centrum), Eşrefoğlu Bridge on Çarşamba Stream; 10.VIII.1998.

Paratypes: ♀ Ad. (ZDNU 1998/32; skin+skull) Hatay: Hassa, Demrek, Dipsiz Cave, 27.VII.1998, *leg.* A. Karataş; ♀ Ad. (ZDNU 1998/102), ♀ Ad. (ZDNU 1998/104; skin+skull), Konya: Beyşehir (centrum), 09-10.VIII.1998, *leg.* A. Karataş, E. Çolak, N. Yiğit; ♀ Ad. (ZDNU 1999/102; skin+skull), ♂ Ad. (ZDNU 1999/103; skin+skull), ♀ Ad. (ZDNU 1999/104; skin+skull), Mersin (İçel): Tarsus, Sayköy, Delikli

(Karadelik) Cave, 25.IX.1999, *leg.* A. Karataş (cf. Karataş et al., 2003).

Other Materials: Konya: Beyşehir (centrum), Eşrefoğlu Bridge, 09.VIII.1998: 2 Ad. ind. (Ankara Univ., Mammalogy Collection).

Diagnosis: It has relatively larger measurements than the nominate form; with a greatest lenght of skull of 15.90 (15.60-16.30) mm, mandiblar length of 11.68 (11.25-12.00) mm, mandiblar tooththrow length of 6.27 (6.20-6.30) mm, maxillary tooththrow length of 5.85 (5.70-5.95) mm. Other morphometric measurements are shown in Table 1 and Fig. 2. No differences in size are determined between sexes.

Description: Paler form. Hairs of fur are bicolor with dark base and pale brownish tip in dorsum and pale yellowish or creamy white in ventral. In general appearance of the adults, dorsal color is pale gray with lighter brownish in the middle; ventral color is gray off-white. In subadults, dorsal color is gray and ventral part is off-white or smoky white. It has larger sizes; with a forearm length of 42.3 (41.5-43.0) mm.

Derivatio nominis: The new subspecies is genitively named in honor of Emeritus Prof. Dr. Abidin Budak, celebrating his 75th birthday.

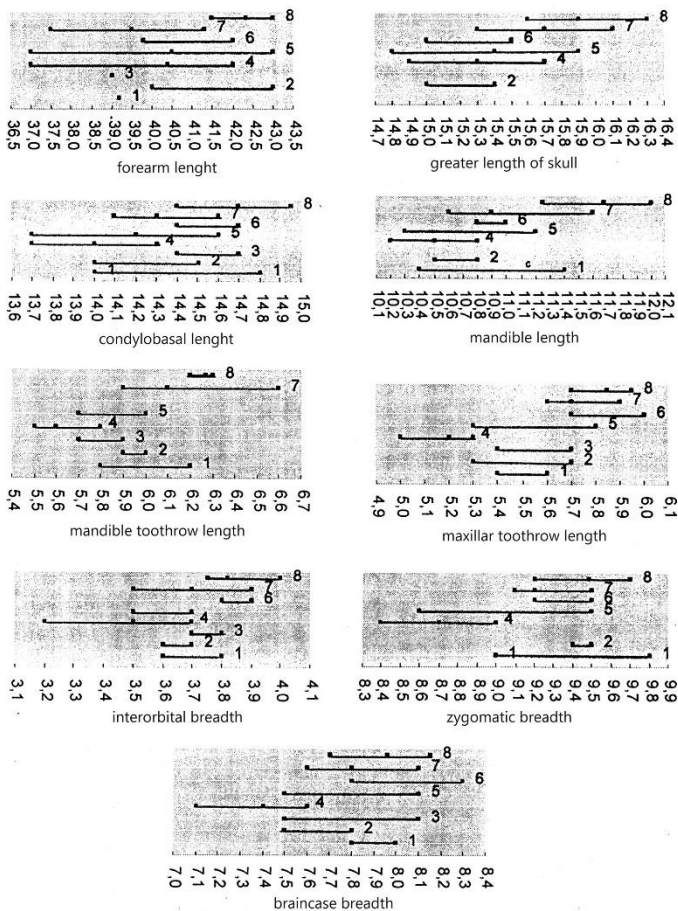


Fig. 2. Geographic variations in some morphometric features of *M. capaccinii*: 1. *capaccinii*: Europe, incl. holotype (Miller, 1912); 2. Algeria (Kowalski and Rzebiak-Kowalska, 1991); 3. *bureschi*: Bulgaria (Heinrich, 1936); 4. Arabian Peninsula (Harrison and Bates, 1991); 5. Iran (DeBlase, 1980); 6. ssp. ? : Hatay (Kahmann und Çağlar, 1960a); 7. *capaccinii*: Turkey (Albayrak, 1990a); 8. this study.

Eptesicus serotinus (Schreber, 1774)

Taxonomic remarks: Ellerman and Morrison-Scott (1966) accepted nine subspecies of *E. serotinus*. Although they also listed *Vespertilio isabellinus*

Temminck, 1840 (Terra-typica: Tripoli, Libya) as separate species; Harrison (1963) listed this form as a subspecies, *E. serotinus isabellinus*, in North Africa. Hayman and Hill (1971) reported North African population as *E. s. isabellinus*. Gaisler (1970) examined *E. serotinus* subspecies comparatively, describing a new subspecies *pashtonus* from Afghanistan. He also included Anatolia into range area of *E. s. serotinus*, without any details. Harrison and Bates (1991) and Koopman (1994) regarded Anatolian population as the nominate form. Similarly, Atallah (1978) and DeBlase (1980) included the Eastern Mediterranean Basin and the region from the Transcaucasus and Turkish-Iran-Iraqi border to the Kopet Mountains as *E. s. serotinus*, respectively. Additionally, DeBlase (1980) also mentioned the presence of the subspecies *shiraziensis* (Dobson, 1871) (Terra-typica: southwest of Shiraz, Iran) in the south of the Zagros Mountains of Iran. Corbet (1978) gave distribution of the nominate subspecies as Europe and to the Caucasus in the east; reporting other subspecies such as *shiraziensis* from southwest of Iran and *turcomanus* (Eversmann, 1840) (Terra-typica: between Caspian and Aral lakes) from Central Asia, *pachyomus* (Tomes, 1857) (Terra-typica: Rajputana, India) and *pashtonus* Gaisler, 1970 (Terra-typica: East of Afghanistan) in the east. However, Strelkov et al. (1978) wrote the nominate form in the west and middle parts and *turcomanus* in east part of the Kopet Mountains in Turkmenistan.

As Gaisler (1970) mentioned, since the coloration is important for identifying subspecies of *E. serotinus*; coloration and distribution are given comparatively below.

Eptesicus s. serotinus ranges in Europe, Mediterranean Basin, including Anatolia and the Levant. Dorsal color is dark brown or grayish-brown, sometimes light golden or shiny tip, ventral is lighter color; ears and wing membranes are black. Steiner and Gaisler (1994), obtained one sample from each Rize and Iran, reported that both of them did not have a dorsal color contrasting with dark hair base as in *E. anatolicus*, and, two individuals were not different

from *E. s. serotinus* of Central Europea in coloration and size. However, they also noted that the samples were insufficient to determine subspecies. Similarly, it is seemed to support this view with respect to measurements of Northern Anatolian samples given by Albayrak (1990b), did not indicate subspecies. Likewise, Spitzenberger (1994), investigated *Eptesicus* samples from Turkey in details, reported that Northeastern Anatolian samples were almost corresponded to *E. s. serotinus* from former Czechoslovakia and Bulgaria, and therefore, it may be presumed that the nominate form ranged in a relatively narrow area in north of Anatolia. According to Spitzenberger (*l.c.*), *E. s. serotinus* ranges from Europe throughout the Balkans and Karadeniz (Black Sea) Mountains to Transcaucasia, south of Caspian Sea and Kopet Mountains in Turkmenistan. The samples from Alanya are different from this subspecies with their larger size, fur color, black face mask, ears and membrane parts contrasting with lighter colored fur.

Eptesicus s. turcomanus is a subspecies in Mongolia, Central Asia, and northern parts of Afghanistan, Iran (whole Iran, if it is regarded as a synonym of *shiraziensis*) and Iraq. But Armenian form is close to the nominate form. Like eremial forms, dorsal color of *turcomanus* is pale brown or light sandy color, ventral color is off-white, and also ears, face and wing membranes are light brown or grayish-straw color, unlike black ones from South Anatolia. It is also smaller in size.

Eptesicus s. shiraziensis ranges in the southern regions of Iran. In coloration, it is almost identical with *turcomanus*. Therefore, according to Gaisler (1970), these two forms may be synonymous. However, the fact that type locality of *turcomanus* is not clear makes it difficult to obtain comparison material. Although our examples do not resemble in coloration, which confirms the opinion of Spitzenberger (1994); close to *shiraziensis* in measurements.

Table 2. Measurements taken from ♀♀ (left) and ♂♂ (right) *Eptesicus serotinus* samples [L: length, N: sample size, ±SD: standart deviation, SE: standart error].

features	N	mean	range	±SD	SE	N	mean	range	±SD	SE
Total L.	6	128.63	121.5-137.0	2.26	5.53	4	120.98	120.5-123.0	1.51	0.75
Tail L.	6	56.01	47.5-60.15	1.85	4.53	4	56.73	51.2-64.6	2.82	5.65
Hindfoot L.	5	11.24	10.0-12.0	0.34	0.75	3	11.83	10.9-13.0	0.62	1.07
Ear L.	5	19.44	19.15-19.8	0.13	0.29	3	18.95	18.6-19.35	0.22	0.38
Tragus L.	5	8.41	7.4-9.1	0.29	0.64	3	8.67	8.4-8.8	0.13	0.23
Forearm L.	5	55.62	53.4-56.8	0.66	1.48	3	51.37	48.9-52.8	1.24	2.15
Tibia L.	5	24.10	23.3-25.4	0.38	0.85	1	—	22.4	—	—
Thumb L.	5	9.17	7.6-10.1	0.43	0.95	3	8.67	8.2-9.1	0.26	0.45
Greatest L. of skull	3	22.00	21.30-22.90	0.47	0.82	2	21.13	20.80-21.45	0.33	0.46
Condylbasal L.	3	20.25	19.70-20.85	0.33	0.58	2	19.89	19.28-20.50	0.61	0.86
Mandible L.	3	16.47	16.30-16.65	0.10	0.18	2	15.48	15.00-15.95	0.48	0.67
Mandible tooththrow L.	3	9.20	8.95-9.50	0.16	0.28	2	8.78	8.50-9.05	0.28	0.39
Maxillary tooththrow L.	3	8.15	7.95-8.50	0.18	0.30	2	7.73	7.60-7.85	0.13	0.18
Rostral breadth	3	6.57	6.20-6.80	0.19	0.32	2	6.40	6.20-6.60	0.20	0.28
Interorbital breadth	3	4.34	4.27-4.45	0.06	0.10	2	4.20	4.05-4.35	0.15	0.21
Zygomatic breadth	2	15.00	14.65-15.35	0.35	0.49	2	13.30	12.90-13.70	0.40	0.57
Mastoid breadth	3	11.49	10.95-12.32	0.42	0.73	2	10.68	10.55-10.80	0.13	0.18
Braincase breadth	3	9.75	9.60-9.85	0.08	0.13	2	9.30	9.25-9.40	0.11	0.08
Skull height	2	8.83	8.60-9.05	0.23	0.32	2	8.20	8.10-8.30	0.10	0.14
Weight (gr)	6	18.42	15.00-21.00	1.19	2.91	4	17.33	14.32-20.00	1.55	3.10

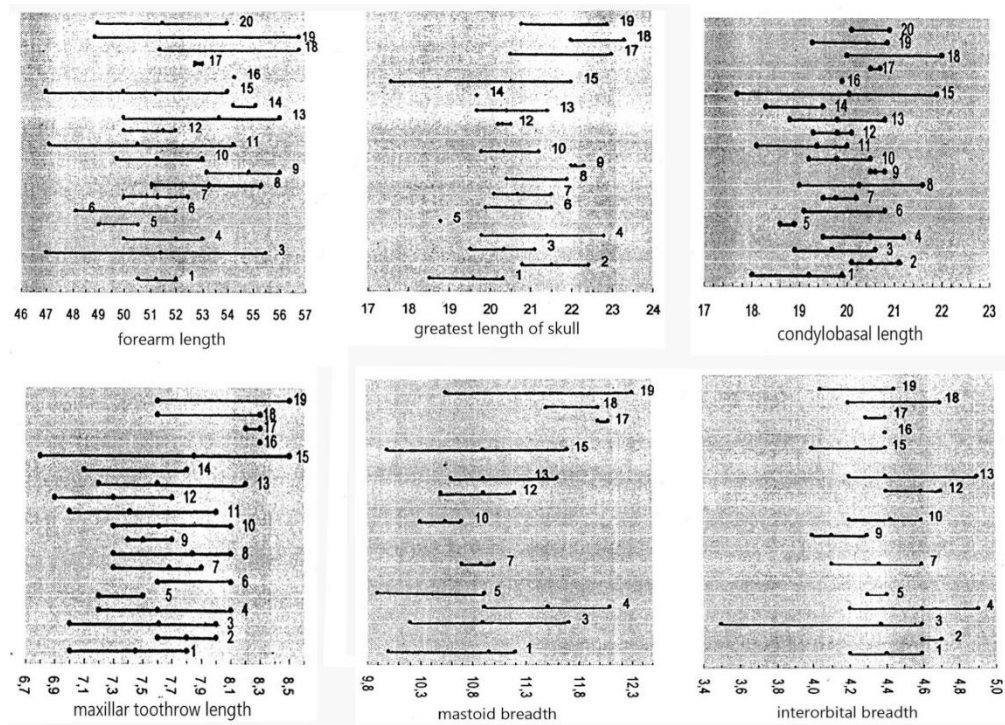


Fig. 3. Geographic variations in some morphometric features of *E. serotinus*: 1. *isabellinus*: Libya+Tunisia (Hanák and Elgadi, 1984); 2. *serotinus*: Sicily (Kock, 1969), 3. Former Czechoslovakia+Bulgaria (Gaisler, 1970), 4. central, south and east Europe (Felten, 1971), 5. Gilan (Iran) and Rize (Turkey) (Steiner and Gaisler, 1994); 6. Turkey (east) (Albayrak, 1990b), 7. Caucasus (Gaisler, 1970), 8. former USSR (Ognev, 1928), 9. Israel+Lebanon (Harrison and Bates, 1991); 10. *turcomanus*: Turkistan (Gaisler, 1970), 11. Turkistan (Ognev, 1928); 12. *pashtonus*: east of Afghanistan (Felten, 1971), 13. *ibid.* (Gaisler, 1970); 14. *pachyomus*: north-west of Indian Peninsula (Bates and Harrison, 1997); 15. *shiraziensis*: Iran (Gaisler, 1970); 16. cf. *serotinus*: Cyprus (Spitzenberger, 1979); 17. ssp. ? : Turkey (west) (Albayrak, 1993), 18. South Anatolia (Spitzenberger, 1994), 19. this study; 20. Anatolia (Helvesen, 1989).

Eptesicus s. intermedius Ognev, 1927 (*Terra-typica*: Vladikavkaz, North Ossetia) is an intermediate form between *serotinus* and *turcomanus* in coloration. It is relatively much closer to *serotinus*. For this reason, Gaisler (1970) accepted *intermedius* as a synonym of *serotinus*.

Eptesicus s. isabellinus, population in North Africa, resembles to *turcomanus* in coloration. It was much smaller than ones from Alanya (cf. Hanák and Elgadi, 1984; Kowalski and Rzebiak-Kowalska, 1991). It was recently raised into species level again (Juste et al., 2013).

Eptesicus s. pachyomus is located in north of India, Kashmir and neighboring regions of Afghanistan and Pakistan. Dorsal side of the holotype is medium brown, base of hair is dark brown, gradually lightening to the tip. The hair tips are pale grayish-brown or silvery except for head fur. Ventral color is buffy-brown, with pale brown tips. The

membranes are brown (sometimes blackish). But this form is smaller than samples from Alanya.

Eptesicus s. pashtonus, from east of Afghanistan, has a grayish dorsal and grayish-white or yellowish-white ventral color (*sensu* Gaisler, 1970). This form is not similar to Alanya samples in both the zoogeographical and morphological respects. Additionally, Juste et al. (2013) did not accept it as a subspecies.

Another subspecies is *E. s. boscai* (Cabrera, 1904) described from Spain. It ranges in southern Iberia and Morocco. The taxon *meridionalis* Dal Diaz, 1926 is its synonym after Principle of Priority. It has an intermediate color between *serotinus* and *isabellinus*. It presents some other subspecies such as *pallens* Miller, 1911 in northern China and Korea; *andersoni* (Dobson, 1871) in southern China and sometimes *brachydigitus* Mori, 1928 from China is also regarded as subspecies.

Spitzenberger (1994) reported that South Anatolian samples were closer to *shiraziensis* in size and *turcomanus* in coloration and also they were different from other subspecies, with their larger size and black ears, membranes, face mask. However, she avoided to describe a new subspecies; since scarcity comparative material. On the other hand, Benda and Horáček (1998) noted that Turkish populations may represent a transition zone between *serotinus* in the north and *shiraziensis* in the south.

Recently, Juste et al. (2013) analysed genetically of the populations of *E. serotinus* and they reported *serotinus* in Europe, northern side of Turkey and the Caucasus, *boscai* in South Iberia and Morocco, *isabellinus* in North Africa, *mirza* in east of Turkey and northwest of Iran, *turcomanus* in Turkistan (Central Asia), *pachyomus* in Afghanistan and Pakistan, *pallens* in north of China and Korea and *andersoni* in south of China, showing southern parts of Turkey with question marks on the map.

The differences, mentioned the above, between Alanya samples and other populations of *E. serotinus* are similar to results of Spitzenberger (1994). Therefore, her idea is further improved and Southern Anatolian population is accepted as a new subspecies here.

***Eptesicus serotinus anatolicus* ssp. nov. Karataş**

Holotype: ♀ Ad. (ZDNU 1998/07; skin+skull), *leg.* A. Karataş.

Terra-typica: Antalya: Alanya, Çakallar, Alarahani (caravanserai); 08.VII.1998.

Paratypes: ♂ Ad. (ZDNU 1998/06; skin+skull), ♀ Ad. (ZDNU 1998/08; skin+skull), ♂ Ad. (ZDNU 1998/09; skin+skull), ♀ Ad. (ZDNU 1998/10; skin+skull), ♀ Ad. (ZDNU 1998/14; skin+skull), ♀ Ad. (ZDNU 1998/15; skin+skull), ♂ Ad. (ZDNU 1998/17; skin+skull), ♀ Ad. (ZDNU 1998/18; skin+skull), ♂ Ad. (ZDNU 1998/19; skin+skull), Antalya: Alanya, Çakallar, Alarahani, 08.VII.1998, *leg.* A. Karataş, Ay. Karataş, B. Özgünlü, S. Özgünlü, Y. Aydın, M. Çetin.

Diagnosis: It is similar to shorter and scarcer furred *Eptesicus anatolicus*, smaller in all external measurements, with respect to coloration and it has relatively a brighter brown dorsum and a darker ventral. There is a sexual dimorphism in size and females generally have larger dimensions (Table 2). It has relatively larger cranial and external measurements than other subspecies of *E. serotinus*, similar in coloration (Fig. 3). Also it is darker than *shiraziensis*, close in size.

Description: The dorsal of the adults is bright brown or chestnut color, ventral side is dirty yellowish-brown. Dorsal hairs are tricolor in brown tones; with a brown base, a darker middle and a light brownish short tip. The ears, the bare parts of the face and the plagiopatagium are blackish and these dark parts contrasts with brown fur. A dark brown hairy gular spot usually presents. Forearm is maximally 46.8 mm, greatest length of skull is 23.3 mm, condylobasal length is 22.0 mm, zygomatic breadth is 15.5 mm, mandiblar toothrow is 9.5 mm, and mastoid breadth is 12.32 mm (Fig. 3, Table 2). Wingspan of an adult female was measured as 390 mm.

Derivatio nominis: The new subspecies is genatively named after its type locality (South Anatolia).

***Eptesicus anatolicus* Felten, 1971**

Mersin (İçel): Silifke, Boğsak (old chapel), 24.IX.1999: 1 Ad. ♀ (ZDNU 1999/95).

***Pipistrellus pipistrellus* (Schreber, 1774)**

Adana: Aladağ, Meydan High Plateau, 21.VIII.1999: 1 Ad. ♀ (ZDNU 1999/55), Feke (centrum), 24.VIII.1999: 1 Ad. ♀, 3 juv. (ZDNU 1999/61-64), Karaisalı, Başkır, 20.VIII.1999: 2 ind. (obs.), Kızıldağ High Plateau (Ca. 1600 m), 18.VIII.1999: 1 juv. (ZDNU 1999/47), Saimbeyli (centrum), 24.VIII.1999: 3 Ad. ♀ (ZDNU 1999/69-71); **Hatay:** Belen, Sarımazı, Aug 1998: 1 ind. (obs.), İskenderun, Payas, Sokullu Building Complex, 24.VII.1998: 1 Ad. ♀ (ZDNU 1998/30); **Konya:** Beyşehir (centrum), Directorate of Highways, 30.VII.1998: 1 Ad. ♀

(ZDNU 1999/11), Beyşehir: Yeşildağ, 11.VIII.1998: 2 Ad. ♀, 1 Sad. ♀ (ZDNU 1998/108-110), Hadim, S.U. Hadim Vocational High School, 16.IX.1999: 3 Ad. ♀ (ZDNU 1999/78-80); **Niğde** (centrum), 1996: 1 Ad ♀? (ZDNU 1996/55).

***Pipistrellus kuhlii* (Kuhl, 1817)**

Adana (Seyhan): Alparslan Türkeş Avenue, 19.VIII.1999: 2 ind. (obs.), İmamoğlu (centrum), 22.VIII.1999: 1 ind. (ZDNU 1999/57), Koyunevi, 21.VIII.1999: 1 juv. (ZDNU 1999/56), Karaisalı (centrum), teacher's lodge, 19.VIII.1999: 1 Ad. ♂ (ZDNU 1999/52), Başkif, 20.VIII.1999: 2 Ad. ♀ (ZDNU 1999/48-49), Çocuklar, 19.VIII.1999: 2 Ad. ♀ (ZDNU 1999/50-51), Kozan, Cumhuriyet Quarter, 22.VIII.1999: 3 Ad. ♀ (ZDNU 1999/58-60); **Antalya**: Alanya, Avsallar (İncekum), 31.VII.1999: 1 Ad. ♂, 1 Ad. ♀, 1 Sad ♂ (ZDNU 1999/12-14); **Hatay**: Alahan (castle), 26.VII.1998: 3 Ad. ♂, 9 Ad. ♀ (ZDNU 1998/85-92, 95-97, 99), Hassa, Söğüt, 27.VII.1998: 1 Ad. ♂, 2 Ad. ♀, 1 Sad ♀ (ZDNU 1998/64, 93-94, 98); **Mersin (İçel)**: Mut, Kadıköyü, bridge on Göksu River, 23.IX.1999: 1 Ad. ♂ (ZDNU 1999/91), Silifke, Tekir Ambarı (south of Silifke Castle), 24.IX.1999: 2 Ad. ♀ (ZDNU 1999/93-94), Tarsus Teacher's Lodge, 25.IX.1999: 1 Ad. ♂, 2 Ad. ♀ (ZDNU 1999/96-98); **Osmaniye**: Bahçe, Yeni Quarter, 27.VIII.1999: 2 Ad. ♀ (ZDNU 1999/73-74).

***Plecotus macrobullaris* Kuzjakin, 1965**

Hatay: Belen, Ötençay, Bakras Castle, 22.VII.1998: 1 Ad. ♂ (ZDNU 1998/23); **Niğde**: Gümüşler, Gümüşler Monastery, 20.VII.1996: 1 Ad. ♂, 2 Ad. ♀ (ZDNU 1996/42-44).

***Plecotus kolombatovici* Đulić, 1980**

Karaman: Ermenek, Üçbölük Village, Dipsiz İn (cave), 17.IX.1999: 3 Sad ♀ (ZDNU 1999/85-87) (cf. Juste et al., 2004).

4. Family: Miniopteridae

***Miniopterus schreibersii* (Kuhl, 1817)**

Mersin (İçel): 8 km North of Anamur, Buğu Cave (Öğü Deliği), 23.X.1999: 1 Ad. ♂ (ZDNU 1999/107), Tarsus, Sayköy, Delikli (Karadelik) Cave, 25.IX.1999: 1 Ad. ♂

(ZDNU 1999/101); **Niğde**: Gümüşler, Epçik Cave, 12.VIII.1999: 1 Ad. ♀, 1 Sad ♂, 1 Sad ♀ (ZDNU 1999/28-30) (cf. Karataş & Sözen, 2004).

5. Family: Molossidae

***Tadarida teniotis* (Rafinesque, 1814)**

Konya: Derebucak, Çamlık, 1994 summer: 1 Ad. ♂ (ZDNU 1994/01).

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