KSÜ Tarım ve Doğa Derg 26 (2), 254-262, 2023
KSU J. Agric Nat 26 (2), 254-262, 2023
https://doi.org/10.18016/ksutarimdoga.vi.1004775

New Data on the Bat Fauna (Mammalia: Chiroptera) from the Eastern Anatolia (Bitlis, Turkey)

Kubilay TOYRAN[1] ✉, Ferit GENCER[2]
[1]Çankırı Karatekin University, Eldivan Vocational School of Health Services, Turkey, Çankırı, [2]Bitlis Eren University, Graduate Education Institute, Department of Biology, Bitlis, Türkiye
[1]https://orcid.org/ 0000-0002-6546-0054, [2]https://orcid.org/ 0000-0003-2557-9840
✉: kubilaytoyran@karatekin.edu.tr

ABSTRACT

This study was conducted between July 2014 and September 2019 in Bitlis province. The bats were caught with sweep net, special bat nets, gloves and flashlight by searching in the places such as caves, dens, empty buildings, historical inns and hammams, churches, tombs and garrets. Some bioecological and habitat characteristics, fur color, number of samples and record locations of the species were presented. As a result, *Rhinolophus hipposideros* belonging to the family Rhinolophidae of the suborder Microchiroptera and *Myotis myotis*, *M. blythii*, *M. mystacinus*, *M. capaccinii*, *Pipistrellus kuhlii*, *Eptesicus serotinus*, *Vespertilio murinus*, and *Plecotus macrobullaris* belonging to the family Vespertilionidae of the suborder Microchiroptera were determined. *Rhinolophus hipposideros*, *Myotis myotis*, *Pipistrellus kuhlii*, *Eptesicus serotinus*, *Vespertilio murinus* and *Plecotus macrobullaris* from the species were firstly recorded in Bitlis province.

Biology

Research Article

Article History
Received : 05.10.2021
Accepted : 04.01.2022

Keywords
Bat
Chiroptera
Distribution
Bitlis
Turkey

Doğu Anadolu Bölgesi'nden (Bitlis, Türkiye) Yarasa Faunası Üzerine Yeni Veriler (Mammalia: Chiroptera)

ÖZET

Bu çalışma Temmuz 2014 ve Eylül 2019 tarihleri arasında Bitlis İl sınırları içeresinde gerçekleştirilmiştir. Yarasalar atrap, özel yarasa ağları, eldiven ve el feneri yardımı ile mağara, in, boş bina, tarihi han ve hamam, kilise, türbe, binaların çatı araları ve benzeri yerlerde araştırılarak yakalanmıştır. Türlerle ilgili bazı biyoekolojik özellikleri, habitat özellikleri, kürk rengi, örnek sayıları ve kayıt yerleri verilmiştir. Sonuç olarak Microchiroptera alt takımının Rhinolophidae familyasına mensup *Rhinolophus hipposideros* ve Vespertilionidae familyasına mensup *Myotis myotis*, *M. blythii*, *M. mystacinus*, *M. capaccinii*, *Pipistrellus kuhlii*, *Eptesicus serotinus*, *Vespertilio murinus* ve *Plecotus macrobullaris* türleri tespit edilmiştir. Türlerden *Rhinolophus hipposideros*, *Myotis myotis*, *Pipistrellus kuhlii*, *Eptesicus serotinus*, *Vespertilio murinus* ve *Plecotus macrobullaris* bu çalışma ile Bitlis ilinden ilk defa kaydedilmiştir.

Biyoloji

Araştırma Makalesi

Makale Tarihçesi
Geliş Tarihi : 05.10.2022
Kabul Tarihi : 04.01.2022

Anahtar Kelimeler
Yarasa
Chiroptera
Yayılış
Bitlis
Türkiye

Atıf Şekli: Toyran, K., & Gencer, F (2023). Doğu Anadolu Bölgesi'nden (Bitlis, Türkiye) yarasa faunası üzerine yeni veriler (Mammalia: Chiroptera). *KSÜ Tarım ve Doğa Derg 26*(2), 254-262. https://doi.org/10.18016/ksutarimdoga.vi.1004775

To Cite : Toyran, K., & Gencer, F (2023). New data on the bat fauna (Mammalia: Chiroptera) from the Eastern Anatolia (Bitlis, Turkey). *KSÜ Tarım ve Doğa Derg 26* (2), 254-262. https://doi.org/10.18016/ksutarimdoga.vi.1004775

INTRODUCTION

Chiroptera, which is the only order with real flying characteristics in the class mammalia, is represented with 1116 species in the world (Wilson & Reeder, 2005). The order Chiroptera is divided into two suborders: Megachiroptera and Microchiroptera. There are 186 species of Megachiroptera included in one family (Pteropodidae) and there are 930 species of Microchiroptera in 17 families (Albayrak, 2000; Wilson & Reeder, 2005). In Turkey, there are a total of 39 bat species including one species included in the suborder Megachiroptera of the order Chiroptera and 38 species included in the suborder Microchiroptera of the order Chiroptera (Yorulmaz & Arslan, 2020).

The aim of this study was to determine the bat species distributing in Bitlis province of the Eastern Anatolia Region and record some bioecological characteristics about these species.

MATERIAL and METHODS

This study was conducted between 2014 and 2019 in Bitlis province, and the identified species are shown by numbering on the map (Figure 1). Field studies were conducted in the city center, districts and villages which were included in the field area. A total of 22 bat samples of 9 species were examined in this study. Caves, empty buildings, historical inns and hammams, churches, tombs, roofs of buildings and window frames were examined to obtain bat samples. The determined samples were caught with sweep net, special bat net, flashlight, and gloves. The bats, which were examined considering the populations of the determined species, were released into their natural habitat.

Some ecological and biological characteristics of the species were specified and their photos with record locations and the number of samples were presented. The obtained data were compared with the relevant literature data and the assessments were presented in tables.

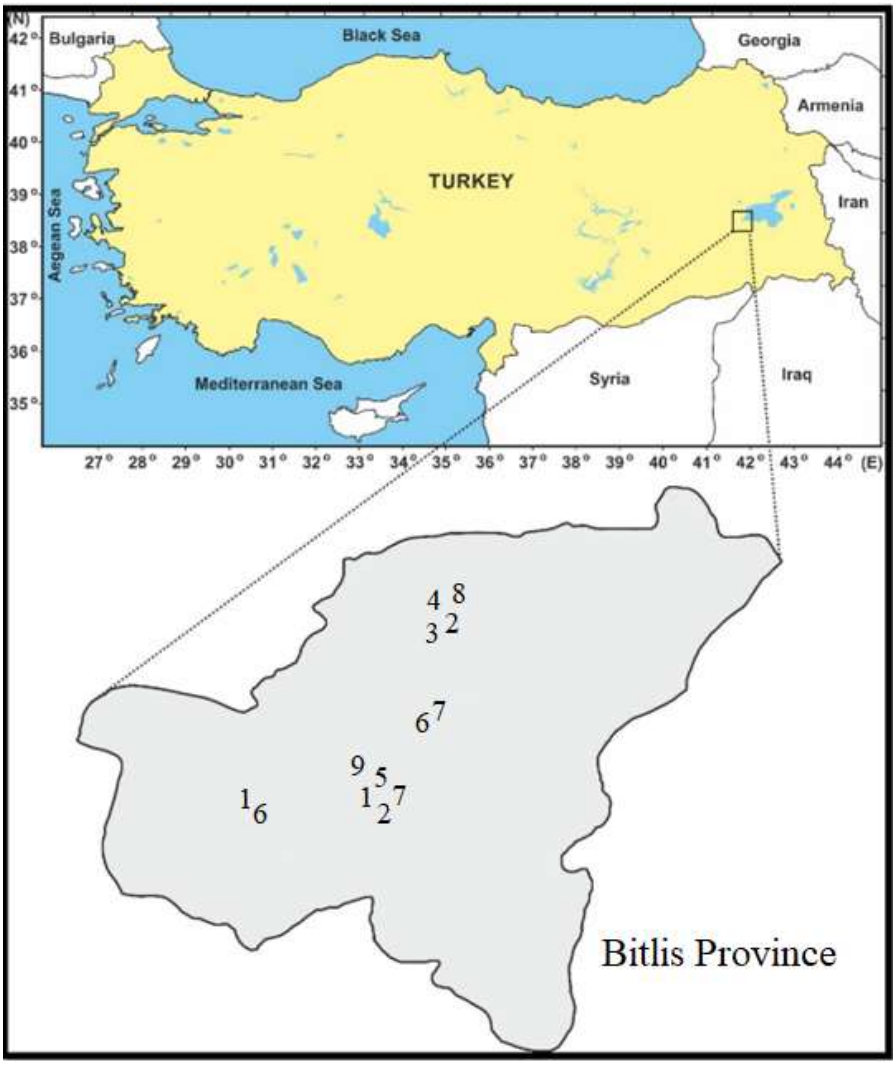

Figure 1. Map of Bitlis province, study area (Distribution of species 1: *Rhinolophus hipposideros*, 2: *Myotis myotis,* 3: *M. blythii*, 4: *M. mystacinus*, 5: *M. capaccinii*, 6: *Pipistrellus kuhlii*, 7: *Eptesicus serotinus*, 8: *Vespertilio murinus*, 9: *Plecotus macrobullaris*).

Şekil 1. Çalışmanın yapıldığı Bitlis il haritası (Türlerin yayılışı 1: *Rhinolophus hipposideros,* 2: *Myotis myotis,* 3: *M. blythii,* 4: *M. mystacinus,* 5: *M. capaccinii,* 6: *Pipistrellus kuhlii,* 7: *Eptesicus serotinus,* 8: *Vespertilio murinus,* 9: *Plecotus macrobullaris).*

RESULTS and DISCUSSION

In Bitlis province, 9 species of 6 genera belonging to the families Rhinolophidae and Vespertilionidae of the suborder Microchiroptera of the order Chiroptera were determined. 6 of these species were firstly recorded in Bitlis province.

One species of the family Rhinolophidae was found in the study area.

Rhinolophus hipposideros (Bechstein, 1800)

1800. *Vespertilio hipposideros* Bechstein, Thomas Pennat's Allgemeine Uebers. Thiere, 2: 629.

Type locality: France

1857. *Rhinolophus hipposideros*, Blasius, Saugeth., Deutschland, 29.

Ecological characteristics: *Rhinolophus hipposideros* was found in Bitlis province solitarily or in pairs in the buildings such as tombs, churches, monasteries, hospital buildings and barns (Figure 2, Figure 3).

Fur color: The dorsal part varied from light brown gray to slightly reddish dark brown gray. The ventral part was smoky gray from the lower part of jaw to tail. In the dorsal, the hair's bottom and middle parts were yellowish gray and its end part was brown. In the ventral, hair's bottom, middle, and end parts were smoky gray. The nasal tip, ears and wing membrane were dark brown.

Sample number (4) and locations: Bitlis, Headquarters, Yükseliş neighborhood, Şeyh Hasan Tomb (2 ♂♂, 03.06.2017); Bitlis, Mutki, Mutki State Hospital (1 ♀, 15.06.2017); Bitlis, Headquarters, Cumhuriyet village (1 ♀, 24.09.2017).

Figure 2. An abandoned barn in which *Rhinolophus hipposideros* was determined.
Şekil 2. *Rhinolophus hipposideros*'un tespit edildiği terkedilmiş bir ahır.

Figure 3. Sample of *Rhinolophus hipposideros*.
Şekil 3. *Rhinolophus hipposideros* örneği.

In the study area, 8 species belonging to the genera *Myotis*, *Pipistrellus*, *Eptesicus*, *Vespertilio* and *Plecotus* of the family Vespertilionidae were identified.

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.

Ecological characteristics: *Myotis myotis* was found solitarily or in colonies in the historical inns, hammams, and ceilings of the natural caves in stream beds in Bitlis province (Figure 4, Figure 5). It was observed that the individuals determined in the first week of August exhibiting mating behavior.

Fur color: The dorsal part was slightly pale brownish gray from neck to tail. The ventral part was yellowish off white from the lower part of jaw to tail. In the dorsal part, the hair's bottom was blackish dark brown and its middle and end parts were brownish gray. In the ventral part, the hair's bottom was black and its middle and end parts were yellowish white.

Sample number (4) and locations: Bitlis, Headquarters, Kamah location (1 ♂, 03.06.2017; 2 ♂♂, 24.09.2017); Bitlis, Ahlat, Kınalıkoç village, Dere havzası (Soğaz) location (1 ♂, 05.08.2017).

Figure 4. The stream bed where *Myotis myotis* was determined.
Şekil 4. *Myotis myotis*'in tespit edildiği mağaranın bulunduğu dere yatağı.

Myotis blythii (Tomes, 1857)

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

Type locality: Nasirabad, Rajputana, India

1951. *Myotis blythii* Ellerman and Morrison-Scott, Checklist of Palaearctic and Indian Mammals 1758-1946. Brit. Mus. (Nat.Hist.) 144-145.

Ecological characteristics: *Myotis blythii* was found solitarily or in colonies in the historical inns,

hammams, and ceilings of the natural caves in stream bed in Bitlis province (Figure 6, Figure 7). It was observed that the individuals determined in the first week of August exhibited mating behavior.

Figure 5. *Myotis myotis* individuals found in the ceiling of a cave.
Şekil 5. Mağara tavanında tespit edilen *Myotis myotis* bireyleri.

Fur color: The dorsal part was slightly yellowish pale brown. The ventral part was grayish off white. In the dorsal, the hair's bottom was ash gray and its middle and end parts were pale grayish brown. In the ventral part, the hair's bottom was pale black and its middle and end parts were off white.

Sample number (5) and locations: Bitlis, Ahlat, Kınalıkoç village, Dere havzası (Soğaz) location (2 ♂♂, 23.06.2015; 2 ♂♂, 1 ♀, 05.08.2017).

Figure 6. The stream bed where *Myotis blythii* was determined.
Şekil 6. *Myotis blythii*'nin tespit edildiği mağaranın bulunduğu dere yatağı.

Figure 7. Sample of *Myotis blythii.*
Şekil 7. *Myotis blythii* örneği.

Myotis mystacinus (Kuhl, 1819)

1819. *Vespertilio mystacinus* Kuhl, Ann. Wetterau Ges. Naturk., 4 (2), 202-204.

Type locality: Germany

1900. *Myotis mystacinus*, Mehely monogr. Chiropt. Hungariae, Budapest, 200-206.

Ecological characteristics: *Myotis mystacinus* was found solitarily in a building in Ahlat district of Bitlis province (Figure 8).

Fur color: The dorsal part was slightly yellowish gray brown. The ventral part was yellowish off white. In the dorsal part, the hair's bottom was nigricant dark brown. In the ventral, the hair's bottom was blackish brown and hair's end was smoky gray.

Sample number (1) and locations: Bitlis, Ahlat headquarters (1 ♀, 03.07.2015).

Myotis capaccinii (Bonaparte, 1837)

1837. *Vespertilio cappaccinii* Bonaparte, Faun. Ital., 1 (20)

Type locality: Sicily

1901. *Myotis cappaccinii* Thomas, Proc. Zool. Soc., London, 37.

Ecological characteristics: *Myotis capaccinii* was found in an empty cottage made of briquettes located in the campus area of Bitlis Eren University (Figure 9).

Fur color: The dorsal part was yellowish light brownish pale gray. The ventral part was yellowish smoky gray.

Sample number (1) and locations: Bitlis, Headquarters, Bitlis Eren University (1♂, 03.09.2019).

Pipistrellus kuhlii (Kuhl, 1819)

1819. *Vespertilio kuhlii* Kuhl Ann. Wetterau. Ges. Naturk., 4 (2), 199-202.

Type locality: Trieste, Italy

1900. *Pipistrellus kuhlii* Mehelyi, Monogr. Chiropt. Hungariae, Budapest, 261.

Ecological characteristics: *Pipistrellus kuhlii* was found in the walls or roofs or under roofing in some empty buildings in the settlements of Bitlis province

(Figure 10, Figure 11).

Fur color: The dorsal part is pale yellowish grayish brown. The ventral part was yellowish off white. In the dorsal part, the hair's bottom was black and its end was light brown. Hair's bottom was pale black and the hair's end was yellowish white in the ventral part.

Sample number (3) and locations: Bitlis, Ahlat, Ahlat Vocational High School (1♂, 16.11.2015); Bitlis, Tatvan, Karşıya neighborhood (1♀, 17.05.2017); Bitlis, Tatvan, Saray neighborhood (1♂, 05.08.2017).

Figure 8. The dorsal (a) and ventral (b) views of *Myotis mystacinus*.
Şekil 8. *Myotis mystacinus*'un dorsalden (a) ve ventralden (b) görünümü.

Figure 9. *Myotis capaccinii.*
Şekil 9. *Myotis cappaccinii.*

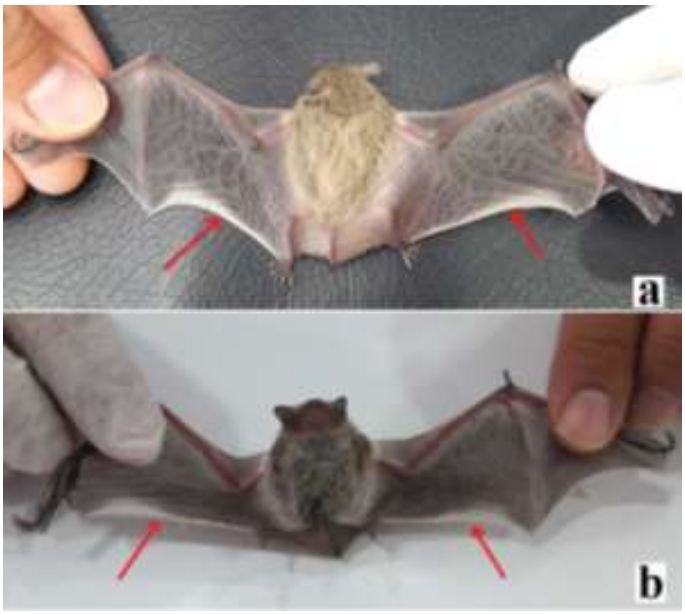

Figure 10. The dorsal (a) and ventral (b) views of *Pipistrellus kuhlii*.
Şekil 10. *Pipistrellus kuhlii*'nin dorsalden (a) ve ventralden (b) görünümü.

Figure 11. The garret where *Pipistrellus kuhlii* was determined.

Şekil 11. *Pipistrellus kuhlii*'nin tespit edildiği çatı arası.

Eptesicus serotinus (Schreber, 1774)

1774. *Eptesicus serotinus* Schreber, Die Saugethiere, 1: 167.

Type locality: France

Ecological characteristics: *Eptesicus serotinus* was found solitarily in the chimney of a building in Tatvan district of Bitlis province and in a toilet in the Engineering and Architecture Faculty of Bitlis Eren University (Figure 12).

Fur color: The dorsal part was dark brown from nasal tip to tail. The ventral part was dark yellowish brown from the lower part of jaw to tail. In the dorsal, hair's bottom, middle and end parts were dark brown. In the ventral part, the hair's bottom was smoky gray and its end part was yellowish brown. The nasal tip, ears, wing and tail membrane were blackish dark brown.

Sample number (2) and locations: Bitlis, Tatvan, Saray neighborhood (1♂, 27.06.2016); Bitlis, Headquarters, Bitlis Eren University (1♂, 12.07.2018).

Figure 12. The dorsal (a) and ventral views of (b) *Eptesicus serotinus*.

Şekil 12. *Eptesicus serotinus*'un dorsal görünümü (a), ventral görünümü (b).

Vespertilio murinus Linnaeus, 1758

1758. *Vespertilio murinus* Linnaeus, Syst. Nat. 10th ed., 1: 32.

Type locality: Upsala, Sweden

Ecological characteristics: *Vespertilio murinus* was found solitarily in the wall of a mosque in Ahlat district of Bitlis province (Figure 13).

Fur color: Ear and nasal tip were pale black. The dorsal part was light, partly fallow, grizzled pale brown until tail and the neck was darker. The ventral part was light, dark and then light brownish light fallow from the lower part of jaw to tail. The hypogastric abdomen end was fully off white. In the dorsal part, hair's bottom was blackish dark brown, its middle part was brown, and its end and almost end parts were broken fallow. In the ventral part, hair's bottom was nigricant dark brown and its middle and end parts were light fallow in the neck and abdomen parts. In the abdomen end, hair was fully off white.

Sample number (1) and locations: Bitlis, Ahlat, Central Grand Mosque (1♂, 05.08.2016).

Plecotus macrobullaris (Kuzjakin, 1965)

1965. *Plecotus macrobullaris* Kuzjakin, Opredelitel mljekopitayushtshikh SSSR. Moskva. 79-116.

Type locality: North Ossetia, Russia

Ecological characteristics: *Plecotus macrobullaris* was found solitarily in the wall of a dark room of an abandoned railroad terminal building located in Rahva plain of Bitlis province (Figure 14, Figure 15).

Fur color: The dorsal part was grayish light brown. The ventral part was yellowish white. The dorsal part was black from hair bottom to its middle part and grayish light brown from its middle part to its end part. The ventral part was black from hair's bottom to the middle part and yellowish white from hair's middle part to its bottom. Ears, wing and tail membrane were light brown.

Sample number (1) and locations: Bitlis, Headquarters, Rahva plain (1♂, 24.09.2017).

Figure 13. The dorsal (a) and ventral views of (b) *Vespertilio murinus*.
Şekil 13. *Vespertilio murinus*'un dorsal görünümü (a), ventral görünümü (b).

Figure 14. The old railroad terminal building where *Plecotus macrobullaris* was determined.
Şekil 14. *Plecotus macrobullaris*'in tespit edildiği eski gar binası.

Figure 15. Sample of *Plecotus macrobullaris*.
Şekil 15. *Plecotus macrobullaris* örneği.

Bats, which are nocturnal species, have crucial roles in wildlife. They are reservoir hosts for many diseases. It is known that many bat species carry rabies virus (Ün et al., 2013). Insectivorous bat species keep insect

populations at a certain level and the species fed with fruits contribute to pollination and spreading of plants (Albayrak, 2000; Anonymous, 2018; Yorulmaz et al., 2018).

Sheltering characteristics vary among bat species and they use caves, rock cracks, tree holes, roofs of buildings and abandoned old inns, hammams and caravansaries as roosts (Vaughan et al., 2000; Toyran, 2013). *Myotis myotis* and *M. blythii*, which are among the identified species, have been found to inhabit sympatrically in the caves in the valley beds with streams. Also, it was observed that these species exhibited mating behavior at the beginning of August. In addition, lipoidosis was determined in the bodies of *Myotis myotis* samples identified at the end of September for winter sleep.

Toyran (2013) stated that the studies performed to open caves to tourism and the restoration works of old historical buildings have affected bat species negatively. The researcher observed a bat density including about 2500-3000 individuals in El-Aman Inn in the field study conducted in 2007. But, it was recorded that all the bats left the inn when the restoration works were completed in 2009. During this study, no bats were found in El-Aman Inn. But very little amount of bat dropping was found in some parts of the inn. In addition, it was observed that the buildings such as old churches and monasteries, which had a high number in the region, in which bats inhabited, were damaged by treasure hunters.

CONCLUSIONS

There are 6 families belonging to the order Chiroptera in Turkey. In addition, several studies have reported that the number of species is 36 and 40 in Turkey (Benda & Horáček, 1998; Wilson & Reeder 2005). Yorulmaz & Aslan (2020) assessed the records of the bat species in Turkey and recorded the number of species as 39.

The records of *Myotis blythii*, *M. mystacinus*, *M. capaccinii* and *Pipistrellus nathusii* species were provided before Bitlis province (Albayrak, 1990; Albayrak, 1991; Benda & Horáček, 1998; Karataş et al., 2003; Yorulmaz et al., 2020). In this study, 9 species from Bitlis province (*Rhinolophus hipposideros*, *Myotis myotis*, *M. blythii*, *M. mystacinus*, *M. capaccinii*, *Pipistrellus kuhlii*, *Eptesicus serotinus*, *Vespertilio murinus* and *Plecotus macrobullaris*) were determined. *Rhinolophus hipposideros*, *Myotis myotis*, *Pipistrellus kuhlii*, *Eptesicus serotinus*, *Vespertilio murinus* and *Plecotus macrobullaris* species were firstly recorded in Bitlis province. 10 of the 39 bat species distributing in Turkey are present in Bitlis province and the newly recorded 6 species have zoogeographical importance in terms of their distribution area.

When the protection of the species identified is examined, it is seen that they are at the least concerned (LC) status based on IUCN criteria (Anonymous, 2021). But, *Vespertilio murinus*, which has a quite limited distribution in Turkey, has been recorded in only three locations (Benda & Horáček 1998). For this reason, identification of this species in Bitlis province is a quite important record. It was observed that *Rhinolophus hipposideros*, *Myotis myotis*, *M. blythii* and *Pipistrellus kuhlii*, which were among the species found in the field studies, were common in the study area.

Researchers Contribution Rate Declaration Summary

This study is produced by the master thesis titled "Bats fauna of Bitlis Province (Mammalia: Chiroptera)" of Ferit GENCER and her supervisor Assoc. Prof. Dr. Kubilay TOYRAN.

Conflicts of Interest Statement

There is no conflict of interest between the authors.

REFERENCES

Albayrak, İ. (1990). Doğu Anadolu Yarasaları ve Yayılışları (Mammalia: Chiroptera). *Doğa Tr. J. of Zoology 14*, 214-228.

Albayrak, İ. (1991). Studies on *Myotis mystacinus* and *Myotis brandti* (Mammalia, Chiroptera) in Turkey. *Mammalia 55* (1), 113-120.

Albayrak, İ. (2000). Yarasalar, Eli kanatlı memeli. *Yeşil Atlas, Coğrafya ve Keşif Dergisi 3*, 69-73.

Anonymous, (2018). Animal diversity. https://animal diversity.org/accounts/Chiroptera/ (Access date: 27.03.2018).

Anonymous, (2021). IUCN. https://www.Iucnred.list. org/ (Access date: 12.04.2021).

Benda, P. & Horácek, I. (1998). Bats (Mammalia: Chiroptera) of the Eastern Mediterranean. Part I. Review of distribution and taxonomy of bats in Turkey. *Acta Soc. Zool. Bohem. 62*, 255-313.

Karataş, A., Benda, P., Toprak, F. & Karakaya, H. (2003). New and significant records of *Myotis capaccinii* (Chiroptera: Vespertilionidae) from Turkey, with some data on its biology. *Lynx (Praha) n. s., 34*, 39-46.

Toyran, K. (2013). Restorasyon Çalışmaları ve Yarasalar: Bitlis El-Aman Hanı Örneği (Sözlü bildiri). Türkiye Yarasaları Sempozyumu, DSİ 25. Bölge Müdürlüğü, Balıkesir, Türkiye, 25-26 Ekim 2013.

Ün, H., Albayrak, İ., Tuncer, S., Ünal, N. & Aylan, O. (2013). Yarasalarda Kuduz ve Kuduz Benzeri Viruslar(Sözlü bildiri). Türkiye Yarasaları Sempozyumu, DSİ 25. Bölge Müdürlüğü, Balıkesir, Türkiye, 25-26 Ekim 2013.

Vaughan, T., Ryan, J. & Czaplewski, N. (2000*). Mammalogy. 4th edition, Brooks Cole,* Toronto, 565 pp.

Wilson, D.E. & Reeder, D.M. (2005). *Mammal Species of the World. A Taxonomic and Geographic Reference. 3rd ed. Johns Hopkins University Press*, Baltimore, USA, 2000 pp.

Yorulmaz, T., Albayrak, İ. & Toyran, K. (2020). Bats in Southeastern Turkey (Mammalia: Chiroptera). *Bitlis Eren Üniversitesi Fen Bilimleri Dergisi 9* (3), 1180-1187.

Yorulmaz, T. & Arslan, N. (2020). Current status of the bats in Turkey with their ecogeographic distributions and recomendations for national conservation status (Mammalia: Chiroptera). *Fresenius Environmental Bulletin 29*, 6691-6706.

Yorulmaz, T., Ürker, O. & Özmen, R. (2018). Yarasa ve orman ilişkisi üzerine bir değerlendirme. *Ormancılık Araştırma Dergisi 5* (1), 31-43.