

*Original research***The mammals (Mammalia) of Yamanlar Mountain (İzmir and Manisa provinces) and their ectoparasites****Ahmet KARATAŞ^{1,*}, Abidin BUDAK²**¹Niğde Ö.H. University, Department of Biology, TR-51240 Niğde, Turkey²Emeritus Professor, Ege University, Department of Biology, TR-35100 Bornova, İzmir, Turkey.

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Abstract: The present study is based on a total of 95 collected specimens and observed individuals on Yamanlar Mountain between İzmir and Manisa provinces and its vicinity. In the survey area, 22 species were determined from six orders: Erinaceomorpha (1), Chiroptera (7), Lagomorpha (1), Rodentia (10), Carnivora (2), and Artiodactyla (1). On the other hand, 14 species of ectoparasites were found on 10 species of the mammalian hosts: Ixodoidea (6), Mesostigmata (1), Diptera (5), Siphonaptera (2).

Keywords: Mammalia, ectoparasites, systematics, ecology, Yamanlar Mountain, İzmir, Manisa, Turkey.

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Introduction

Turkish mammalian fauna consists of 165-168 species (Anonymous, 2018a, 2018b). There are many publications about these species (e.g. Neuhäuser, 1936; Misonne, 1957; Osborn, 1961, 1963, 1964, 1965a, 1965b; Lehmann, 1966; Çağlar, 1967, 1968, 1969; Spitzenberger, 1970, 1971; Felten et al., 1971, 1973, 1977; DeBlase and Martin, 1973; Mursaloğlu, 1973, 1976; Kumerloeve, 1978, 1980, 1982; Morlok, 1978; Şimşek, 1979; Kivanç, 1988; Doğramacı, 1989; Helversen, 1989; Doğramacı and Gündüz, 1993; Steiner and Gaisler, 1994; Kefelioğlu, 1995; Benda and Horaček, 1998). Some of these works was based on local and little materials. Because of that exact distributions of many species in Turkey are not able to be determined. In addition, subspecific status, ecology and ectoparasites of some species are not known as well as their systematics.

The study aimed to provide knowledge of distribution, ecology and ectoparasites of the mammals living on Yamanlar Mountain, and also to contribute to Turkish mammalian fauna. Additionally, it supplied a comparative data for human effects with future faunistic studies on Yamanlar Mountain, which located between two big city centers, İzmir and Manisa, a very popular weekend activity area.

Materials and Methods

This study was conducted during the period between April 1995 and July 1996 in Yamanlar Mountain, located between İzmir and Manisa provinces, and its vicinity (Fig. 1). Several specimens collected in 1999 and 2000 were added to the study. The bats were caught in caves, pipe culverts under roads, attics, roofs, and crevices between windows and walls by using gloves, hand-nets and mist-nets. The rodents and hedgehog were trapped. *Mustela nivalis* was found after hunted by a local resident. Other

mammals were only observed and their photographs were taken.

Ectoparasites were collected from fur of the captured mammals and preserved in 70% ethyle-alchole. Of these, ticks, fleas, and bat-flies were identified by Prof. Dr. Ayşegül Karataş (Niğde University), Prof. Dr. Metin Aktaş and Prof. Dr. Abdullah Hasbenli (Gazi University), respectively.

The museum voucher samples were prepared as standart type according to Budak et al. (1997). They have been deposited in Mammalian Collection in Zoological Museum at Department of Zoology, Ege University (ZDEU-M). All measurements were taken using a caliper and a balance to the nearest 0.1mm and 0.1gr as described in Budak et al. (1997). Only adult males and females were used for measurements.

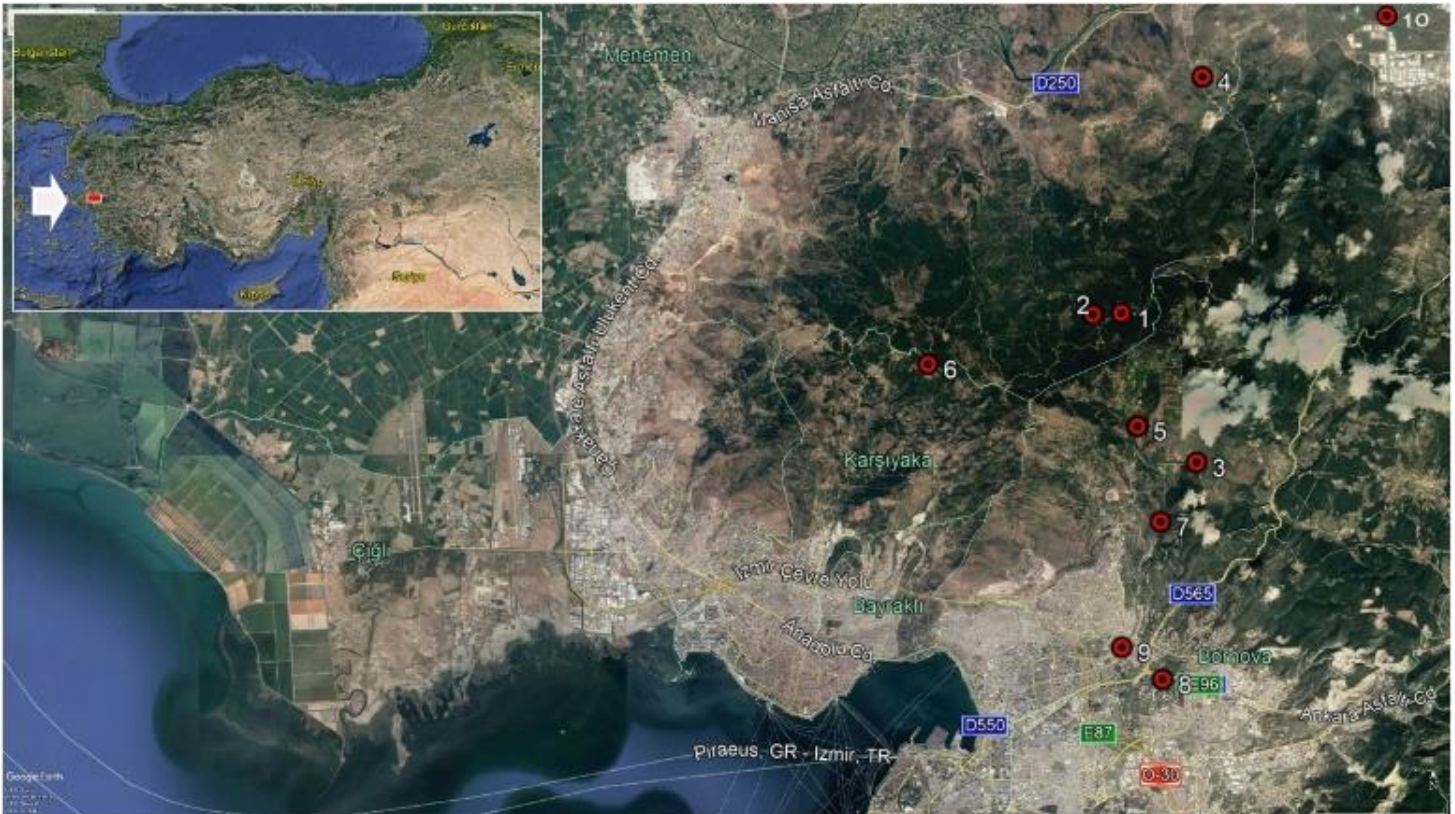


Fig. 1. Localities of collected and observed specimens on Yamanlar Mountain and Bor-nova: [1] Karagöl Lake, [2] Akkaya Caves, [3] Kayadibi Village, [4] Uzunburun Village, [5] İkizgöl Lake, [6] Former Yamanlar Tuberculosis Camp, [7] Yenigöl vicinity (Borno-va), [8] Ege University Faculty of Science, [9] Bornova (center), [10] Muradiye.

Results and Discussion

As a result of this study, 15 genera and 22 species belong to 11 families of 6 orders of Mammalia were determined (Table 1). Some information on their distributions, ecology and ectoparasites are given below.

Erinaceus concolor Martin, 1838

Collected specimen: 1; İzmir: Menemen, near Karagöl Lake, 13.VII.1995: 1 ♂.

Ecologic note: An individual was observed in forest in Karagöl vicinity, foraging over grasses, as like several individuals in the campus of Ege University in summer of 1995 and 1996.

Subspecies: *E. c. transcausicus* Satunin, 1905 was determined after Felten et al. (1973), Doğramacı and Gündüz (1993).

Ectoparasites: *Rhipicephalus sanguineus* (Latreille, 1806), *R. turanicus* Pomerancev et Matikasvili, 1940, *Dermacentor marginatus* (Sulzer, 1776) (Ixodoidea: Ixodidae), *Archaeopsylla erinacei erinacei* Bouche, 1835 (Siphonaptera: Pulicidae: Archaeopsyllinae).

Rhinolophus ferrumequinum (Schreber, 1774)

Collected specimen: 7; İzmir: Menemen, Emiralem-Karagöl road, c. 8th km, 16.VII.1995: 1 ♂; Akkaya Caves,

16.VII.1995: 1 ♂; Manisa: Uzunburun Village, a cave near Ilica Stream, 07.IV.1996: 3 ♀♀, 2 ♂♂.

Ecologic note: During the summer, they were observed in caves and in dried drainage channels passing under roads. During the winter, they were seen only in caves. A lactating female with one young was observed in mid-June, 1996. Based on the development of the young, births seem to occur in late-May.

Subspecies: The nominate *R. f. ferrumequinum* (Schreber, 1774) was determined after Ognev (1928), Strinati (1959), Felten et al. (1977), Steiner and Gaisler (1994).

Ectoparasites: *Phthiridium biarticulatum* Hermann, 1804 (Diptera: Nycteribiidae), *Ixodes vespertilionis* Koch, 1844 (Ixodoidea: Ixodidae).

Table 1. Systematics of the mammalian species, determined on Yamanlar Mountain.

Order	Family	Species
Erinaceomorpha	Erinaceidae	<i>Erinaceus concolor</i>
Chiroptera	Rhinolophidae	<i>Rhinolophus ferrumequinum</i>
		<i>Rhinolophus hipposideros</i>
		<i>Rhinolophus euryale</i>
	Vespertilionidae	<i>Myotis blythii</i>
		<i>Myotis capaccinii</i>
		<i>Pipistrellus pipistrellus</i>
	Miniopteridae	<i>Miniopterus schreibersii</i>
Lagomorpha	Leporidae	<i>Lepus europaeus</i>
Rodentia	Sciuridae	<i>Sciurus anomalus</i>
	Cricetidae	<i>Microtus hartingi</i>
	Spalacidae	<i>Nannospalax xanthodon</i>
	Muridae	<i>Apodemus mystacinus</i>
		<i>Apodemus witherbyi</i>
		<i>Apodemus flavicollis</i>
		<i>Rattus norvegicus</i>
		<i>Rattus rattus</i>
		<i>Mus domesticus</i>
		<i>Mus macedonicus</i>
Carnivora	Mustelidae	<i>Mustela nivalis</i>
		<i>Martes foina</i>
Artiodactyla	Suidae	<i>Sus scrofa</i>

***Rhinolophus hipposideros* (Bechstein, 1800)**

Collected specimen: 4; İzmir: Menemen, Karagöl-Emiralem road, 2nd km, 16.VII.1995: 1 ♂; 1 km north, 16.VII.1995: 1 ♂; 1.5 km north, 16.VII.1995: 1 ♂; Manisa: Uzunburun Village, near Ilica Stream, Saya (Ağıl) Cave, 07.IV.1996: 1 ♀.

Ecologic note: During the summer, solitary or small groups of *R. ferrumequinum* were found inside pipe culverts in forest roads. In early spring, they were found hanging torpid at the crevices on cave ceilings, and not

mixing with other species. This species was observed to be covering most of its body with its wing membrane.

Subspecies: *R. h. minimus* Heuglin, 1861 after Miller (1912), Ognev (1928), Strinati (1959), Lehmann (1966), Felten et al. (1977), Steiner and Gaisler (1994).

***Rhinolophus euryale* Blasius, 1853**

Collected specimen: 1; Manisa: Uzunburun Village, a cave near Ilica Stream, 07.IV.1996: 1 ♂.

Ecologic note: At the end of a cave, which is located close to a stream, one male *R. euryale* was seen in a large colony including more than a thousand of *Rhinolophus* colonies, dominated by *R. ferrumequinum*, and a few *Miniopterus schreibersii*.

Subspecies: The nominate form *R. e. euryale* Blasius, 1853 was determined after Strinati (1959), Felten et al. (1977), Steiner and Gaisler (1994).

Ectoparasite: *Phthiridium biarticulatum* Hermann, 1804 (Diptera: Nycteribiidae).

***Myotis blythii* (Tomes, 1857)**

Collected specimen: 3; Manisa: Uzunburun Village, a cave near Ilica Stream, 07.IV.1996: 1 ♀, Sinekli Cave, 07.IV.1996: 2 ♀♀.

Ecologic note: They were observed forming mixed clusters separately with *Rhinolophus* species or *Miniopterus schreibersii* but mainly found solitary or in clusters of several individuals in caves.

Subspecies: *M. b. oxygnathus* (Monticelli, 1885) after Ognev (1928), Felten et al. (1977), Hanák and Elgadi (1984).

Ectoparasites: *Nycteribia (Acrocholidia) vexata* Westwood, 1835, *N. (N.) latreillii* (Leach, 1817), *Penicillidia dufourii* (Westwood, 1835) (Diptera: Nycteribiidae).

***Myotis capaccinii* (Bonaparte, 1837)**

Collected specimen: 1; Manisa: Uzunburun Village, a cave near Ilica Stream, 07.IV.1996: 1 ♂.

Ecologic note: An individual was observed at the end of a cave, which is located nearby a stream, within a colony of *Miniopterus schreibersii*, separated from the rest of the other *M. blythii*.

Subspecies: *M. c. capaccinii* (Bonaparte, 1837) after Albayrak (1990; cf. Karataş et al., 2003).

Ectoparasite: *Nycteribia (Nycteribia) schmidlii* Schiner, 1853 (Diptera: Nycteribiidae).

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

Collected specimen: 17; İzmir: Bornova, Büyük Park, 05.V.1996: 1 ♀; Ege Univ. Fac. Science, 10.VI.1995: 1 ♀; 21.VI.1999: 2 juv.; 02.VI.2000: 1 adult; near Fac. Pharmacy, 05.IV.1995: 1 ♂; near İkizgöl Lake, 04.IV.1996: 1 ♂; Menemen, side of Karagöl Lake, 13.VII.1995: 1 ♂; 14.VII.1995: 1 ♂; Karşıyaka, Yamanlar Tuberculous Struggle Centre, 17.VII.1995: 4 ♀♀, 4 ♂♂.

Ecologic note: A colony of c. 350 individuals was found under the bricks, in the attic of a small hut. In early April, an individual was observed in torpid inside the cavity of a *Quercus coccifera*. Specimens were collected while foraging around a street light, over a pool or a lake. Also a few individuals were observed inside the crevices between the window frames and the walls.

Subspecies: *P. p. pipistrellus* (Schreber, 1774) after Ognev (1928), Lehmann (1966), Steiner and Gaisler (1994).

Ectoparasites: *Argas vespertilionis* (Latreille, 1796) (Ixodoidea: Argasidae) and *Spinturnix acuminata* (C.L. Koch, 1836) (Mesostigmata: Spinturnicidae).

***Miniopterus schreibersii* (Kuhl, 1819)**

Collected specimen: 9; Manisa: Uzunburun Village, a cave near Ilıca Stream, 07.IV.1996: 1 ♀; Sinekli Cave, 07.IV.1996: 6 ♀♀, 2 ♂♂.

Ecologic note: Two colonies of Long-winged Bat were found in two neighbour caves located in the valley of a small creek. At the wider part of the larger cave, which is about 35 m long, c. 100 individuals were observed hibernating close to a small group of *Myotis blythii*. In second cave, they were observed within a large colony of *Rhinolophus*, dominated by *R. ferrumequinum*, and separated from *Myotis blythii*. A single embryo was observed in each of four specimens caught during first weekend of April, and total length of embryos was measured c. 1 cm.

Subspecies: *M. s. schreibersii* (Kuhl, 1819) after Ognev (1928), Strinati (1959).

Ectoparasites: *Penicillidiia dufourii* (Westwood, 1835), *Nycteribia (Nycteribia) schmidlii* Schiner, 1853 (Diptera: Nycteribiidae).

***Lepus europaeus* Pallas, 1778**

Observed specimen: 1; İzmir: Bornova, about 4 km north of İkizgöl Lake, 04.VI.1995: 1 individual.

Ecologic note: It was seen among long grasses under scrubs near a mixed forest of junipers (*Juniperus* sp.) and pines (*Pinus brutia*).

***Sciurus anomalus* Gmelin, 1778**

Observed specimens: 5; İzmir: Menemen, near Karagöl Lake, 13.VII.1995: 1 adult, 4 juvenils.

Ecologic note: The squirrels were observed on willows (*Salix* sp.) trees, sometimes on plane (*Platanus* sp.) and pine (*Pinus brutia*) trees near Karagöl Lake.

Subspecies: *S. a. pallescens* (Gray, 1867) (*Terra-typica:* Anatolia) sensu criteria in Mursaloğlu (1976); no reddish colour in fur.

***Microtus hartingi* (Barrett-Hamilton, 1903) (Fig. 2)**

Collected specimens: 5; İzmir: Menemen, Karagöl, 28.V.1995: 1 ♀, 1 ♂; 11.VII.1995: 2 ♂♂; 13.VII.1995: 1 ♂.

Ecologic note: The voles were captured in virgin pastures and dried grassland and in galleries in loose soil between tree roots on the edges of Karagöl Lake.

Systematic Note: Short-tailed voles from İzmir was classified as *Microtus guentheri* *lydius* Blackler, 1916 (*Terra-typica:* İzmir) after Neuhäuser (1936), Ellerman (1948), Oktar et al. (1965), Lehmann (1966), and Kefelioğlu (1995). Recently, western (Ege) population of *M. guentheri* has been included into *M. hartingi* (Barrett-Hamilton, 1903) (Pardiñas et al., 2017).



Fig. 2. *Microtus hartingi* (foto: Ahmet Karataş).

***Nannospalax xanthodon* (Nordmann, 1840)**

Collected specimen: 1; Ege University, Botanical Garden, 14.III.1996: 1 ♀.

Ecologic note: A specimen was trapped into a gallery under the trees in Botanical Garden. It was determined that the mole-rat formed 6-7 soil clusters along about a line of 10 m.

Subspecies: Nannospalax xanthodon anatolicus (Méhely, 1909) (*Terra-typica*: Bornova) after Mursaloğlu (1976) and Kivanç (1988).

***Apodemus mystacinus* (Danford et Alston, 1877)**

Collected specimens: 3; İzmir: Bornova, Kayadibi Village, 04.VI.1995: 1 ind.; İkizgöl Lake, Bornova, 27.VII.1995: 2 ♂♂; Manisa: Uzunburun Village, a cave near Ilica Stream, 1 (observed).

Ecologic note: Individuals were observed beneath the stone walls surrounding the agricultural fields, and under the nearby oak trees, and also between the rock aggregations under pine trees at the edge of a lake. One specimen was also seen at the end of a bat cave, which is located nearby a stream

Subspecies: A. m. mystacinus (Danford et Alston, 1877) after Ellerman and Morrison-Scott (1951), Lehmann (1966), Doğramacı (1972).

Ectoparasite: Haemophysalis concinna Koch, 1844 (Ixodoidea: Ixodidae).

***Apodemus witherbyi* (Thomas, 1902)**

Collected specimens: 3; İzmir: Menemen, near Karagöl Lake, 07.IV.1996: 3 ♂♂.

Ecologic note: They were found at the edge of pine forest as syntopic with *A. flavicollis*.

Systematic Note: This mouse was formerly given as *Apodemus hermonensis* Filippucci, Simson et Nevo, 1989 (Filippucci et al., 1989).

***Apodemus flavicollis* (Melchior, 1834)**

Collected specimen: 18; İzmir: Bornova, İkizgöl Lake, 27.VII.1995: 1 ♂; 28.VIII.1995: 3 ♂♂; Kayadibi Village, 04.VI.1995: 1 ind.; Menemen, Karagöl Lake, 28.V.1995: 1 ♀, 1 ♂; 11.VII.1995: 3 ♂♂, 13.VII.1995: 7 ♂♂; 14.VII.1995: 1 ♂.

Ecologic note: Specimens were trapped under scrubs and blackberries on inner side and edge of forest, sometimes among stones under the shadow of pine trees nearby lake and also near cultivate areas in villages. *A. flavicollis* was found rarely syntopic with *A. mystacinus*.

***Rattus norvegicus* Berkenhout, 1769**

Observed specimens: The Norwegian rats were observed in İzmir Harbour and in cellars of few buildings in Bornova. Two amplex trapped in Bornova were

investigated and they have been deposited in collection of Bornova Agricultural Struggle Institute.

Subspecies: R. n. norvegicus Berkenhout, 1769 after Corbet (1978).

***Rattus rattus* (Linnaeus, 1758)**

Collected specimens: 3; İzmir: Bornova, Ege University, Faculty of Science (near İzmir-Ankara highway), 22.VIII.1995: 1 ♂; buildings of Biology Department, 10.XI.1999 and 06.XII.1999: 2 ind.

Ecologic note: A rat was trapped into reed-bed in a small marshy place (now dried). Others were captured in a building at night.

Subspecies: R. r. rattus Linnaeus, 1758 after Neuhäuser (1936), Ellerman (1948), Ellerman and Morrison-Scott (1951), Osborn (1965b), Lehmann (1966), Mursaloğlu (1976), Corbet (1978), Kumerloeve (1980).

Ectoparasite: Rhipicephalus turanicus Pomerancev et Matikasvili, 1940 (Ixodoidea: Ixodidae).

***Mus domesticus* Ruty, 1772**

Collected specimens: 2; Bornova (centre), 13.VII.1995: 1 ♂; Menemen, Karagöl Lake, 22.VIII.1995: 1 ♂.

Ecologic note: It is strictly commensal species and its samples were collected in a forest hut and a house.

Systematic remarks: This commensal species is different from *M. macedonicus* with following distinguishable features: the tail is longer than head and body and also there are differences on colouration of feet, in shapes of baculum and upper incisives, width of zygomatic arches and habitat. It was sympatric but not syntopic with *macedonicus*.

***Mus macedonicus* Petrov et Ružić, 1983**

Collected specimens: 13; Bornova, between İzmir-Ankara road and Ege University, Faculty of Science, 03.III.1996: 2 ♂♂; 04.IV.1996: 1 ♀, 2 ♂♂; Farms of Faculty of Agriculture, 04.VI.1996: 4 ♂♂; Bornova, Yenigöl district, 05.IV.1996: 2 ♂♂; Kayadibi Village, 04.VI.1995: 1 ♂; Menemen, Karagöl Lake, 13.VII.1995: 1 ♂.

Ecologic note: They were trapped under blackberries (*Rubus* sp.), scrubs and into stone clusters along the ways, roadside vegetation, crop fields, bushy banks, orchards, olive groves, sides of forests and near settlements, but they avoided forests and human dwellings.

Systematic remarks: This aboriginal species is relatively small body and short tailed and it is different from *M.*

domesticus with its colouration on feet, indentation of upper incicives, shapes of baculum, width of zygomatic arches and also habitat features.

Ectoparasite: Stenoporia tripectinata tripectinata Traboschi, 1902 (Siphonaptera: Hystrichopsyllidae).

***Mustela nivalis* Linnaeus, 1766**

Collected specimen: 1; Manisa: Muradiye, near Gediz River, poultry-house, 14.VII.1995: 1 ♂.

Ecologic note: It was shot by a farmer, while hunting hens in a poultry-house.

***Martes foina* (Erxleben, 1777)**

Observed specimens: 2; İzmir: Bornova, Ege Univ. Fac. Science, 20.VIII.1995: 2 adults.

Ecologic note: They were observed in cellars and gardens of buildings of Department of Biology in Ege University, while walking around before sunset.

***Sus scrofa* Linnaeus, 1758**

Observed specimen: 1; İzmir, Bornova, near İkizgöl Lake, 26/27.VII.1995: 1 adult.

Ecologic note: An adult individual was seen in İkizgöl Lake at night.

Table 2. Ectoparasite species found on mammalian hosts in Yamanlar Mountain.

Order:Suborder	Family	Species (ectoparasite)	Species (host)
Acari: Ixodoidea	Argasidae Ixodidae	<i>Argas vespertilionis</i>	<i>Pipistrellus pipistrellus</i>
		<i>Dermacentor marginatus</i>	<i>Erinaceus concolor</i>
		<i>Haemophysalis concinna</i>	<i>Apodemus mystacinus</i>
		<i>Ixodes vespertilionis</i>	<i>Rhinolophus ferrumequinum</i>
		<i>Rhipicephalus sanguineus</i>	<i>Erinaceus concolor</i>
		<i>Rhipicephalus turanicus</i>	<i>Erinaceus concolor</i>
			<i>Rattus rattus</i>
Acari: Mesostigmata	Spinturnicidae	<i>Spinturnix acuminata</i>	<i>Pipistrellus pipistrellus</i>
Diptera	Nycteribiidae	<i>Nycteribia (Acrocholidia) vexata</i>	<i>Myotis blythii</i>
		<i>Nycteribia (Nycteribia) latreillii</i>	<i>Myotis blythii</i>
		<i>Nycteribia (Nycteribia) schmidlii</i>	<i>Myotis capaccinii</i>
			<i>Miniopterus schreibersii</i>
		<i>Penicillidia dufourii</i>	<i>Myotis blythii</i>
			<i>Miniopterus schreibersii</i>
		<i>Phthiridium biarticulatum</i>	<i>Rhinolophus ferrumequinum</i>
			<i>Rhinolophus euryale</i>
Siphonaptera	Hystrichopsyllidae	<i>Stenoporia tripectinata tripectinata</i>	<i>Mus macedonicus</i>
	Pulicidae	<i>Archaeopsylla erinacei erinacei</i>	<i>Erinaceus concolor</i>

In the study area, 22 species of terrestrial mammals were established (Table 1). Of these, *Rhinolophus euryale*, *Myotis blythii*, *M. capaccinii*, *Miniopterus schreibersii*, and *Mustela nivalis* were newly recorded from Manisa (*M. capaccinii* and *M. schreibersii* were also cited in Karataş et al. (2003) and Karataş and Sözen (2004), respectively).

Additionally, Felten et al. (1973) gave the records of *Crociodura* spp. from Bornova (İzmir), located in southern part of the study area. They noted the locality as “1 km north of Bornova”. For the long period after this publication, this area is filled by tall buildings and other settlements. Even though the traps were set up in almost all kinds of biotop; no specimen of *Crociodura* was able to be captured.

Addition to the mammal specimens, 14 species of ectoparasites were found on 10 species of the mammalian hosts. These were from six families of the orders Acari,

Diptera, and Siphonaptera (Table 2). From these ectoparasites, *Argas vespertilionis* was previously recorded from Denizli and İstanbul (Merdivenci, 1969, 1970). Similarly, *Ixodes vespertilionis* was reported from Denizli (Merdivenci, 1969). Both tick species were new records for Manisa Province. *Dermacentor marginatus*, *Haemophysalis concinna* and *Rhipicephalus sanguineus* were previously recorded from İzmir and Manisa provinces (Merdivenci, 1969, 1970). *H. concinna* is an ectoparasite of many animals such as sheep, goat, cow, water buffalo, hedgehog, horse and wild boars (Merdivenci, 1970); but it was the first record for *Apodemus mystacinus*. Addition to tick species, a mite, *Spinturnix acuminata*, was also found in the present study and published as the first record from Turkey (Karataş and Çakır, 2004).

Five bat fly species determined in this present study were previously reported from İzmir (Kock, 1989; Hasbenli, 1997). However, these were newly recorded in this area from Manisa Province.

Of the fleas (Siphonaptera), *Archaeopsylla erinacei erinacei* was formerly known from Adana, Çanakkale, Edirne, Kırklareli, and Kırşehir provinces (Merdivenci, 1970; Peus, 1976, 1978; Aktaş and Dinçer, 1980). Also, *Stenoporia tripectinata tripectinata* was recorded from Adana, Ankara, Aydın, İstanbul, İzmir, Manisa, and Muğla provinces (Merdivenci, 1970; Peus, 1978; Aktaş, 1982; Aktaş and Hasbenli, 1995). The first record of *S. t. tripectinata ex Mus macedonicus* in Turkey was given here. Its previous records were given on *Sorex* sp., *Mus musculus* and *Apodemus* spp. as hosts (Peus, 1976).

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