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THE RODENTS OF KASTAMONU PROVINCE (*MAMMALIA: RODENTIA*)

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ABSTRACT

This study is based on 145 rodent specimens collected from Kastamonu province during the summer in 1992 and 1993. Age determination of the specimens was done and only the adult specimens were evaluated. In the study area, 12 species which belongs to 10 genera; *Sciurus anomalus, Cricetulus migratorius, Clethrionomys glareolus, Microtus arvalis, Spalax leucodon, Rattus rattus, Mus musculus, Apodemus mystacinus, Apodemus flavicollis, Apodemus sylvaticus, Dryomys nitedula* and *Allactaga euphratica* were determined. Of these species *Spalax leucodon, Apodemus flavicollis* and *Dryomys nitedula* are the first records from the study area. Diagnostic characters, habitat, fur colour and measurements related to the species were recorded.

INTRODUCTION

Parasites of some rodent species are known to infect man and other animals with extremely dangerous diseases such as typhoid, typhus, tularemy (Corbet and Southern, 1977; Özsan et al., 1974 a, b). For this reason, determination of areas where rodent species are widespread is of great significance for health. On the other hand, rodent animals make up the major part of food sources of wildlife. Thus, most of the reptiles, birds and mammals owe their existence to rodents.

Rodent species which feed on underground and upperground vegetal food are always regarded as agricultural pests (Kıral and Benli, 1979; Tunçdemir, 1988). Therefore, poisonous pesticides are used in agricultural fields to get rid of rodents kill also other mammals and birds (Mursaloğlu, 1987). The control method that would keep rodent

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populations at harmless level can be determined only by knowing about their identities and distribution.

Up to the present as many as 49 rodent species have been recorded in Turkey (Danford and Alston, 1877; Thomas, 1897; Satunin, 1901; Neuhäuser, 1936; Zimmermann, 1953; Misonne, 1957; Çağlar, 1957; 1967; Matthey, 1957; Hoogstral, 1959; Mursaloğlu, 1965; Osborn, 1962; 1964; 1965; Lehmann, 1969; Kock, Malec and Storch, 1972; Kurtonur, 1972; Felten, Spitzenberg and Storch, 1973; Doğramacı, 1974; 1989; Kumerloeve, 1975; Kıvanç, 1988). Most of these records are based on regional and limited materials. So, a full and uninterrupted record has not been carried out as to the habitat of many species in Turkey. In addition, there is still lack of both taxonomic and biological information on local rodents. According to the literary records, 17 rodent species in Turkey exist in the Black Sea region. The province of Kastamonu, chosen as the research area, is a region possessing various climatic and vegetal characteristics (Akman et al., 1971; Ketenoğlu et al., 1983; Akman et al., 1987). As regards rodents peculiar to the area, a record of 9 species belonging to 8 genera has been provided (Neuhäuser, 1936; Osborn, 1962; 1964; Doğramacı, 1974).

The main purpose of this study is to determine what other rodent species live in the study area.

MATERIALS AND METHODS

Field work was carried out in the environs of Kastamonu and its districts at intervals in the summer months from 27 June 1992 to 15 October 1993 (Figure 1).

At the end of field work, 145 rodent specimens were caught and of them, 123 were stuffed in the type of research specimen by their skin and skull (22 of them only by skull) and are being preserved at the Department of Biology, Faculty of Sciences, University of Ankara.

Traps were set in various habitats such as forests, arable or nonarable fields, aquatic environments, residential districts, and banks of rivers and water ponds, considering the living conditions of different species.

Jerboa was caught by covering it with a blanket after a chase under torch light at night, mole rat with a special trap, squirrel shot, and other

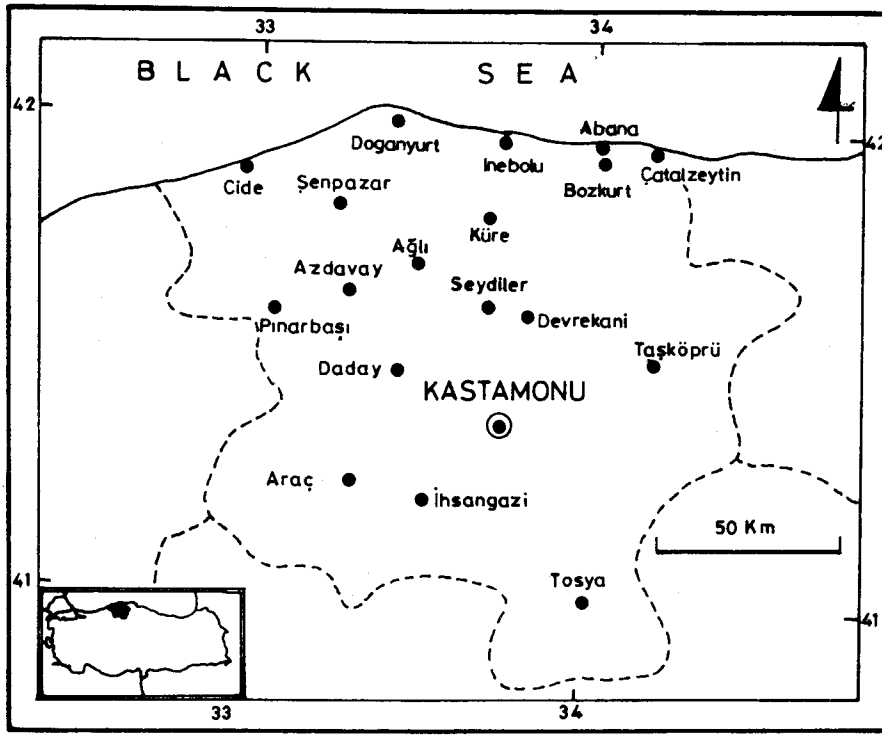

Fig. 1. Kastamonu provincial map where field work was carried out.

rodents caught dead with special spring traps. Trap baits were prepared with bread and peanut. The other day when the animals were found dead in the traps, they were collected before sun shine.

Small rodent specimens were weighed by the precision hand steellyard graded up to 0.25 gr. and big one by a normal balance. For each animal, 4 outer standart measurements were recorded in mm. (interms of the total length, tail, hind foot and ear lenght) and the specimens were stuffed after being embalmed like a standart museum specimen. Skulls were cleaned separately in 70°C benmari plastic boxes containing 10% of ammonia solution. After the skulls were left to dry, their sexes and field record numbers were written on each one with china ink.

The specimen were divided into two groups, as adult and young, with respect to the degrees of wear in tooth, fur features and field notes. Except standart external measurement of each specimen, 11 cranial measurements were taken. The evaluation was made only according to the

adult specimens. The length of head and body was found by subtracting the tail lenght from the total length. For alveol lengths, measurements were made always on molars on the right of the lower and upper jaws.

Measurements were recorded to the tenth of a millimeter by compass (Thomas, 1905).

Whether there are differences between sexes were explored through variance analysis of the adult group which included the most specimens and control of importance of difference between averages (Kutsal and Muluk, 1972). As there were no differences between sexes in this age group, measurement were given together. The same method was used for comparing more than one species of the same genera (of *Apodemus*), as well.

Determination of the species was carried out according the previously published records in literature (Miller, 1912; Ognev, 1948; Corbet, 1978; Harrison and Bates, 1991; Çolak and Kıvanç, 1991). Diagnostic characters, habitats, fur colour, measurements, of the species, the places from where specimens were collected and the number of specimens were dealt with in sequence.

The measurements of one or two specimens were recorded in sequence in the subject of the species they belong to for the species with more specimens, the minimum, maximum values of the measurements taken, average and standard deviations were illustrated in tables.

The genera and species studied were placed in sequence according to Corbet (1978). The history and the original name of the species were given together with its publication, type locality, and then the date and the author who first used the name, and his/her publication were provided.

If the species belonging to the some genera are more then one, they were compared with each other finally, the conclusion section was provided with a general evaluation of the subject.

RESULTS

In the study area, 12 species pertainning to the genera *Sciurus, Cricetulus, Clethrionomys, Microtus, Spalax, Rattus, Mus, Apodemus, Dryomys* and *Allactaga* were found.

Sciurus anomalus Güldenstaedt, 1785

1785. *Sciurus anomalus* Güldenstaedt, Schreb. Säugeth. 4: 781.
Type locality: Caucasus.

Diagnostic characters: Dorsal colour starts from the nose tip and continues up to the middle of the back with a decreasing tone of yellowish red mixed with light gray which becomes clearer towards the tail. Henna-like reddish colour prevails on the sides from front feet to back ones. Underneath the feet are five pads, which are foremost in position. There are four molars each in the lower and upper jaws. The tail is longer than half the length of the head and body. Head and body is 237 mm, tail 141 mm, hind foot 60 mm, condylobasal length 47.7 mm.

Habitat: Only one specimen was obtained from open forest close to a small residential area.

Fur colour: Dorsal colour starts from the nose tip and continuous up to the middle of the back with a decreasing tone of yellowish red mixed with light gray which becomes clearer at the start of the tail. Very light yellowish red tones are seen on the back specially on both sides of the body starting from the front feet up to the back ones, reddish colour like henna is the most visible. The ventral section is covered with red like camel's hair from beneath the jaw up to the start of the tail. The dorsal colour prevails the upper part up to the mid of the tail and the darker of the ventral colour as from the mid of the tail. The side body colour again occupies the lower parts of the tail. The side body colour also covers the upper parts of the front and hind foot.

Measurements: Measurements of one specimen (♂): Head and body 259 mm, total length 400 mm, tail 141 mm, hind foot 60 mm, ear 32 mm, weight 356 gr, condylobasal length 47.7 mm, nasal length 16.9 mm, occipitonasal length 52.2 mm, length of diastema 12.2 mm, basilar length 41.4 mm, zygomatic width 30.9 mm, alveolar length of upper molar 10.4 mm, interorbital width 17.1 mm, height of skull 22.5 mm, alveolar length of lower molar 11.3 mm, length of mandible 30.8 mm.

Locality and specimen examined: Hacıköyü, Kastamonu, (1♂).

Cricetulus migratorius (Pallas, 1773)

1773. *Mus migratorius* Pallas, Reise, 2: 703.
Type locality: Lower Siberia, Ural.
1906. *Cricetulus migratorius* Satunin, Mittiel, Kaukas, Mus, 2: 340.

Diagnostic characters: The tail is below 30% of the head and body. Parietals' anterio-external corners are round. Bullae is very big and 5.0-5.1 mm. Condylobasal length is 24.6-26.7 mm, zygomatic width 13.3-14.0 mm, interorbital width 3.6-4.2 mm, length of mandible 13.5-14.9 mm.

Habitat: It was caught in an orchard and in the bushy with sandy soil near a river.

Fur colour: Dorsal hair is smoky gray at the base and light yellowish gray at tip and there is a thin black stripe running behind the ear to the start of the tail. The ventral part is dirty white.

Measurements: See Table 1.

Table 1. External and cranial measurements, number of specimens (n), range (r), mean (m), standart deviation (±SD) values for adult male (1) and female (3) *Cricetulus migratorius* specimens.

Measurement	n	r	m	±SD
Total length	4	125-134	129.5	3.69
Length of head and body	4	98-108	104.5	4.72
Length of tail	4	21-27	25.0	2.70
Length of hind foot	3	12-184	15.6	3.21
Length of ear	4	19-20	19.5	0.57
Weight (gr.)	4	22-27.5	25.3	2.65
Condylobasal length	4	24.6-26.7	25.5	1.15
Nasal length	4	9.4-9.8	9.6	0.14
Occipitonasal length	4	25.9-27.5	26.9	0.74
Length of diastema	4	7.3-8.1	7.7	0.42
Basilar length	4	21.3-23.2	22.2	0.82
Zygomatic width	4	13.3-14.0	13.7	0.28
Alveolar length of upper molar	4	3.9-4.2	4.0	0.13
Interorbital width	4	3.6-4.2	3.9	0.25
Height of skull	4	9.6-10.3	9.9	0.31
Alveolar length of lower molar	4	3.9-4.2	4.0	0.11
Length of mandible	4	13.5-14.9	14.2	0.67

Localities and specimens examined: Kastamonu, Devrekani, Devrekani River, Kasaplar district, (2 ♀♀); Devrekani, Sazyaka district, Karaköy, (1♂, 1 ♀).

Clethrionomys glareolus (Schreber, 1780)

1780. *Mus glareolus* Schreber, Säugeth 4: 680.
Type locality: Caucasus.
1936. *Clethrionomys glareolus* Neuhäuser, Zeit. Säugeth 11: 185.

Diagnostic characters: The dorsal part is reddish brown and the ventral part ash-gray. The lower and upper parts of the tail one of different colour. Head and body is 95-108 mm, tail 35-52 mm, hind foot 18-20 mm, weight 19-29 gr. The tail is half the length of the body. For adults, each molar has double roots with curved blaze (mine). The alveolar length of upper molar is below 6.0 mm.

Habitat: The wood, near rivers and agricultural fields, bushies, areas covered with leaves and in rocky places.

Fur colour: Dorsal colour is dark smoky in hair bottom and reddish brown like rust above the hair, getting darker in the mid of the back. Ventral has a dirty white colour.

Measurements: See Table 2.

Table 2. External and cranial measurements, number of specimens (n), range (r), mean (m), standart deviation (±SD) values for adult male (6) and female (5) *Clethrionomys glareolus* specimens.

Measurement	n	r	m	±SD
Total length	11	130-160	149.2	8.73
Length of head and body	11	95-112	102.3	5.37
Length of tail	11	35-52	46.9	4.3
Length of hind foot	11	18-20	19.5	0.68
Length of ear	11	12-15	13.8	0.75
Weight (gr.)	11	19-29	22.9	3.75
Condylobasal length	6	22.6-24.2	23.2	0.69
Nasal length	11	6.6-7.6	7.1	0.38
Occipitonasal length	6	23.6-25	24.2	0.57
Length of diastema	11	6.5-7.9	7.4	0.41
Basilar length	7	20.3-21.6	20.8	0.54
Zygomatic width	6	12.2-13.5	12.6	0.48
Alveolar length of upper molar	11	5.1-5.4	5.2	0.10
Interorbital width	8	3.9-4.4	4.0	0.19
Height of skull	6	9.2-9.6	9.4	0.15
Alveolar length of lower molar	10	5.0-5.6	5.2	0.17
Length of mandible	11	12.6-14.1	13.2	0.46

Localities and specimens examined: Kastamonu, Azdavay, Ceviz district, Aşağı Arpalık, (2♂♂, 1 ♀); Küre, İkiçay, Köprüyanı, (3♂♂, 4♀♀); Taşköprü Köçekli village, (1♂).

Microtus arvalis (Pallas, 1778)

1778. *Mus arvalis* Pallas, Nov. Sp. Quadr. Gliv. Ord., P. 78.
Type locality: Germany.
1908. *Microtus arvalis* Miller, G., Ann. Mag. N.H., 1: 197.

Diagnostic characters: Plantar and palmar tubercules are relatively smaller. The tail is short and below 50% of the head and body. The back points of premaxilla bones extend farther nasal bones, up to frontal bones. Interorbital region is low, the skull dorsal profile is a entle convex as if it is flat. Bullae is big and 7.8 mm, hind foot length 18.0-22.0 mm, condylobasal length 23.5-26.0 mm.

Habitat: They live in uncultivated fields covered with short thorny shrub and near rivers.

Fur colour: Dorsal colour is smoky gray at the hair bottom and yellowish gray like brown on the surface. Ventral is dirty white.

Measurements: See Table 3.

Table 3. External and cranial measurements, number of specimens (n), range (r), mean (m), standart deviation (±SD) values for adult male (4) and female (11) *Microtus arvalis* specimens.

Measurement	n	r	m	±SD
Total length	15	137-172	151.9	10.87
Length of head and body	15	99-123	109.9	7.28
Length of tail	15	36-49	42.0	4.03
Length of hind foot	15	18-22	19.0	1.03
Length of ear	14	12-14	13.1	0.94
Weight (gr.)	14	22-45	33.0	8.22
Condylobasal length	11	23.5-26	24.5	0.87
Nasal length	15	6.6-7.4	6.9	0.24
Occipitonasal length	11	23.6-25.7	24.4	0.66
Length of diastema	14	7.2-8.3	7.6	0.43
Basilar length	11	21.2-23.3	22.0	0.78
Zygomatic width	10	12.9-14.8	13.7	0.60
Alveolar length of upper molar	13	5.6-6.3	5.9	0.18
Interorbital width	14	3.2-3.6	3.4	0.12
Height of skull	11	9.1-10.1	9.6	0.30
Alveolar length of lower molar	15	5.7-6.2	5.8	0.15
Length of mandible	15	13.4-14.8	14.0	0.44

Localities and specimens examined: Kastamonu, Daday, "Sağlık Merkezi" (1♀); Devrekani, Kasaplar, (1 ♀); Devrekani, Karaköy, (4♂♂, 9♀♀); Taşköprü, Köçekli village (2 ♀♀).

Spalax leucodon Nordmann, 1840

1840. *Spalax typlus leucodon* Nordmann, Demidoff Voy. 3, 34.
Type locality: Russia.
1938. *Spalax leucodon*, Migulin A.A., Mammals of Ukrainian SSR, 345.

Diagnostic characters: The upper incisor is in the shape of a stripe on the front surface, with a light brown girdle around. Rostrum width is below 11 mm. Condylobasal length is 45.3-45.9 mm, interorbital width 6.8-6.9 mm, length of mandible 28.7-28.8 mm.

Habitat: Open grassland with no woods away from aquatic environments.

Fur colour: The general dorsal and ventral colour is smoky gray, which is discernible from bright reddish yellow hair tips scattered at the back and side. Smoky gray is the common colour for the only young specimen, whose back and side hair tips are reddish light yellow like on adult.

Measurements: Measurements of two specimens (♂,♀): Total length 210,- mm; tail -,- mm; hind food 29,- mm; ear 4,- mm; weight 250,- gr; condylobasal length 45.3, 45.9 mm; nasal length 18.4, 18.4 mm; occipitonasal length 47.2, 47.6 mm; length of diastema 18.4, 18.2 mm; basilar length 41.4, 42.0 mm; zygomatic width -,37.6 mm; alveolar length of upper molar 7, 6 mm; interorbital width 6.8, 6.9 mm; height of skull 21.0, 21.4 mm; alveolar length of lower molar 7.5,- mm; legnth of mandible 28.7, 28.8 mm.

The only young specimen (♂) possesses the following: Total length 170.0 mm; tail -; hind foot 26.0 mm; ear 4.0 mm; weight - gr; condylobasal length 37.8 mm; nasal length 15.6 mm; occipitonasal length 40.0 mm; length of diastema 12.6 mm; basilar length 33.1 mm; zygomatic width 29.3 mm; alveolar length of upper molar - mm; interorbital width 8.0 mm; height of skull 17.5 mm; alveolar length of lower molar - mm; length of mandible 24.3 mm.

Localities and specimens examined: Kastamonu, Daday, Karcaağaç village, (1♂), Devrekani, Bozkoca village, (1♂), Seydiler (1♀).

Rattus rattus (Linnaeus, 1758)

1758. *Mus rattus* Linnaeus, Syst. Nat. 10th ed. 1: 61.
Type locality: Sweden.
1918. *Rattus rattus* Hinton, N.A.C., Report on the house-rats. Sc. Mesufts from the mammal. Survey Nr. 18.

Diagnostic characters: Dorsal colour is light gray at the hair bottom and reddish brown on the surface. The tail has one colour and is longer than the head and body. The supraorbital extremity extends from orbits to the surrounding area of the skull in a curve without interruption. The hind foot is above 30 mm. The head and body is 162 mm, tail 180 mm, weight 94.5 gr.

Habitat: It lives in residential areas.

Fur colour: Dorsal colour is light gray and hair surface yellowish and reddish brown, sides gray-like dirty white. Ventral colour is a little dirty white.

Measurements: Measurements of one specimen (♂): Head and body 162 mm; total length 342 mm; tail 180 mm; hind foot 33 mm; ear 23 mm; weight 94.5 gr; condylobasal length 35.1 mm; nasal length 13.0 mm; occipitonasal lenght 38.0 mm; length of diastema 10.2 mm; basilar length 31.1 mm; zygomatic width -; alveolar length of upper molar -; interorbital width 5.6 mm; height of skull 13.6 mm; alveolar length of lower molar 6.1 mm; length of mandible 20.1 mm.

Locality and specimen examined: Kastamonu, Tosya, (1♂).

Mus musculus Linnaeus, 1758

1758. *Mus musculus* Linnaeus, Syst. Nat. I. 10th ed. P. 62.
Type locality: Sweden.

Diagnostic characters: The ventral part is in general gray-yellowish brown but the sides and the back are dark brown or yellowish brown. Being of medium size, head and body 84 mm, hind foot 19 mm, condylobasal length 20.8 mm, tail is almost the same size as the length

of the head and body. The upper front incisors each have a visible protrusion.

Habitat: It lives in buildings in residential areas.

Fur colour: Dorsal colour is light gray at the hair bottom and gray with light brown tone on the surface, and ventral colour is dirty white (light ash colour).

Measurements: Measurements of one specimen (♂): Head and body 84 mm; total length 152 mm; tail 68 mm; hind foot 19 mm; ear 15 mm; weight 16 gr; condylobasal length 20.8 mm; nasal length 8.3 mm; occipitonasal length 22.2 mm; length of diastema 6.1 mm; basilar length 17.4 mm; zygomatic width 11.6 mm; alveolar length of upper molar 3.8 mm; interorbital width 3.6 mm; height of skull 8.6 mm; alveolar length of lower molar 3.4 mm; length of mandible 11.2 mm.

Locality and specimen examined: Kastamonu, İnebolu, Musa village, İslamtepe, İkiçay, (1♂).

Apodemus mystacinus (Danford and Alston, 1877)

1877. *Mus mystacinus* Danford and Alston, Proc. Zool. Soc. P. 279. Type locality: Zebil, Bolkar Mt, Mersin.
1915. *Apodemus mystacinus* Allen, Bull. Mus. Comp. Zool. Harvard, 59:10.

Diagnostic characters: Dorsal colour is between smoky gray and brown gray. Condylobasal length is 26.3-29.4 mm, alveolar length of upper molar 4.6-5.0 mm, length of mandible 15.0-17.2 mm.

Habitat: It lives in forests, rocky and steep fields, shrublands, areas with black-berries, amorphous trees and thorny plants.

Fur colour: Dorsal colour varies between smoky gray and dark brown while ventral colour is dirty white.

Measurements: See Table 4.

Localities and specimens examined: Kastamonu, Abana, Manavra river, (2♂♂, 2♀♀); Araç, Boyalı, Soğanlı river and environs (2♂♂, 1♀); İnebolu, Musa village, İslamtepe, İkiçay (2♂♂, 1♀); Küre, İkiçay, Köprüyanı (1♂); Tosya, Çüşçüş dwelling (2♂♂); Tosya, Ortalıca township, Dedekayası district, Ortaboğaz (1 ♀).

Table 4. External and cranial measurements, number of specimens (n), range (r), mean (m), standart deviation (±SD) values for adult male (6) and female (4) *Apodemus mystacinus* specimens.

Measurement	n	r	m	±SD
Total length	8	217-252	232.7	12.6
Length of head and body	8	101-125	111	8.91
Length of tail	8	114-127	121.7	4.68
Length of hind foot	10	25-29	26.5	1.35
Length of ear	9	19-27	21.5	2.24
Weight (gr.)	9	32-44	38.6	4.53
Condylobasal length	7	26.2-29.4	27.2	1.15
Nasal length	9	10.8-12.7	11.9	0.59
Occipitonasal length	7	29.0-32.3	30.0	1.08
Length of diastema	10	7.4-8.8	8.0	0.37
Basilar length	7	21.9-25.2	22.9	1.27
Zygomatic width	4	14.3-15.9	14.9	0.72
Alveolar length of upper molar	8	4.6-5.1	4.8	0.14
Interorbital width	9	4.5-4.8	4.6	0.09
Height of skull	7	10.4-11.1	10.7	0.21
Alveolar length of lower molar	10	4.2-5.1	4.8	0.25
Length of mandible	10	15.0-17.2	15.6	0.67

Comparison

While the dorsal colour of *Apodemus mystacinus* changes between smoky gray and dark brown gray, the dorsal colour of *Apodemus flavicollis* is between dark brown and light camel hair colour.

It was found out that all of the external and cranial diagnostic sizes of *Apodemus mystacinus* handled in this study as well as its weight were statistically bigger than those of *Apodemus flavicollis* (Figures 2, 3).

While dorsal colour of *Apodemus mystacinus* changes between smoky gray and dark brown gray, the dorsal colour of *Apodemus sylvaticus* is between light yellowish gray with brown tone and reddish yellow.

It was founded that all of the external and cranial diagnostic sizes of *Apodemus mytacinus* handled in this study as well as its weight were statistically bigger than those of *Apodemus sylvaticus* (Figures 4, 5).

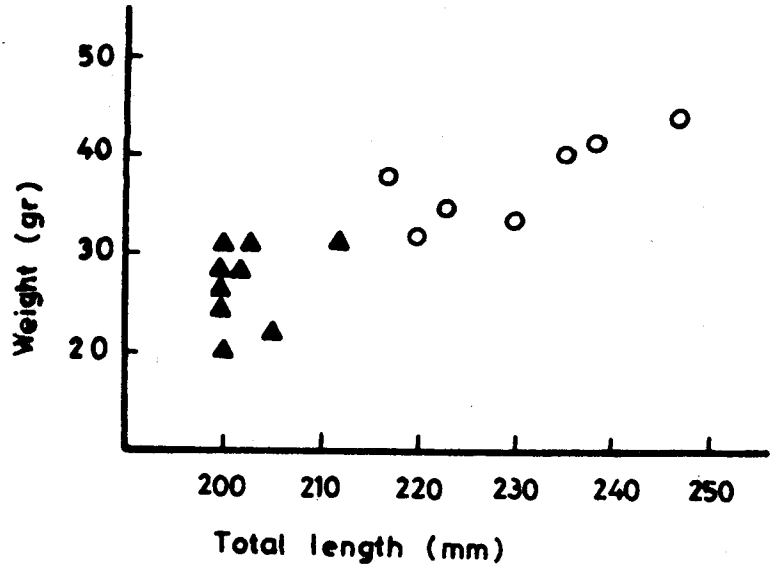

Fig. 2. Separation of *Apodemus mystacinus* (○) and *Apodemus flavicollis* (▲) by means of a scatter diagram where weight is plotted against the total length.

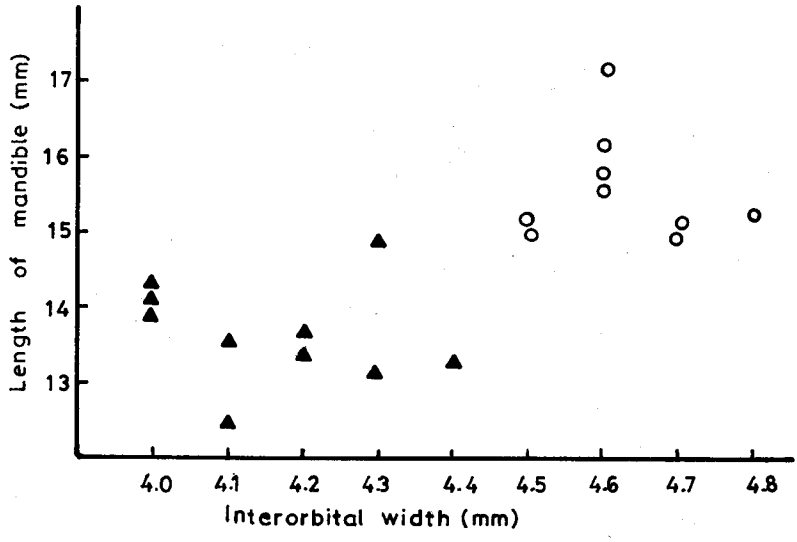

Fig. 3. Separation of *Apodemus mytacinus* (○) and *Apodemus flavicollis* (▲) by means of a scatter diagram where length of mandible is plotted against the interorbital width.

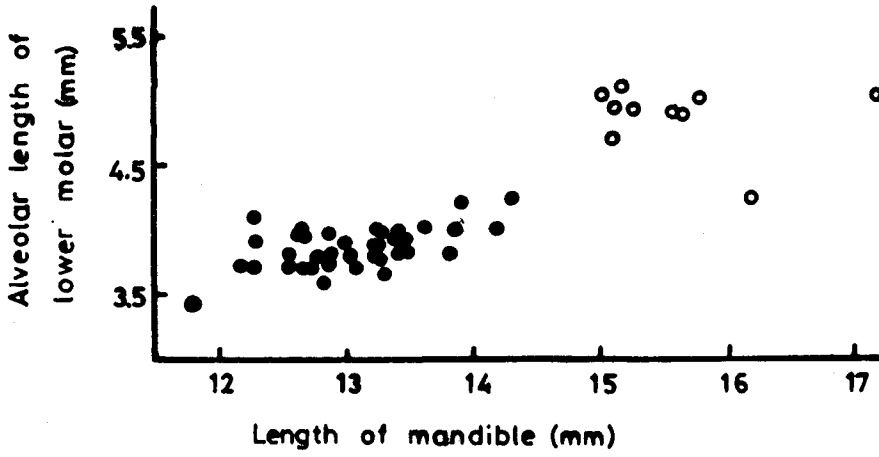

Fig. 4. Separation of *Apodemus mystacinus* (○) and *Apodemus sylvaticus* (●) by means of a scatter diagram where alveolar length of lower molar is plotted against the length of mandible.

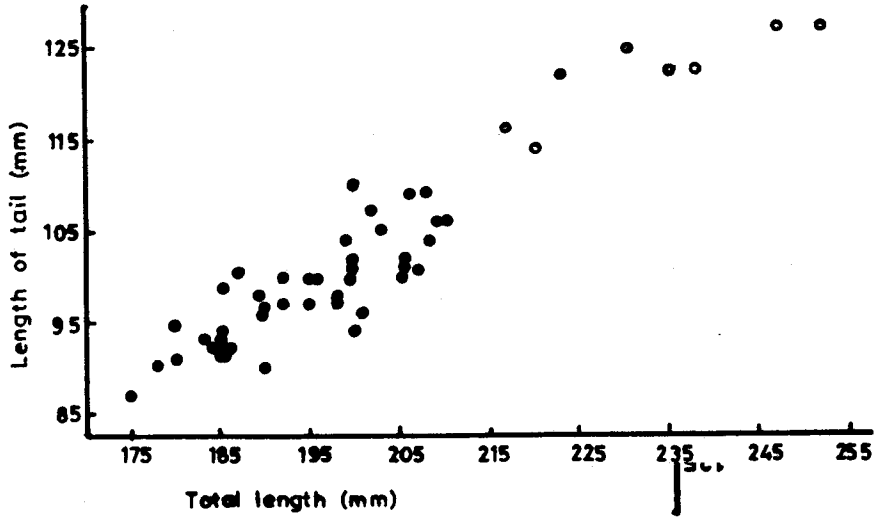

Fig. 5. Separation of *Apodemus mytacinus* (○) and *Apodemus sylvaticus* (●) by means of a scatter diagram where length of tail is plotted against the total length.

Apodemus flavicollis (Melchior, 1834)

1834. *Mus flavicollis* Melchior, Danske staats ag Norges pattordya, P. 99. Type locality: Sielland, Denmark.

1912. *Apodemus flavicollis* Miller, Brit. Mus. Nat. Hist. London. P. 828.

Diagnostic characters: Dorsal colour changes from dark brown to light camel hair colour. The alveolar length of upper molar is 3.8-4.3 mm. Width 4.5-10.0 mm, and all have a breast spot with the pointed end facing the abdomen or which extends up to the shoulders.

Habitat: It lives in shrubland, forests, areas with thorny plants.

Fur colour: Dorsal colour is gray at the hair bottom and brown gray on the surface. Ventral colour is dirty white.

Measurements: See Table 5.

Table 5. External and cranial measurements, number of specimens (n), range (r), mean (m), standart deviation (±SD) values for adult male (5) and female (5) *Apodemus flavicollis* specimens.

Measurement	n	r	m	±SD
Total length	9	200-212	202.3	4.03
Length of head and body	9	93-107	100.2	4.76
Length of tail	9	94-107	102.1	4.45
Length of hind foot	10	20-25	23.6	1.57
Length of ear	10	14-18	16.8	1.03
Weight (gr.)	10	20.5-31	26.9	3.46
Condylobasal length	2	24.6-25.1	24.8	0.35
Nasal length	9	9.1-11.1	9.8	0.65
Occipitonasal length	2	26.5-26.6	26.5	0.07
Length of diastema	10	6.3-7.9	7.2	0.46
Basilar length	2	20.7-21.3	21	0.42
Zygomatic width	2	13.7-14.0	13.8	0.21
Alveolar length of upper molar	9	3.8-4.3	4.0	0.16
Interorbital width	10	4.0-4.4	4.1	0.14
Height of skull	2	9.4-10.2	9.8	0.56
Alveolar length of lower molar	9	3.7-4.3	4.0	0.17
Length of mandible	10	12.4-14.8	13.6	0.65

Localities and specimens examined: Kastamonu, Abana, Manavra river, (2♂♂); Araç, Boyalı, Soğanlı river and environs, (2♀♀); Cide, Cide river, (1♂, 1♀); İhsangazi road, (1♂); İnebolu, Musaköyü, İslamtepe, İkiçay, (1♀); Tosya, Deringöziçi, Ortayol, Hasanargı (1♂, 3 ♀♀); Tosya, Ortayol, (1♂).

Comparison

While the dorsal colour of *Apodemus flavicollis* ranges from dark brown to light camel hair tone, that of *Apodemus sylvaticus* is between light yellowish gray with brown tone and reddish yellow.

It was found out that *Apodemus flavicollis* was statistically different from and larger than *Apodemus sylvaticus* in respect of total length, weight, condylobasal and nasal lengths.

Apodemus sylvaticus (Linnaeus, 1758)

1758. *Mus sylvaticus* Linnaeus, Syst. Nat. I., 10th ed., P. 62.
Type locality: Upsala, Sweden.

1910. *Apodemus sylvaticus* Miller, Ann. Mag. Nat. Hist., 8th sr. VI. p. 460.

Diagnostic characters: In some of this species, there is a breast spot of up to 4.0 mm which extends from beneath the jaws towards the breast, whereas some others do not have this. Dorsal hair bottom is smoky gray, and surface colour changes between light yellowish gray with brown tone and reddish yellow. The alveolar length of upper molar is 3.5-4.2 mm.

Habitat: It lives in shrubs near rivers, forests, grassland, in areas where there are all kinds of vegetation.

Fur colour: Dorsal hair bottom colour is smoky gray, surface colour light yellowish gray with brown tone changing to reddish yellow. Ventral colour is between dirty white and ash colour.

Measurements: See Table 6.

Localities and specimens examined: Kastamonu, Abana, Manavra river (1♂, 1♀); Araç, Boyalı, Soğanlı river and environs (3♂♂, 3 ♀♀); Azdavay, Ceviz district, Lower Arpalık (7♂♂, 1 ♀); Azdavay, Karşıyaka district, Deringöl (2♂♂, 4 ♀♀); Azdavay, Omuzlar district (3♂♂); Bozkurt, Ezine river, Yılmaz district (1♂); Çatalzeytin, Cide river

(3♂♂, 1♀); Cide, Cumhuriyet district, Gecen village hill (1 ♀); Daday, Daday river, Göç village (2♀♀); Daday, Sağlık Merkezi (4♂♂); İnebolu, Musaköyü, İslamtepe, İkiçay (3♂♂, 2 ♀♀); Küre, İkiçay (4♂♂, 1♀); Küre, İkiçay, Köprüyanı (5♂♂, 4♀♀); Taşköprü, Köçekli village (5♂♂,4♀♀); Tosya, Deringöziçi, Ortayol, Hasanargı (7♂♂); Tosya, Ortalıca, Dedekayası district, Ortaboğaz (2♂♂); Tosya, Kışla (1♂, 1♀).

Table 6. External and cranial measurements, number of specimens (n), range (r), mean (m), standart deviation (±SD) values for adult male (25) and female (23) *Apodemus sylvaticus* specimens.

Measurement	n	r	m	±SD
Total length	43	175-218	194.5	10.08
Length of head and body	43	85-114	96.2	6.41
Length of tail	43	87-110	98.3	5.78
Length of hind foot	47	19-25	22.6	1.34
Length of ear	45	13-22	16.1	1.96
Weight (gr.)	48	19-36.5	24.3	3.7
Condylobasal length	25	21.6-25.3	23.3	1.02
Nasal length	43	8.0-10.9	9.3	0.59
Occipitonasal length	24	22.6-27.7	25.2	1.09
Length of diastema	42	6.3-7.8	6.9	0.35
Basilar length	25	18.3-21.6	19.9	0.88
Zygomatic width	22	12.1-14.1	12.8	0.53
Alveolar length of upper molar	43	3.5-4.2	3.8	0.14
Interorbital width	45	3.8-4.5	4.1	0.19
Height of skull	21	8.3-10.7	9.3	0.48
Alveolar length of lower molar	42	3.4-4.2	3.8	0.15
Length of mandible	47	11.8-14.3	13.0	0.52

Dryomys nitedula (Pallas, 1778)

1778. *Mus nitedula* Pallas Nor. Sp. Quadr. Glir. Ord. p. 88.
Type locality: Volga, Russia.
1910. *Dryomys nitedula* Trouessort, Faune Mamm. d'Europe, p. 133.

Diagnostic characters: The tail is as long as the head and body. A mask live black stripe passes from the nose tip to the ear, surrounding the eyes. The tail is completely covered with thick and long hair. The skull and rostrum are quite long and bullae is not developed. The hind foot is 21 mm, and alveolar length of upper molar 3.8 mm.

Habitat: One specimen was caught from a garden of apple, grapes, etc.

Fur colour: Over the head, it has a narrow, mask-like black stripe running from the mouth to the ear, surrounding the eyes. The dorsal colour is light yellow with pale brown tone, ventral colour light yellow. The tail is very light yellowish gray on the upperside, and yellowish gray below.

Measurements: Measurements of one specimen (♂): Head and body 95 mm; total length 190 mm; tail 95 mm; hind foot 21 mm; ear 14 mm; weight 24 gr; condylobasal length 22.6 mm; nasal length 9.3 mm; occipitonasal length 25.2 mm; length of diastema 5.8 mm; basilar length 19.8 mm; zygomatic width 15.0 mm; alveolar length of upper molar 3.8 mm; interorbital width 4.1 mm; height of skull 11.4 mm; alveolar length of lower molar 4.0 mm; length of mandible 12.3 mm.

Locality and specimen examined: Kastamonu, Tosya, Gavurçayı (1♂).

Allactaga euphratica Thomas, 1881

1881. *Allactaga euphratica* Thomas, Ann. Mag. N.H. 8:15.
Type locality: Iraq.

Diagnostic characters: Tail 220 mm, ear 71 mm, weight 110 gr. The thympanic bullae is small and 6.6 mm. The condylobasal length is 30.9 mm, alveolar length of upper molar 6.8 mm long.

Habitat: It lives in areas with very poor vegetation, with thorny brushes, away from aquatic environments.

Fur colour: Dorsal hair bottom is light yellowish orange and surface light smoky gray with the general appearance being in dirty yellow with reddish brown tones. Ventral is light dirty white. The tip of the tail is covered with a bunch of hair in a sequencial colour of brown-gray and white.

Measurements: Measurements of one specimen (♀): Head and body 153 mm; total length 373 mm; tail 220 mm; hind foot 42 mm; ear 71 mm; weight 110 gr; condylobasal length 30.9 mm; nasal length 13.3 mm; occipitonasal length 32.0 mm; length of diastema -; basilar length 26.6

mm; zygomatic width 23.0 mm; alveolar length of upper molar 6.8 mm; interorbital width 9.6 mm; height of skull 15.2 mm; alveolar length of lower molar 6.9 mm; length of mandible 18.4 mm.

Locality and specimen examined: Kastamonu, Tosya, Kurtbeli, Sapaca village (1 ♀).

CONCLUSION

A total of 145 rodent specimens were obtained from the study area as a result of 100 day field work. These specimens represent 10 genera and 12 species. With the most abundant 78 specimens *Apodemus sylvaticus* comes first, followed by *Microtus arvalis* with 17, *Apodemus mystacinus* with 14, *Apodemus flavicollis* with 13, and *Clethrionomys glareolus* with 11 specimens. Of the species represented by only one genus, one or several specimens could be caught.

Only one specimen was provided for every 38 of 5500 traps, set up in the field. As the field work was come out to the extend that weather conditions and financing allowed, traps were first built at random in different habitats for the purpose of catching specimens belonging to various species. And even no work could be done in spring season when rodents are the most activated. Studies had to be shiffed to summer months when these animals are relatively less active.

Up to date, as many as 17 genera have been recorded to be living in the Black Sea Region. Records are available of 8 genera from the study area, namely, *Sciurus anomalus, Cricetulus migratorius, Clethrionomys glareolus, Microtus arvalis, Rattus rattus, Mus musculus, Apodemus mystacinus, Apodemus sylvaticus, Allactaga euphratica.*

Meriones blackleri was later made synonym into *Meriones tristrami* (Matthey, 1957). This species was not met during the research. As a result, it was found out that 3 species of 3 genera, *Spalax leucodon, Apodemus flavicollis* and *Dryomys nitedula*, were surviving, and this is the difference from the previous records.

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