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HEDGEHOGS AND SHREWS OF TURKEY

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Very little has been written on the Order Insectivora (böcek yiyenler familyasi) of Turkey. Available, however, are a few reports on collections of shrews (see species discussions) as well as Wettstein's (1941) analysis of subspeciation in the European hedgehog. Some information on the natural history of Insectivora was compiled by Tolunay and Tuncok (1938). My collections have extended the known ranges of several species and added to the knowledge of their ecology and distribution.

I have written elsewhere on the geography and the vegetation of Turkey (Osborn, 1962). Several good references are Bell (1931), Neuhäuser (1936), Fisher (1950), Kosswig (1955), and the Food and Agriculture Organization of the United Nations report (1959).

I have put into parentheses equivalents of geographical and other names. The Turkish names of animals are mostly from Tolunay and Tuncok (1938). All measurements are in millimeters. The following abbreviations have been used to simplify tabulations: HBL, for head and body length; foot, for the length of the hindfoot with the claw, unless indicated otherwise; CbL, condylobasal length; RBr, rostral breadth; ZW, zygomatic width; and B.M., British Museum (Natural History).

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Family Erinaceidae

Hedgehogs (Kirpiler)

Erinaceus europaeus Linnaeus

Common hedgehog (adi kirpi, kandosere).

This animal is widely distributed in Europe and Asia (Ellerman and Morrison-Scott, 1951), on many of the islands in the Aegean Sea (Wettstein, 1941), and it is common to all parts of Turkey except possibly the high mountains and the open plains. On the steppe it is probably limited to the watercourses as indicated by the records from southeastern Turkey, northern Syria, Iraq, and Iran (fig. 1). The geographic range extends along the Levant southward into Israel. Bodenheimer (1958) said that "stragglers had been found as far south as Ruhama and Gaza."

The localities of the collection and the measurements of my specimens are as follows:

locality	*HBL*	*tail*	*foot*	*CbL*	*ZW*
Istanbul	204	25	43	50.0	30.5
Tarsus	209	32	50	57.2	35.9
Tarsus	137	22	39	43.3	26.2
Talas	244	24	46	57.8	37.3
Yalova	244	–	50	63.0	38.6

The facial patterns of these specimens match the illustrations of *Erinaceus europaeus roumanicus* (Herter, 1938) and the "östliche Formen" of Van den Brink (1956). The facial patterns of the specimens from Tarsus are, however, more like the Rhodes type.

Specimens from Istanbul and Yalova have a single color band on the majority of the spines. Two color bands are present on the spines of specimens from Tarsus and Talas. Single color bands have been reported from northeastern Anatolia, northern Greece, the islands of

Rhodes and Crete, Italy, Sardinia, Sicily, the Iberian Peninsula (Wettstein, 1941), Palestine (Thomas, 1918), and Lebanon (Bate, 1945) while in other parts of the range two color bands are thought to be more common. Wettstein (1953) considers that the character of a single color band is older than two color bands. Further analysis of facial patterns and the color bands on a geographical basis should be of value; however, considerably more collecting would be necessary. The number of specimens from Turkey is small and the majority are melanistic forms from the eastern Black Sea region.

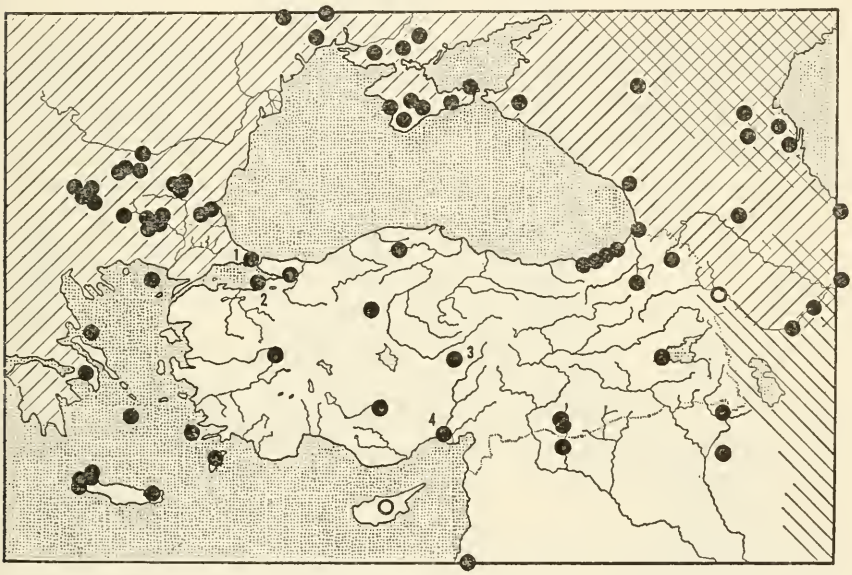

FIGURE 1

Erinaceus europaeus
probable range
localities of collection

Hemiechinus auritus
probable range
localities of collection

new collection records: 1 Istanbul; 2 Taşköprü, Yalova; 3 Talas, Kayseri; 4 Tarsus

After Bobrinskii et al (1944), Bate (1903), Herter (1938), Van den Brink (1956), Satunin (1901), Missone (1959), Hatt (1959), Markov (1957), Wettstein (1941, 1953), Thomas (1918), Harrison (1956), Hoogstraal (1959), Hoogstraal and Kaiser (1960), and the British Museum and the Berlin Zoological Museum collections.

Hedgehogs could have moved between western Anatolia and Thrace before the formation of the Bosporus and the Dardanelles. The island collections indicate that there was interchange between Greece and Anatolia across "Aegean Land" (Pohle, 1953) (fig. 1). Wettstein (1941, 1953) considered the specimens from the Aegean Islands and Crete to show overlapping of characters from east and west.

***Hemiechinus auritus* Gmelin**

Long-eared hedgehog (uzun kulaki kirpi).

Despite the widespread distribution of this species in southwestern Asia, it has been recorded only from Aralyk in eastern Anatolia (Satunin, 1901). It occurs on Cyprus (Bate, 1903) but *Erinaceus europaeus* does not (fig. 1).

Family Soricidae

Sharp-Nosed Mice (Sivri Burunlu Fareler)

***Sorex minutus* Linnaeus**

Dwarf sharp-nosed mouse (sivri burunlu cüce fare), lesser shrew.

The range of this shrew includes most of Europe (Van den Brink, 1956), the western, northern, and eastern USSR, and Transcaucasia (Ellerman and Morrison-Scott, 1951). There is a collection in the

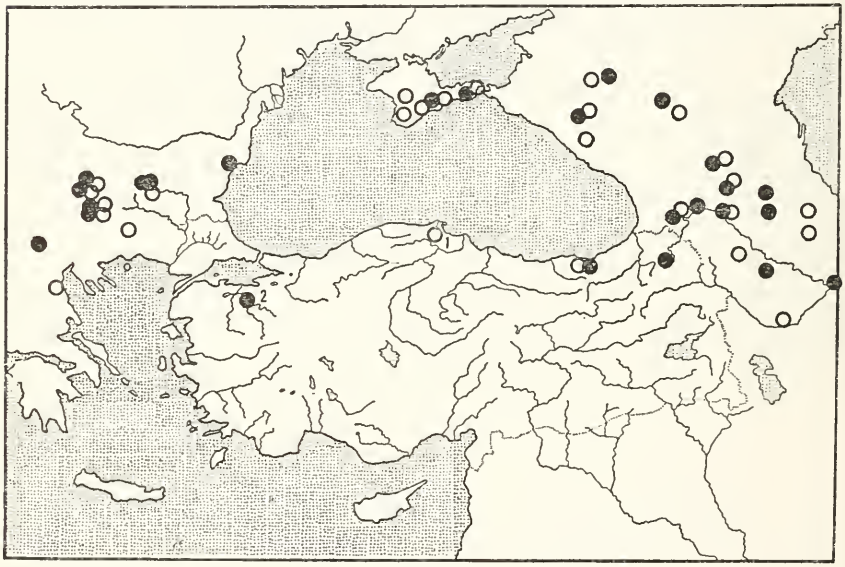

FIGURE 2

Sorex minutus
○ localities of collection
new collection record: 1 Bürnük

Sorex araneus
● localities of collection
new collection record: 2 Ulu Dağ

After Markov (1957), Bobrinskii et al (1944), Thomas (1913), and the British Museum collection.

British Museum (Natural History) from the mountains south of Trebizon(d) (Trabzon), Turkey. I collected three specimens from the same locality near Mereyem Ana (fig. 2) and two specimens near Bürnük, south of Sinop.

The external measurements of my specimens of *S. minutus* together with those from the British Museum collection are listed in table 1. The size of the Bürnük specimens of *S. minutus* approaches that of *S. araneus* but dental characters show that these specimens are *S. minutus*.

TABLE 1.—*External measurements of* Sorex minutus *from Turkey*

No.	Locality	HBL	Tail	Foot
526	Mereyem Ana	56	48	12
541	Mereyem Ana	64	45	12
546	Mereyem Ana	58	44	11
6.3.6.22 (B.M.)	Sumela	55	46	11*
6.3.6.23 (B.M.)	Sumela	58	43	11*
6.3.6.24 (B.M.)	Sumela	55	45	11*
6.3.6.25 (B.M.)	Sumela	55	44	11.5*
6.3.6.26 (B.M.)	Sumela	53	40	11.5*
6.3.6.27 (B.M.)	Sumela	52	42	11*
6.3.6.28 (B.M.)	Sumela	60	45	12*
6.3.6.216 (B.M.)	Sumela	54	43	11*
6.3.6.217 (B.M.)	Scalita	56	42	11*
668	Bürnük	74	35	12
677	Bürnük	67	41	12

*Without claw.

S. minutus was trapped near Mereyem Ana in burrows in the dense leaf mold under rhododendron, beside holes between rocks under the same cover, and in a spruce forest. At Bürnük I caught this shrew in a dense stand of fir.

The localities of collection indicate that this shrew could have moved into Anatolia either from the Balkans via Thrace or from the Caucasus.

Sorex araneus Linnaeus

Sharp-nosed mouse of the forest (sivri burunlu orman faresi), common shrew.

The range of this shrew is approximately that of *S. minutus*, except that it has penetrated into drier and colder habitats than the latter.

S. araneus has been collected near Miusaret, Kars district, eastern Anatolia (see reference in Ellerman and Morrison-Scott, 1951). Thomas (1913) recorded the species from "Sumela, thirty miles south of Trebizond 1,000–1,300 m." I collected seven specimens from this same location, which is now called Mereyem Ana. A single specimen was collected on Ulu Dağ in western Anatolia at about 1400 meters elevation (fig. 2).

S. araneus was trapped along with *S. minutus* in burrows under rhododendron, in spruce forest near a large rock-outcropping, and

among rocks on a steep, damp slope that supported a hardwood forest. On Ulu Dağ the specimen was trapped alongside a stream in the fir forest.

The measurements of my specimens together with those from the British Museum collection are listed in table 2.

The remark made above regarding the migratory route followed by *S. minutus* applies to this shrew as well.

TABLE 2.—*External measurements of* Sorex araneus *from Turkey*

No.	Locality	HBL	Tail	Foot
515	Mereyem Ana	76	54	14
537	Mereyem Ana	77	55	15
542	Mereyem Ana	81	52	15
547	Mereyem Ana	75	49	14
565	Mereyem Ana	77	49	14
582	Mereyem Ana	76	48	—
888	Mereyem Ana	70	52	14
6.3.6.14 (B.M.)	Sumela	67	50	12.5*
6.3.6.15 (B.M.)	Sumela	70	48	13*
6.3.6.16 (B.M.)	Sumela	66	49	13*
6.3.6.17 (B.M.)	Sumela	70	49	13.5*
6.3.6.19 (B.M.)	Sumela	68	52	13*
6.3.6.20 (B.M.)	Sumela	67	52	13.5*
6.3.6.21 (B.M.)	Sumela	72	52	12.5*
6.3.6.25 (B.M.)	Sumela	70	50	14*
6.3.6.212 (B.M.)	Sumela	70	50	14*
6.3.6.213 (B.M.)	Sumela	70	53	13.5*
6.3.6.214 (B.M.)	Sumela	71	51	13.5*
6.3.6.26 (B.M.)	Khotz	70	53	14*
6.3.6.27 (B.M.)	Khotz	77	55	13*
6.3.6.211 (B.M.)	Khotz	80	55	13*
911a	Ulu Dağ	56.5	36.5	13

*Without claw.

Neomys anomalus Cabrera

Sharp-nosed mouse of the water (sivri burunlu su faresi), round tailed water shrew.

This shrew is known to have a discontinuous distribution in Europe (Van den Brink, 1956 and Niethammer, 1953). Records of collections are from a scattering of localities. A sight record from Jerusalem has never been verified (Bodenheimer, 1935, 1958). Miller (1908) reported the collection of a specimen "twenty-five miles north of Erzerum, 7,000 ft., Asia Minor." I collected three specimens in a swampy area along a stream called Rive Çayisi or Irve Deresi near Mahmutşevketpaşa (Ömerli). These specimens indicate that the

distribution of *N. anomalus* previously was continuous between western Anatolia and southeastern Europe (fig. 3).

The external measurements of my specimens and Miller's (1908) are as follows:

collection	*HBL*	*tail*	*foot*
Osborn	87	53	18
Osborn	79	47	17*
Osborn	82	47	17*
Miller	88	58	18.5

*Without claw.

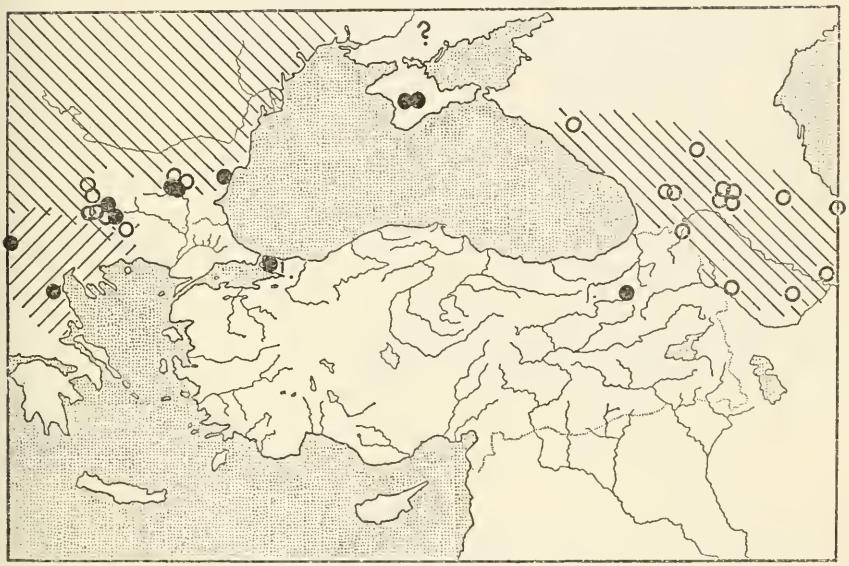

FIGURE 3

Neomys anomalus
probable range
localities of collection
new collection record:
1 Mahmutşevketpaşa (Ömerli)

Neomys fodiens
probable range
localities of collection

After Van den Brink (1956), Bobrinskii et al (1944), Markov (1957), and Niethammer (1953).

Neomys fodiens

This European water shrew has been collected in the Georgian and Armenian SSR near the Turkish border and probably will be found to occur in eastern Antolia (fig. 3).

Crocidura leucodon Hermann

Sharp-nosed mouse of the fields (sivri burunlu tarla faresi), bicolor white-toothed shrew.

This shrew is widely distributed and has been reported from all countries adjacent to Turkey except Syria (fig. 4). Bodenheimer (1958) reported the species *C. lasiura lasia* Thomas 1906 = (*C. leucodon*) as being common in Lebanon.

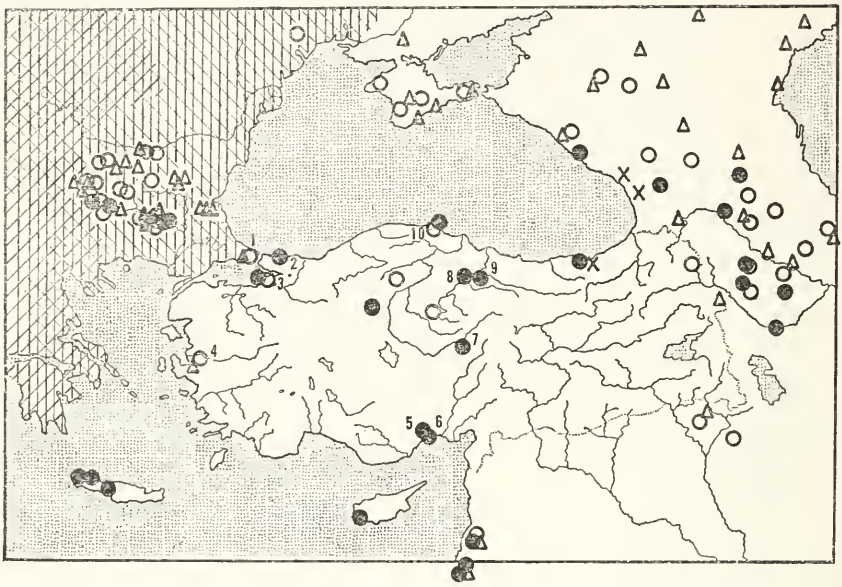

FIGURE 4

Crocidura russula

probable range
localities of collection
new collection records: 2 Şile; 3 Taşköprü, Yalova; 5 Cehennem Dere; 6 Tarsus; 7 Kayseri; 8 Amasya; 9 Borabay Lake, Taşova; 10 Bektaşağa, Sinop

Crocidura lasiura

localities of collection

Crocidura leucodon

probable range
localities of collection
new collection records: 1 Istanbul; 3 Taşköprü, Yalova; 10 Bektaşağa, Sinop

Crocidura suaveolens

probable range
localities of collection
new collection records: 1 Istanbul; 4 Izmir

After Van den Brink (1956), Bobrinskii et al (1944), Hatt (1959), Markov (1957), Bate (1903, 1945), Wettstein (1953), Allen (1915), Harrison (1956), Bodenheimer (1958), and the collections of the British Museum and the Zoological Museum, Munich.

Thomas (1906) first recorded the species from Turkey in the mountains south of Trabzon. There are a few specimens in the British Museum from Changra (Çankiri), Yozgat, and Smyrna (Izmir). I collected two specimens near Bektaşağa, Sinop, and one at Taşköprü, Yalova. Seven from the vicinity of Istanbul represent the first specimen records from Thrace even though Van den Brink (1956) included this area on his map of the range of this species.

In Anatolia, *C. leucodon* was trapped together with *C. russula* along streams under bracken and other dense vegetation and in thick ground litter in hardwood forest. Near Istanbul, *C. leucodon*, along with *C. suaveolens*, was trapped in dense grass under poplar trees.

The characters used by Miller (1912) and Ellerman and Morrison-Scott (1951) to separate *C. leucodon* from *C. russula* can not always be used with satisfaction. Dental characters are useful only when dealing with young animals and an overlap of measurements of the two species is rather marked (tables 3 and 4).

Dr. Henry W. Setzer of the Smithsonian Institution was kind enough to check my material; his notes on the differences between the two species based on a comparison with specimens in the British Museum are:

> *C. leucodon* is markedly whiter on the belly, with the white extending farther up the side. The tail is markedly bicolor in all pelages. There is a pronounced dark streak of color over the tarsus and onto the hallux. The skull is generally flat in the braincase; sides of the skull (braincase) nearly parallel. *C. russula* is pale grayish on the belly, not extending markedly on the sides. Tail not bicolor; no dark colored streak on tarsus or hallux. Skull rather rounded dorsally and sides quite convergent anteriorly. Both *leucodon* and *russula* are of about the same body and cranial size as well as in proportion.

A large series of specimens from Scalita, Trabzon district, in the British Museum were originally said to be *C. leucodon* by Thomas (1906) but were later referred to *C. lasiura* (Ellerman and Morrison-Scott, 1951). The tails of these shrews range from 38–45 millimeters

TABLE 3.—*External and cranial measurements and tail/head and body length ratios of* Crocidura leucodon *from Turkey*

No.	Date	HBL	Tail	Tail/HBL (%)	Foot	Skull			RBr
						Length	Width	Height	
Bektaşağa, Sinop, 1959:									
695	Sept. 8	73	43	59	14	18.4	9.8	5.5	5.9
698	Sept. 8	78	46	59	14	18.7	9.0	5.6	5.7
Taşköprü, Yalova, 1960:									
1092	May 16	84	38	45	14	20.0	9.4	5.9	6.5
Army Sanitorium, Derbent, Istanbul:									
997	Jan. 24	73	35	48	14	19.7	9.5	5.7	6.5
1002	Jan. 28	76	32	42	14	20.4	9.5	5.7	6.7
1003	Jan. 28	70	35	50	14	19.7	9.3	5.6	6.5
1005	Jan. 28	72	34	47	14	19.0	9.3	5.4	6.5
1012	Jan. 29	74	35	47	14	18.9	8.9	5.4	6.3
1019	Jan. 30	80	34	42	14	19.2	9.4	5.7	6.7
1020	Jan. 30	78	(29)	(37)	14	19.5	9.3	5.6	6.4

TABLE 4.—*External and cranial measurements and tail/head and body length ratios of* Crocidura russula *from Turkey*

No.	Date	HBL	Tail	Tail/HBL (%)	Foot	Skull			RBr
						Length	Width	Height	
Tarsus, 1959:									
761	July 20	74	42	56	14	18.3	8.3	5.5	5.7
762	July 20	76	46	61	15	19.8	9.1	5.6	6.1
765	July 21	84	49	58	15	18.8	8.8	5.6	6.2
777	July 23	64	48	75	13	–	8.5	5.2	–
Cehennem Dere, 1959:									
794	July 30	64	45	70	13	18.1	8.5	5.3	5.5
800	July 31	70	45	64	14	19.0	8.8	5.6	5.8
801	July 31	74	46	62	13	18.3	8.7	5.3	5.8
804	Aug. 1	74	45	62	13	18.7	9.0	5.6	5.8
805	Aug. 1	76	46	60	14	18.3	8.8	5.3	5.8
811	Aug. 1	68	50	74	14	19.0	8.6	5.5	5.8
812	Aug. 1	74	47	64	14	18.4	8.5	5.6	5.7
Kayseri, 1959:									
834	Aug. 11	72	43	60	14	18.0	8.5	5.4	5.6
843	Aug. 11	66	46	70	13	17.4	8.5	5.0	5.4
Şile, 1959:									
965	Sept. 26	62	38	61	13	16.4	7.9	4.8	5.2
Mereyem Ana, Trabzon, 1958:									
581	Aug. 1	80	37	46	(13)	20.6	9.5	5.7	6.6
Amasya, 1958:									
596	Aug. 10	65	48	74	14	18.5	8.5	5.4	5.9
Borabay Lake, Taşova, 1958:									
609	Aug. 16	70	45	64	14	18.7	8.9	5.4	5.7
619	Aug. 18	72	43	60	15	18.4	8.8	5.4	6.0
620	Aug. 18	73	39	53	13	18.0	8.7	5.2	5.7
Bektaşağa, Sinop, 1959:									
686	Sept. 6	72	45	62	14	18.1	8.7	5.3	5.7
687	Sept. 6	75	41	55	13	18.9	9.0	5.7	5.5
688	Sept. 6	74	45	61	14	19.0	8.9	5.6	6.0
691	Sept. 6	70	43	60	13	17.7	8.5	5.3	5.7
692	Sept. 6	74	43	58	14	18.6	8.8	5.4	6.0
703	Sept. 8	68	46	68	14	18.7	8.9	5.4	5.9
704	Sept. 8	72	47	65	14	18.9	8.9	5.3	6.0
Taşköprü, Yalova, 1960:									
1090	May 16	75	37	50	13	18.1	8.8	5.6	6.0
1091	May 16	76	41	54	13	18.9	8.7	5.6	6.0

and from 47–56 percent of the head and body length. Specimens of *C. leucodon* from other parts of Turkey (table 3) have tails varying from 32–46 millimeters and 42–59 percent of the head and body length. Vinogradov (1958) questioned the taxonomic status of

C. lasiura from the Black Sea on the basis of the similarity of the genitalia of the named forms which he examined. The localities of these specimens are shown in figure 4.

The distribution of *C. leucodon* (fig. 4) suggests that, prior to the formation of the Bosporus, there was continuous distribution of the species between Anatolia and the Balkans via Thrace.

Crocidura russula Hermann

Sharp-nosed mouse of the house (sivri burunlu ev faresi), European white-toothed shrew, greater white-toothed shrew.

This shrew is widely distributed in Europe and Asia (Bate, 1945; Bobrinskii et al., 1944; Bodenheimer, 1958; Dor, 1947, and Van den Brink, 1956). It is the only species of shrew from the Near East known to exist on an island, being reported from Crete by Bate (1905) and Wettstein (1953). Prior to my collections, *C. russula* was known to occur in Turkey only in the mountains south of Trabzon (Thomas, 1906) and in the vicinity of Ankara (two skins in the Zoological Museum, Munich) (fig. 4; table 4).

Specimens of *C. russula* were trapped in various habitats. One was captured by hand at mid-day on the open beach sand at Şile. A few were trapped in piles of trash from gardens and fields. The specimen from Mereyem Ana was trapped in grass in an abandoned field. Near Cehennem Dere (Hell River) south of Namrun, specimens were trapped among stones in a pine and fir forest, and in a hardwood forest near Bektaşağa, Sinop. Two specimens were taken in a swamp in the steppe 15 kilometers northeast of Kayseri. The majority of specimens, however, came from streambanks, springs, or swamps. The labels on two specimens from Ankara in the Zoological Museum, Munich, read: "collected in house."

My specimen from Sumela (Mereyem Ana) and those in the British Museum from Scalita and Khotz (Çosandere) in the mountains south of Trabzon are very dark and concolor probably as a response to the humid conditions found in the eastern Black Sea region. Other species of mammals such as *Erinaceus europaeus*, *Pityms subterraneus*, and *Clethrionomys glareolus* also are darkest in this part of their range.

Previous records of the distribution of *C. russula* indicated a broad discontinuity between populations of southeastern Europe and central Anatolia. Now, however, with my collections from western Anatolia and the records of Markov (1957) from Bulgaria, there is a good indication that the species probably occurs in Thrace. The species could have migrated from Europe to Anatolia either via Thrace or across the southern Aegean land bridge via Crete.

Crocidura suaveolens Pallas

Lesser white-toothed shrew.

This shrew has been collected in Bulgaria (Markov, 1957), Greece (Miller, 1912), and the USSR north and east of the Black Sea (Bobrinskii et al., 1944). The species is also known from Iran (Goodwin, 1940), Iraq (Harrison, 1956), and Palestine (Thomas, 1920, and Bodenheimer, 1958). Although Van den Brink (1956) indicated that the species occurred in Thrace, my seven specimens are the first to have been recorded from the region. Three specimens from Yalikahve, Izmir, represent their first occurrence in western Anatolia (fig. 4).

TABLE 5.—*External and cranial measurements and tail/head and body length ratios of* Crocidura suaveolens *from Turkey*

No.	Date	HBL	Tail	Tail/HBL (%)	Foot	Skull			RBr
						Length	Width	Height	
Yalikahve, Izmir, 1959:									
711	Jan. 22	68	42	62	13	17.5	8.5	5.3	5.5
716	Jan. 22	77	37	48	12	17.0	8.5	5.2	5.7
719	Jan. 22	64	42	66	13	17.0	8.4	5.0	5.7
Army Sanitorium, Derbent, Istanbul, 1960:									
1004	Jan. 28	67	39	60	14	18.0	8.5	5.1	5.7
1006	Jan. 28	63	37	58	13	17.0	8.4	5.2	5.4
1017	Jan. 30	62	39	63	12	16.7	8.6	5.1	5.6
1018	Jan. 30	64	35	55	12	18.4	8.5	4.9	5.6
Kağithane Dere, Istanbul, 1960:									
1034	Feb. 28	72	37	51	13	17.8	8.6	5.4	5.9
1043	Mar. 21	70	40	57	13	17.3	8.4	5.0	5.7
1044	Mar. 21	70	39	57	13	17.5	8.4	5.1	5.8

Specimens from Yalikahve were trapped in bamboo along the highway; those from the Istanbul area were in dense vegetation along a stream and in grass in a poplar forest.

Locality records in Thrace and Anatolia suggest that there previously was a connection between populations of *C. suaveolens* that have now been separated by the Bosporus (fig. 4).

Specimens and measurements of *C. suaveolens* are listed in table 5.

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