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Research Note

An Investigation on Fish Fauna of the River Mert (Samsun)

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Abstract: This study was carried out between May 1999 and June 2000 in order to determine the fish species of the River Mert. In total, 244 individuals from different sampling stations were caught by electric shock, scoop nets, fish nets and fishing lines. In this study, 3 species and 2 subspecies were identified as belonging to 3 families (Cyprinidae, Cobitidae, Gobiidae). The systematic characteristics of fish species were explained. These characteristics were then compared with those in previous studies, and keys to identification were also presented.

Key Words: River Mert, Osteichtyes, Taxonomy, Fauna.

Mert Irmağı (Samsun) Balık Faunası Üzerine Bir Araştırma

Özet: Mert Irmağında yaşayan balık türlerini ortaya çıkarmak amacıyla yapılan bu araştırma, Mayıs 1999-Haziran 2000 tarihleri arasında gerçekleştirilmiştir. Farklı istasyonlardan toplam 244 örnek; elektro-şoker, balık kepçeleri, serpme ve oltalar aracılığıyla yakalanmıştır. Bu çalışmada 3 familya (Cyprinidae, Cobitidae, Gobiidae)'ya ait 3 tür ve 2 alttür tespit edilmiştir. Balık türlerinin sistematik karakterleri açıklanarak daha önce yapılan çalışmalarla karşılaştırmaları yapılmış ve tayin anahtarı verilmiştir.

Anahtar Sözcükler: Mert Irmağı, Osteichtyes, Taksonomi, Fauna.

Introduction

Turkey is a country rich in terms of its aquatic ecosystems and water sources owing to its geomorphological structure. It is necessary to find out the biological richness, especially with regards fish faunae, to increase the utilisation of products obtained from inland water sources. The first systematic research about freshwater fish in Turkey was carried out by Abbott in 1835 (1). Foreign researchers took fish samples that they had caught from Turkey to European museums, and made taxonomic publications related to these fish from 1835 to 1940 (2). A lot of research has been accomplished related to freshwater fish of Turkey by both local and foreign researchers since 1940. Some of them are Battalgil (3), Kuru (4), Ekingen and Sarıeyyüboğlu (5), Çolak (6), Erk'akan and Kuru (7), Erdemli (8), Kutrup (2), and Ergene (9). Systematic studies by local researchers continue apace, especially after 1971. Thus, a lot of inland water fish faunae have been revealed through taxonomic investigations up till now.

There is no study related to the fish fauna of the River Mert. This river is one of the major rivers near Samsun, and provides a part of the protein requirements of the people in the area. Fish species inhabiting the River Mert must be determined to so as to better allocate resources for the future. This study has been realized to determine the fish species of the River Mert, to contribute to efforts seeking to benefit from fish with economic importance, and to assist similar future investigations.

Materials and Methods

The sources of the River Mert are two streams in Mount Karadağ in the province of Samsun. This river is known as Karadere while it passes through Ladik, and the River Kavak as it passes through Kavak. After the River Kavak joins with the Karataş Stream in Boğaziçi, it takes the name of the River Mert, and empties into the Black Sea.

In this study, stations able to represent the features of the river were determined by taking into consideration

ecological conditions. The locations of the stations are shown in Figure 1. The samples used in this study were caught from different stations between May 1999 and June 2000. Sample collection was generally done by an electric shock and scoop nets; fish nets and fishing lines were used in those regions where electric shock was not used.

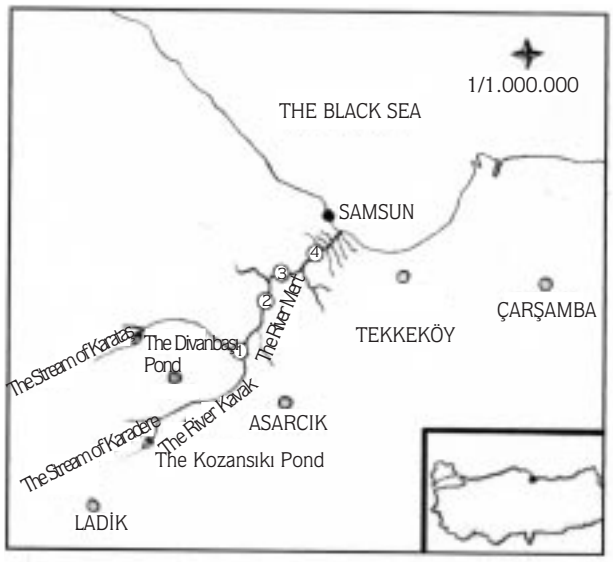

Figure 1. Sampling stations for fish in the River Mert
1: Boğaziçi **3:** Yukarı Avdan
2: Kurcalan **4:** Demirciköy

The fish caught from the River Mert were preserved according to Balık (10). The colours and features of patterns were recorded as well, and photographs were taken before they were fixed.

Pharyngeal teeth, which are important when determining different species of Cyprinidae, were carefully removed from the fish and stood for ten minutes in 4% NaOH. After they were washed with distilled water, the numbers and patterns were determined and their photographs were taken under a stereoscopic binocular microscope. They were preserved in small plastic boxes containing 70% alcohol solution.

Metric measurements were made by a dial caliper with 95% confidence limits and with a fish measurement scale. The following fourteen metric characteristics were measured: total length, standard length, body depth, head length, head depth, head width, predorsal, postdorsal, length of caudal peduncle, depth of caudal peduncle, eye diameter, interorbital distance, snout length and barbel length (Figure 2). All meristic characteristics were counted by lancet, pens and fish needle under a stereoscopic binocular microscope. The meristic characteristics, such as branched and unbranched rays in dorsal, ventral, anal and pectoral fins, lateral lines scales, line transversal scales, body spots, genipor numbers, gill rakers on the first arch, barbel numbers, row and number of pharyngeal teeth were examined (Figure 2).

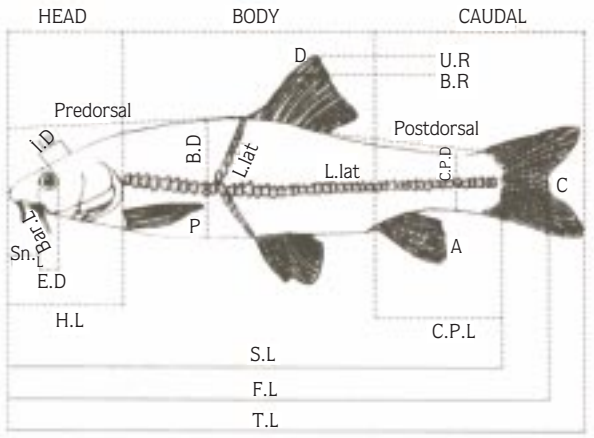

Figure 2. General fish figure showing parts of the body (Adding from Balık,15)
T. L.: Total Length, **D :** Dorsal Fin, **F. L. :** Fork Length, **A :** Anal Fin, **S. L. :** Standard Length, **V :** Ventral Fin, **Sn. L. :** Snout Length, **P :** Pectoral Fin, **E. D. :** Eye Diameter, **C :** Caudal Fin, **H. L. :** Head Length, **B. R. :** Branched Ray, **I. D. :** Interorbital Distance, **U. R. :** Unbranched Ray, **B. D. :** Body Depth, **G. R. :** Gill Rakers, **Bar. L. :** Barbel Length, **S.D. :** Standard Deviation, **C. P. L. :** Length of Caudal, **S. E. :** Standard Error Peduncle, **C. P. D. :** Depth of Caudal Peduncle, **N :** Specimen Numbers, **L. lat. :** Lateral line scales, **Min. :** Minimum, **L. tran. :** Line transversal scales, **Max. :** Maximum, **S q. :** The number of scales on a line between the back of the head and the beginning of the caudal fin in the fish without lateral line.

To determine the systematic positions of fishes inhabiting the River Mert and prepare a key for identification, the following references were used: Slastenenko (11), Kuru (12,13), Geldiay and Balık (14), Balık and Ustaoğlu (15), and Blanc et al. (16).

Findings

Systematic Locations of Fish in the River Mert

A total of 244 individuals caught from the River Mert were evaluated. As a result of this study, 4 genera, 3

species and 2 subspecies belonging to 3 families were identified. These species and subspecies have been classified according to Kuru (12).

PHYLUM :	Chordata
SUBPHYLUM :	Vertebrata
CLADUS :	Gnathostomata
SUPERCLASSIS :	Pisces
CLASSIS :	Osteichthyes
SUBCLASSIS :	Actinopterygii
SUPERORDO :	Teleostei
1. ORDO :	Cypriniformes
SUBORDO :	Cyprinoidei
1. FAMILIA :	Cyprinidae
	Leuciscus cephalus orientalis
	Capoeta capoeta sieboldi
	Capoeta tinca
2. FAMILIA :	Cobitidae
	Orthrias (Noemacheilus) angorae
2. ORDO :	Perciformes
FAMILIA :	Gobiidae
	Gobius (Neogobius) fluviatilis

Key to the Identification of Fish in the River Mert

1. Ventral fins united into a disk (Figure 8.1) ..... GOBIIDAE 2

   Ventral fins not united into a disk (Figure 8.2) 3

2. The head is large. There are two dorsal fins. Second dorsal fin is longer than first and lateral line is absent.....*Gobius (Neogobius) fluviatilis*

3. Barbels in 3 pairs. Maximum body depth is 5 times more than standard length ..... COBITIDAE 4

   Generally mouth without barbels or maximum in 2 pairs. Maximum body depth is 5 times smaller than standard length ..... CYPRINIDAE 5

4. Body is cylindrical. Lateral line complete. Scales are very small. Eyes are small and on the top of the head. Caudal fin lightly recessed .... *Orthrias (Noemacheilus) angorae*

5. Pharyngeal teeth biserial (Figure 3.2). The rear edge of the last unbranched dorsal ray is not serrated (Figure 9.1) 6

   Pharyngeal teeth triserial (Figure 4.2 and Figure 5.2). The rear edge of the last unbranched dorsal ray is serrated (Figure 9.2) 7

6. Lateral line scales 43-47. Anal fin convex. Lips thin and well developed. The head length is always more than the body depth ..... *Leuciscus cephalus orientalis*

7. Barbels in two pairs. Lateral line is more than 60 scales. Lips are not well developed (Figure 10.1) ..... *Capoeta tinca*

   Barbels in one pair. Lateral line is less than 60 scales. Lower lips are fleshy (Figure 10.2) .... *Capoeta capoeta sieboldi*

Species and Subspecies Inhabiting the River Mert

C. c. sieboldi, C. tinca, L. c. orientalis from Cyprinidae, *O. angorae* from Cobitidae, and *G. fluviatilis* from Gobiidae were caught in the River Mert. The synonym, terra typica, local name, and taxonomic characteristics are presented in the data of this study and in the references. The body ratios and meristic characteristics of fish caught in the River Mert are shown in the tables as well.

Familia : CYPRINIDAE

Leuciscus cephalus orientalis (NORDMANN, 1840)

Synonym : *Squalius turcicus* FILIPPI, 1865

Terra typica : Abhaziya

Local name : Tatlısu Kefali

Taxonomic Characteristics

The general body shape of *L. c. orientalis* is shown in Figure 3.1, body ratios, according to the results, are given in Table 1.1, and the meristic characteristics of the fish are shown in Table 1.2.

Body is moderately elongate; mouth is large in terminal position without barbels. Pharyngeal teeth are biserial 2.5-5.2 (Figure 3.2). Lateral line is clearly curved to abdomen. Scales are of moderate size with small dark spots. Posterior edge of dorsal fin is smooth. Anal fin is convex. The colour at back lightens toward laterals. Ventral side is silvery-white. Peritoneum is black.

Figure 3.1. View from the right side of *Leuciscus cephalus orientalis*

Figure 3.2. Pharyngeal teeth of *Leuciscus cephalus orientalis* (x10)

Table 1.1. Body ratios of *L. c. orientalis*

	S.L. / B.D.	S.L. / H.L.	H.L. / E.D.	H.L. / I.D.	I.D. / E.D.
Min.-Max.	4.09–4.95	3.33–4.03	3.43-5.89	1.94–3.07	1.11–2.37
Mean	4.51	3.65	4.16	2.72	1.52
S.D.	0.19	0.12	0.42	0.16	0.18
S.E.	0.01	0.01	0.04	0.01	0.01
N	102	102	102	102	102

Table 1.2. Meristic characteristics of *L. c. orientalis*

	D		A		V		P		L.lat.	L.tran.	G.R.
	U.R.	B.R.	U.R.	B.R.	U.R.	B.R.	U.R.	B.R.			
Min.-Max.	3	7-8	3	7-9	2	7-9	1	15-18	43-46	7.5-8.5 / 3-4	10-12
Mean	3	7.96	3	7.96	2	7.97	1	16.15	44.28	7.73 / 3.79	11.38
S.D.	0	0.19	0	0.24	0	0.29	0	0.68	0.82	0.32 / 0.4	0.71
S.E.	0	0.01	0	0.02	0	0.02	0	0.06	0.08	0.03 / 0.03	0.07
N	102	102	102	102	102	102	102	102	102	102	102

Capoeta capoeta sieboldi (STEINDACHNER, 1864)

Synonym : *Scaphidon sieboldi* STEINDACHNER, 1864

Varicorhinus sieboldi BERG, 1914

Terra typica : Amasya

Local name : Siraz Balığı

Taxonomic Characteristics

General body shape of *C. c. sieboldi* is shown in Figure 4.1, body ratios, according to the results, are given in Table 2.1, and the meristic characteristics of the fish are given in Table 2.2.

Body is fusiform. Mouth is in ventral position, a pair of short barbels at its corner. Length of barbels equal to interorbital distance. Lips are well-developed and fleshy (Figure 10.2). Pharyngeal teeth are triserial 2.3.4-4.3.2 (Figure 4.2). The last unbranched ray of the dorsal and anal fins is ossified (3/4) and the rear edges are serrated (Figure 9.2). Colour: Back is greyish. Ventral side is silvery-white. Anal and pectoral fins are orange. Peritoneum is black.

Capoeta tinca (HECKEL, 1843)

Synonym : *Varicorhinus tinca* BERG, 1914

Scaphidon tinca HECKEL, 1843

Terra typica : Bursa

Local name : Kara Balık

Taxonomic Characteristics

General body shape of *C. tinca* is shown in Figure 5.1, body ratios, according to the results, are given in Table 3.1, and the meristic characteristics of the fish are shown in Table 3.2.

Body is thin and laterally compressed. Mouth is horseshoe-shaped and in ventral position. Barbels are in two pairs. One of pairs is in the corners of the mouth, the others on tip of the snout (Figure 10.1). Scales are small with dark spot. Pharyngeal teeth are triserial 2.3.4-4.3.2 (Figure 5.2). The last unbranched ray of the dorsal and anal fins is ossified (3/4) and the rear edges are serrated (Figure 9.2). Colour at back is black. Ventral side is dirty yellow-white. Peritoneum is black.

Familia : COBITIDAE

Orthrias (Noemacheilus) angorae STEINDACHNER, 1897

Synonym : *Nemachilus brandti* DERJUGIN, 1899

Terra typica : Ankara

Local name : Çöpçü balığı

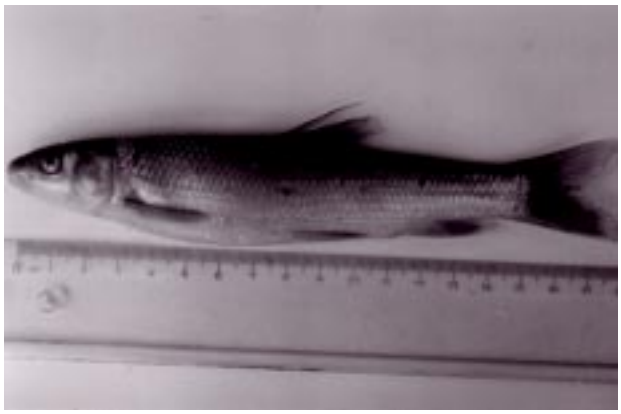

Figure 4.1. View from the right side of *Capoeta capoeta sieboldi*

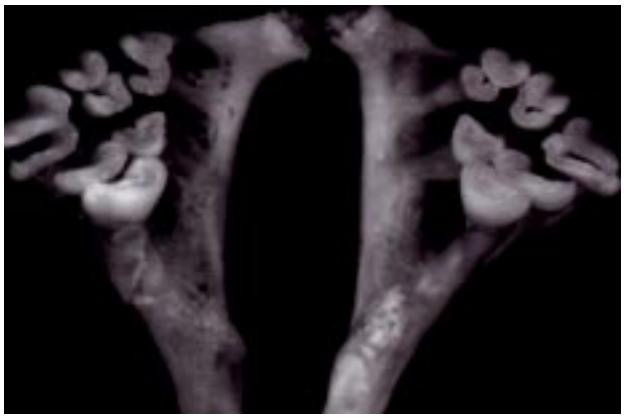

Figure 4.2. Pharyngeal teeth of *Capoeta capoeta sieboldi* (x10)

Table 2.1. Body ratios of *C. c. sieboldi*

	S.L. / B.D.	S.L. / H.L.	H.L. / E.D.	H.L. / I.D.	I.D. / E.D.
Min.-Max.	4.38–4.98	4.01–4.65	4.63-6.48	2.18–3.19	1.70–2.28
Mean	4.76	4.28	5.26	2.66	1.96
S.D.	0.16	0.17	0.39	0.17	0.14
S.E.	0.02	0.02	0.06	0.02	0.02
N	34	34	34	34	34

Table 2.2. Meristic characteristics of *C. c. sieboldi*

	D		A		V		P		L.lat.	L.tran.	G.R.
	U.R.	B.R.	U.R.	B.R.	U.R.	B.R.	U.R.	B.R.			
Min.-Max.	3	7-8	3	5	1-2	6-10	1	16-18	54-60	8-11 / 8-11	25-30
Mean	3	7.94	3	5	1.52	8.08	1	16.88	57.26	9.23 / 9.17	27.11
S.D.	0	0.23	0	0	0.50	0.57	0	0.59	1.71	0.78 / 0.86	1.78
S.E.	0	0.03	0	0	0.08	0.09	0	0.10	0.29	0.13 / 0.14	0.30
N	34	34	34	34	34	34	34	34	34	34	34

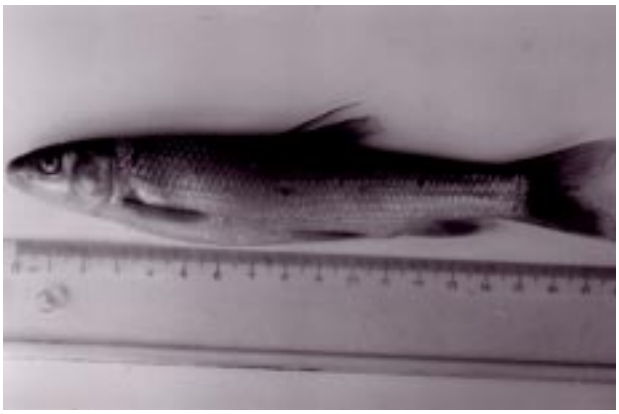

Figure 5.1. View from the right side of *Capoeta tinca*

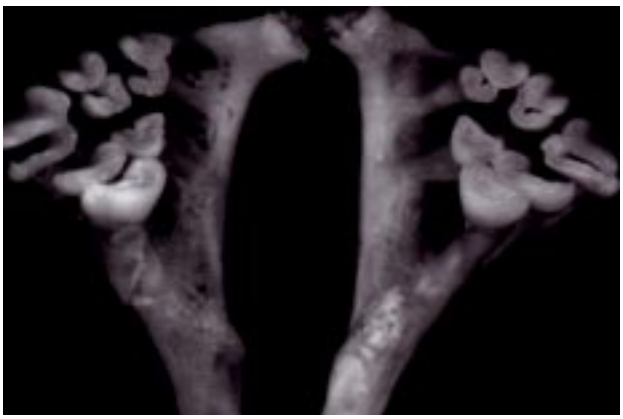

Figure 5.2. Pharyngeal teeth of *Capoeta tinca* (x10)

Table 3.1. Body ratios of *C. tinca*

	S.L. / B.D.	S.L. / H.L.	H.L. / E.D.	H.L. / I.D.	I.D. / E.D.
Min.-Max.	4.22–4.98	3.93–4.72	4.28–6.18	2.35–3.07	1.47-2.50
Mean	4.70	4.25	4.96	2.69	1.85
S.D.	0.20	0.16	0.39	0.14	0.22
S.E.	0.03	0.02	0.05	0.02	0.03
N	46	46	46	46	46

Table 3.2. Meristic characteristics of *C. tinca*

	D		A		V		P		L.lat.	L.tran.	G.R.
	U.R.	B.R.	U.R.	B.R.	U.R.	B.R.	U.R.	B.R.			
Min.-Max.	3-4	8-9	3	5	1	8–9	1	15-19	75-85	11-16 / 10-14	25-30
Mean	3.32	8.02	3	5	1	8.23	1	17.65	80.47	14.26 / 12.37	26.65
S.D.	0.47	0.14	0	0	0	0.43	0	0.84	3.02	1.32 / 1.23	1.46
S.E.	0.06	0.02	0	0	0	0.06	0	0.12	0.44	0.16 / 0.18	0.21
N	46	46	46	46	46	46	46	46	46	46	46

Taxonomic Characteristics

General body shape of *O. angorae* are shown in Figure 6, body ratios, according to the results are given in Table 4.1, and the meristic characteristics of fish are shown in Table 4.2.

Body is cylindrical. Mouth is small and in ventral position. Barbels are in three pairs. Lips are well developed. Upper jaw functions like a tooth. Scales are very small. Lateral line is complete. Pharyngeal teeth are very small, one row. Eyes are small and at the top of the head. Caudal fin is lightly recessed. Colour: greyish-yellow. On the sides of the body, there are nine or eleven distinct dark spots. Sometimes, there are both large and small scattered dark spots.

Familia : GOBIIDAE

Gobius (Neogobius) fluviatilis (PALLAS, 1811)

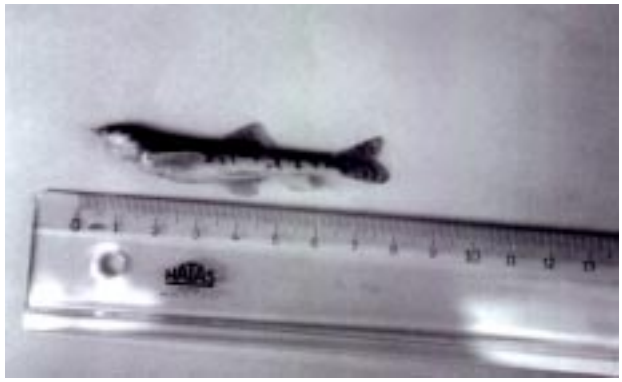

Figure 6. View from the right side of *Orthrias (Noemacheilus) angorae*

Synonym : *Gobius lacteus* NORDMANN, 1840

Gobius steveni NORDMANN, 1840

Terra typica : Rivers emptying into the Black Sea

Local name : Tatlısu Kaya Balığı

Table 4.1. Body ratios of *O. angorae*

	S.L. / B.D.	S.L. / H.L.	H.L. / E.D.	H.L. / I.D.	I.D. / E.D.	Sn.L./E.D.
Min.-Max.	5.19–6.86	3.88–5.03	3.56–5.46	3.31–5.18	1.00–1.38	1.09–2.69
Mean	6.00	4.33	4.47	4.21	1.06	2.10
S.D.	0.42	0.22	0.40	0.35	0.10	0.27
S.E.	0.05	0.02	0.05	0.04	0.01	0.03
N	60	60	60	60	60	60

Table 4.2. Meristic characteristics of *O. angorae*

	D		A		V		P	
	U.R.	B.R.	U.R.	B.R.	U.R.	B.R.	U.R.	B.R.
Min.-Max.	3	8	3	5	1	6–7	1	8–10
Mean	3	8	3	5	1	6.95	1	9.58
S.D.	0	0	0	0	0	0.21	0	0.53
S.E.	0	0	0	0	0	0.02	0	0.06
N	60	60	60	60	60	60	60	60

Taxonomic Characteristics

General body shape of *G. fluviatilis* is shown in Figure 7.1, 7.2 and 7.3. Body ratios. However, the meristic characteristics of the fish, according to the results, are not shown in the tables, because only two samples, which is insufficent for statistical evaluation, were caught the river. The following results were found. The meristic characteristics of *G. fluviatilis* are D_1 = VI, D_2 = I 16, A = I 14, V = I 5, P = 17-18, Sq. = 63-65. The body ratios of *G. fluviatilis* are S.L./B.D.=5.55-5.88, S.L./H.L.=3.46-3.55, H.L./E.D.=4.17-4.79, H.L./İ.D.=9.91-11.52, I.D./E.D.=2.06-2.76, H.W./H.D.=1.27-1.35, C.P.L./C.P.D.= 8.12-8.43.

The body is elongate, anteriorly cylindrical, posterior compressed. There are two dorsal fins. Ventral fins are united into a sucking disk (Figure 7.3 and Figure 8.2). Lateral line is absent. Behind the eyes, nape, back throat, abdomen, pectoral fin bases scaled. Maxillary teeth are a few in number row and conical. Genipors are vertical and in six rows. The body is semi-transparent. The back is dark grey. Lateral sides are with dark spots. In reproductive seasons, male is black (Figure 7.2) and the fins are 1.5 times longer than those studied by Geldiay and Balık (14).

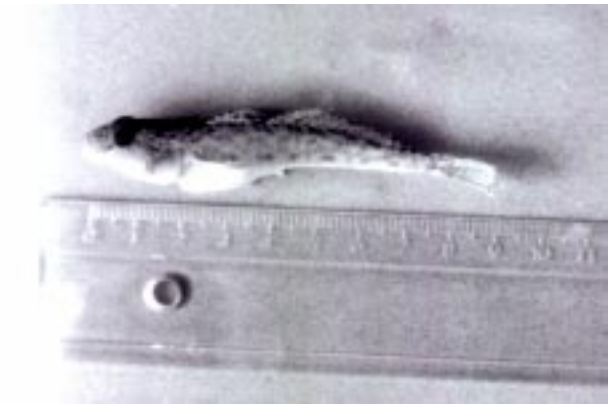

Figure 7.1. View from the right side of *Gobius (Neogobius) fluviatilis*

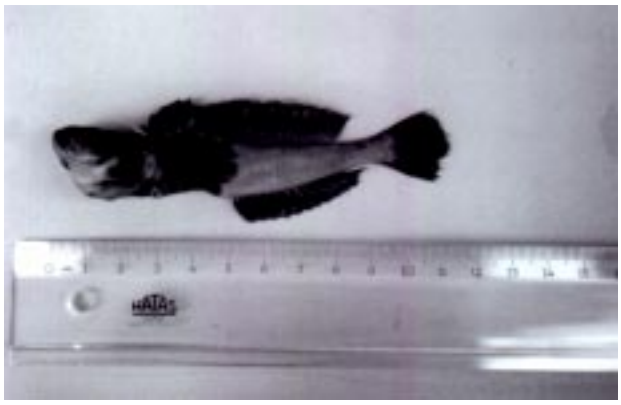

Figure 7.2. View from the right side of *Gobius (Neogobius) fluviatilis*

Figure 7.3. View from the ventral side of *Gobius (Neogobius) fluviatilis*

Discussion

Morphologies of the fish in the River Mert were examined in this study. The results about the metric and

Figure 8.1. United ventral fins like a disk

Figure 8.2. Normal view of ventral fins

Figure 9.1. Non-serrated rear edge of the last unbranched dorsal ray

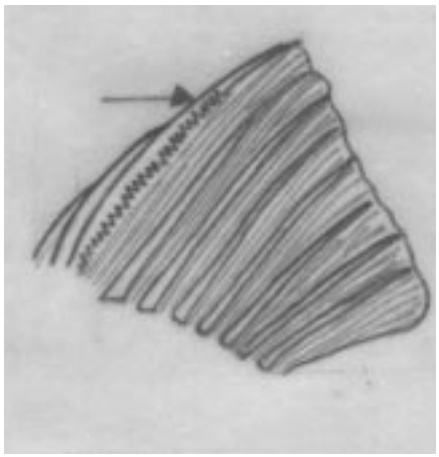

Figure 9.2. Serrated rear edge of the last unbranched dorsal ray

Figure 10.1. Thin and not well developed lips of *Capoeta tinca*

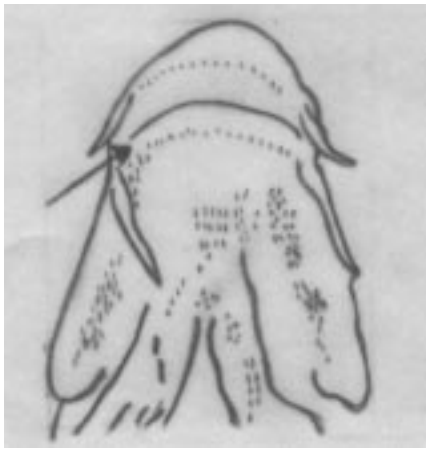

Figure 10.2. Fleshy lower lips of *Capoeta capoeta sieboldi*

meristic characteristics were discussed by comparing them with those obtained from previous studies. As a result of our evaluations, two species and one subspecies from Cyprinidae, one species Cobitidae and Gobiidae were determined.

The body ratios of *L. c. orientalis* are similar to the findings of Slastenenko (11), Çolak (6), Erdemli and Kalkan (17-20), Kalkan and Erdemli (18), Örün and Erdemli (19). Minimum and maximum limits belonging to the meristic characteristics of *L. c. orientalis* are included with given results by Battalgil (3), Slastenenko (11), Kuru (21), Ekingen and Sarıeyyüpoğlu (5), Balık (10), Erdemli and Kalkan (17), and Kalkan and Erdemli (18). However, while D=II 9, P=12-15, V=II 9 according to Ekingen and Sarıeyyüpoğlu (5), D=III 7-8, P=I 15-18, V=II 7-8 according to Table 1.2. As is seen, our results are different from the above-mentioned ones. This difference may stem from the fact that they may think that the bases of last two branched rays in the dorsal and anal fin are one.

The head length of *C. c. Sieboldi* is equal to body depth according to Slastenenko (11), Geldiay and Balık (14), and Çelikkale (22). However, the head length was found to be more than the body depth in our samples. S.L./B.D. ratios are similar to Slastenenko's (11). Minimum and maximum limits belonging to the meristic characteristics of *C. c. sieboldi* are in accordance with the findings of Slastenenko (11), Geldiay and Balık (14), Çelikkale (22), Kuru (21), Erk'akan and Kuru (7), and Alaş et al. (23). However, while the numbers of the unbranched rays in the dorsal fin are 4 according to Slastenenko (11), in our study the number was 3, as is seen in Table 2.2. Lateral line scales have been assayed as being 60-72 by Erk'akan and Kuru (7), and 54-64 in this present study (Table 2.2). Erk'akan and Kuru (7) compared the samples that they examined to *Capoeta capoeta bergamae*, in respect of lateral line scales. However, they defined them as *C. c. sieboldi* because of gill rakers on the first arch.

The body ratios of *C. tinca* resemble the findings of Slastenenko (11). The head length was measured as being smaller than the body depth by Geldiay and Balık (14). The head length was found to be larger than the body depth in the examined samples. The meristic characteristics of *C. tinca* are similar to the findings of Slastenenko (11), Çelikkale (22), Kuru (21), Balık (24), Geldiay and Balık (14), Erk'akan and Kuru (7), and Kutrup (2). Gill rakers on the first arch were noted as being 10-15 by Geldiay and Balık (14), Kuru (21), and Slastenenko (11). This reason behind the increase in gill rakers on the first arch in our samples may be the dominant nourishment of the fish. Morever, according to Altun (25), gill rakers on the first arch may show diversity even among populations of the same species. Line transversal scales were found to be 9 by Slastenenko (11), 22 by Balık (24), 18-21 by Geldiay and Balık (14), and 10-14 in our samples. More reliable results can be obtained by examining the morphometric and meristic characteristics of the *C. tinca* population both inhabiting the River Mert and in another river.

The body ratios of *O. angorae* are similar to the findings of Erdemli and Kalkan (20), Slastenenko (11), Küçük and İkiz (26), and Geldiay and Balık (14). The numbers of the unbranched ray in the dorsal fin are similar to the study of Geldiay and Balık (14), Kuru (12), Balık (10), and Erdemli (27), but different from those studied by Slastenenko (11),Kuru (21), Ekingen and Sarıeyyüpoğlu (5), Erdemli and Kalkan (17, 20), Küçük and İkiz (26), Kalkan and Erdemli (18), and Alaş et al. (23). The numbers of branched rays in the dorsal fin are between the minimum and maximum limits given by the afore mentioned researchers except Erdemli and Kalkan (20), Kalkan and Erdemli (18), and Ekingen and Sarıeyyüpoğlu (5). The numbers of the unbranched ray in the dorsal fin are different from those given by the above mentioned researchers. This value given in Table 5.2 is important due to the fact that it has been given for the first time in this study. The numbers of the branched rays in the anal fin are almost the same as the findings of the above mentioned researchers, except Alaş et al. (23). The numbers of branched and unbranched rays in the pectoral and ventral fins are similar to the findings of Balık (10), Geldiay and Balık (14), Küçük and İkiz (26), and Alaş et al. (23).

The body ratios of *G. fluviatilis* are different from those given in the study by Slastenenko (11). S.L./H.L.=4.25-4.50 according to Slastenenko (11). This diversity may stem from the insufficiency of the samples (only 2). C.P.L./C.P.D. was measured as 1.4-2.6 by Geldiay and Balık (14), but were 8.12-8.43 in our study. We think that the reason behind the large difference between the two findings is the usage of different criteria in the measurement of caudal peduncle length and caudal peduncle depth (Figure 2). The meristic characteristics of

G. fluviatilis go with the findings of Slastenenko (11), Kuru (21), Balık (24), and Geldiay and Balık (14). However, the values of Sq. are not similar to the results given by Kuru (21). We think that these differences may stem from the ecological conditions of the river.

Results and Suggestions

In this study, the numbers of the samples from chosen stations are given in Table 5. The most wide-spread fish is *L. c. orientalis* in the river, according to Table 5.

Wide diversities were observed with respect to the regional origin of the fish species and subspecies that were determined in the river. The origin of *L. c. orientalis* is Central, Southern and Eastern Europe; *O. angorae* is Europe; *C. c. sieboldi* and *C. tinca* are Western Asia (28, 29). *G. fluviatilis* is an old Sarmatian relict form according to Kuru (21). The origin of *G. fluviatilis* has not been understood due to the fact that Sarmatian relict forms can be found only in the Black Sea and in the Caspian Sea, another part of the Sarmatian Inland Sea. In the estuary regions of streams emptying into the Black Sea, Sarmatian members may be seen according to Kosswig and Battalgil (30). This mixed situation in fish fauna of the River Mert may have been caused by intense tectonic movements in previous geological periods.

The investigation area is poorer than many other regions of Anatolia in terms of species and subspecies. The reasons behind it may be explained as follows:

I – One of the most important reasons behind the poverty of fish fauna in the river is the ecological conditions. The River Mert is shorter and more sloped than the other rivers of Samsun. In our investigation area the water runs rapidly and is turbid, except for in the summer. Although five taxa have been determined in this study, there may be other species or subspecies of fish present.

II – In recent years, the decrease in the quantity of the fish caught in the Black Sea directs people of the area towards utilizing freshwater fishes according to Kutrup (1996). Fishing has been performed by illegal methods, such as using electric shock, dynamite, slaked lime or toxic weeds. Since overfishing by the same methods continues, fish species and population stocks have decreased and reached minimum levels nowadays.

III – Water flow in the river has decreased because of the Kozansıkı and Divanbaşı ponds in the river. We think that this decrease may have negatively affected species and subspecies of fish.

IV – Chicken coops have been set up along the Karataş, one of the major branches of the river. These coops empty their waste and medicated water into the river. Thus, they cause massive fish deaths.

V – In the housing area that the River Mert passes through, sewer systems empty directly into the river. This is one of the most important reasons why fish numbers are decreasing.

VI – Some agricultural medicines and fertilizers used in lands around the River Mert run into the river via irrigation and rainwater in certain periods. We think that this situation especially damages sensitive fish eggs and larvae.

Table 5 . Sampling stations in the investigation area, the numbers of caught samples and distribution percentage according to the stations

Sampling Stations	The Numbers of Caught Samples and Distribution Percentage According to Stations										
	Leuciscus cephalus orientalis		*Capoeta capoeta sieboldi*		*Capoeta tinca*		*Orthrias (Noemacheilus) angorae*		*Gobius (Neogobius) fluviatilis*		Total
	N	%	N	%	N	%	N	%	N	%	
Boğaziçi	13	27.66	10	21.28	11	23.40	13	27.66	-	-	47
Kurcalan	48	48	12	12	15	15	25	25	-	-	100
Y. avdan	26	41.94	7	11.29	12	19.35	16	25.81	1	1.61	62
Demirciköy	15	42.86	5	14.28	8	22.86	6	17.14	1	2.86	35

VII – In our opinion, the Yılanlı Stream, which joins the River Mert from the right side 1300 m before the mouth of the river, causes an important problem. At 4 km before the coming together of the Yılanlı Stream and the River Mert, a garbage station has been constructed by Samsun Greater Municipality. Since the Yılanlı Stream Valley is very deep, garbage freely empties into the source of the stream. As well as the garbage station, there is a slaughterhouse, which empties its waste into the stream 500 m before the Yılanlı Stream and the River Mert meet. This region is completely polluted because of black and smelly bottom mud. Due to the above-mentioned reasons, the Yılanlı Stream has polluted both the River Mert and the Black Sea. As is seen, the Yılanlı Stream is an important factor damaging the ecologicy. In this study, fish species were not found in the Yılanlı Stream region.

L. c. orientalis, *C. c. sieboldi* and *C. tinca* inhabiting the river and having economic importance are fished by the people of the area illegally, unconsciously and excessively. As a result of this, the continuity of life in the river has been threatened.

Turkey is very lucky in terms of its variety of species. This richness should be revealed and protected from excessive fishing and pollution.

In the investigation of Kuru (4) entitled "The fresh-water fish in the Terme-Bafra region (Black Sea)", the River Mert was not studied. Therefore, the determination of fish fauna inhabiting the River Mert is important in terms of the composition of the inventory of freshwater fishes in Turkey. *L. c. orientalis*, *C. c. sieboldi*, *G. fluviatilis* were present in the study of Kuru (4), which determined fish stocks between Terme and Bafra. In this study, *C. tinca* and *O. angorae* were found, though they were not in the study of Kuru (4).

Although fish species like *O. angorae* and *G. fluviatilis*, which inhabite the River Mert, are not economically important, they are important in terms of biological richness and the food chain.

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