



Distribution of Fish Fauna on the Upper and Middle Basin of Ceyhan River, Turkey

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Abstract

Fish fauna in the upper and middle Ceyhan River basin were investigated with the distribution and systematical determination from May 2001 to April 2004. The fish specimens were obtained by electro fishing and gill nets from two lakes, two reservoirs and 18 streams. A total of 2,414 specimens were collected and 1,156 of these were investigated diagnostic characteristics. Twenty species belong to 10 families were determined. The fish species determined in the study are: *Anguilla anguilla*, *Salmo trutta macrostigma*, *Cyprinus carpio*, *Acanthobrama* sp., *Alburnus orontis*, *Pseudophoxinus zekayi*, *Squalius kottelati*, *Garra rufa*, *Chondrostoma regium*, *Luciobarbus pectoralis*, *Capoeta angorae*, *Capoeta erhani*, *Cobitis evreni*, *Schistura ceyhanensis*, *Oxyemacheilus* sp., *Silurus glanis*, *Clarias gariepinus*, *Aphanius mento*, *Gambusia affinis* and *Salaria fluviatilis*. Endemic species *Pseudophoxinus zekayi*, *Capoeta erhani*, *Schistura ceyhanensis* and *Cobitis evreni* reported in recent years were described.

Salaria fluviatilis present stations which under 750 m altitudes while *Anguilla anguilla* was not present in the upper Ceyhan River basin. *S. t. macrostigma* was also determined in the streams and river located between 720-1,474 m altitudes. *Capoeta angorae*, *Garra rufa* and *Alburnus orontis* were showed a large distribution in the Ceyhan River system. *Gambusia affinis* and *Clarias gariepinus* were determined only in Gavur Lake canals and Kumaşır Lake. *Acanthobrama* sp. only presented in Sır Reservoir, *Silurus glanis* and *Squalius kottelati* presented in Sır lake canals and Menzelet lake reservoir, *Cobitis evreni* and *Aphanius mento* were determined in the vegetative areas.

Keywords: Ceyhan River basin, fish fauna, distribution.

Türkiye'nin Orta ve Yukarı Ceyhan Nehir Havzasının Balık Faunası ve Dağılımı

Özet

Mayıs 2001- Nisan 2004 tarihleri arasında orta ve yukarı Ceyhan havzası balık faunasının dağılımı ve sistematik özellikleri incelendi. Balık örnekleri, elektroşoker ve çeşitli göz açıklığındaki balık ağları kullanılarak iki göl, iki baraj gölü ve 18 akarsu sisteminde yakalandı. Yakalanan toplam 2.414 balık örneğinden 1.156 bireyin diagnostik özellikleri incelendi. Araştırma bölgesinde 10 familyaya ait 20 tür tanımlandı. Bunlar; *Anguilla anguilla*, *Salmo trutta macrostigma*, *Cyprinus carpio*, *Acanthobrama* sp., *Alburnus orontis*, *Pseudophoxinus zekayi*, *Squalius kottelati*, *Garra rufa*, *Chondrostoma regium*, *Luciobarbus pectoralis*, *Capoeta angorae*, *Capoeta erhani*, *Cobitis evreni*, *Schistura ceyhanensis*, *Oxyemacheilus* sp., *Silurus glanis*, *Clarias gariepinus*, *Aphanius mento*, *Gambusia affinis* ve *Salaria fluviatilis*'dir. Son yıllarda rapor edilen dört balık türünden *Pseudophoxinus zekayi*, *Capoeta erhani*, *Schistura ceyhanensis* ve *Cobitis evreni* endemik türlerinin tanımlanması yapıldı.

Anguilla anguilla bireyleri yukarı Ceyhan havzasında bulunmaz iken *Salaria fluviatilis* bireyleri 750 m rakımı altındaki istasyonlarda mevcuttur. *S. t. macrostigma* bireyleri ise 720 ile 1.474 m rakımdaki akarsu ve çaylarda bulunmaktadır. *Capoeta angorae*, *Garra rufa* ve *Alburnus orontis* Ceyhan nehir sisteminde çok geniş bir dağılım göstermiştir. *Gambusia affinis* ve *Clarias gariepinus* sadece Gavur Gölü kanalları ve Kumaşır Gölü'nde belirlenmiştir. *Acanthobrama* sp. sadece Sır Baraj Gölü'nde; *Silurus glanis* ve *Squalius kottelati* Sır Baraj gölü kanallarında ve Menzelet Baraj gölünde, *Cobitis evreni* ve *Aphanius mento* ise bitikisel floranın olduğu lokalitelerde belirlenmiştir.

Anahtar Kelimeler: Ceyhan Nehir havzası, balık faunası, dağılım.

Introduction

The Ceyhan River begins in mountains of 2,200 m high to the North of the regional center of Kahramanmaraş and flows south to the Mediterranean Sea (Alp and Kara, 2007). The river basin covers 20,670 km² and annual flow of the river is about 7.18 billion m³ (Argin Co. Ltd., 1999). The Ceyhan River has 18 main tributaries, the Hurman, Söğütlü, Nergerle, Kömür, Törbüzek, Tekir, Fırnız, Zeytin, Aksu, Körsulu, İmalı, Andırın, Karaçay, Yarpuz, Sabun, Hamus, Karasu and Savrun. Two natural lakes, Gavur Lake and Kumaşır Lake, present in the region. Kumaşır Lake is an extension of Gavur Lake and it has 9 ha area (Korkmaz, 2001). Gavur Lake was also very important wetland in the south region of Turkey (Yarar and Magnin, 1997). However, it dried up and contains water only winter months. In recent years, many reservoirs have been formed on the Ceyhan River in succession, Berke, Aslantaş, Sır, Kılavuzlu, Menzelet, Kartalkaya, Suçatı, Adatepe and Ayvalı. Some of the fish populations in the region were investigated by Alp *et al.* (2002; 2003; 2005), Kara and Alp (2005) and Alp and Kara (2007). A few

fish species named as *Pseudophoxinus zekayi* (Bogutskaya *et al.*, 2006), *Capoeta erhani* (Turan *et al.*, 2008), *Squalius kottelati* (Turan, *et al.*, 2009), *Cobitis evreni* (Erk'akan *et al.*, 2008), *Schistura ceyhanensis* (Erk'akan *et al.*, 2007) have also been recognised by Bogutskaya *et al.* (2006), Turan *et al.* (2006; 2008; 2009), Erk'akan *et al.* (2007; 2008) in the region recently. However, there is no study on fish distribution of the Ceyhan River basin. Therefore, in this study, it was aimed to determine distribution of the fish species and fish fauna in the upper and middle Ceyhan River basin.

Material and Methods

The fish specimens were collected from 18 streams (Hurman, Tekir, Söğütlü, Nergerle, Kömür, Törbüzek, Fırnız, Zeytin, Aksu, Körsulu, İmalı, Andırın, Karaçay, Yarpuz, Sabun, Hamus, Karasu and Savrun), two reservoirs (Sır and Menzelet) and two natural lakes (Kumaşır and Gavur) located in the upper and middle Ceyhan River basin (Figure 1). Altitudes of the working stations varied from 127 to 1475 m. In order to catch fish specimens,

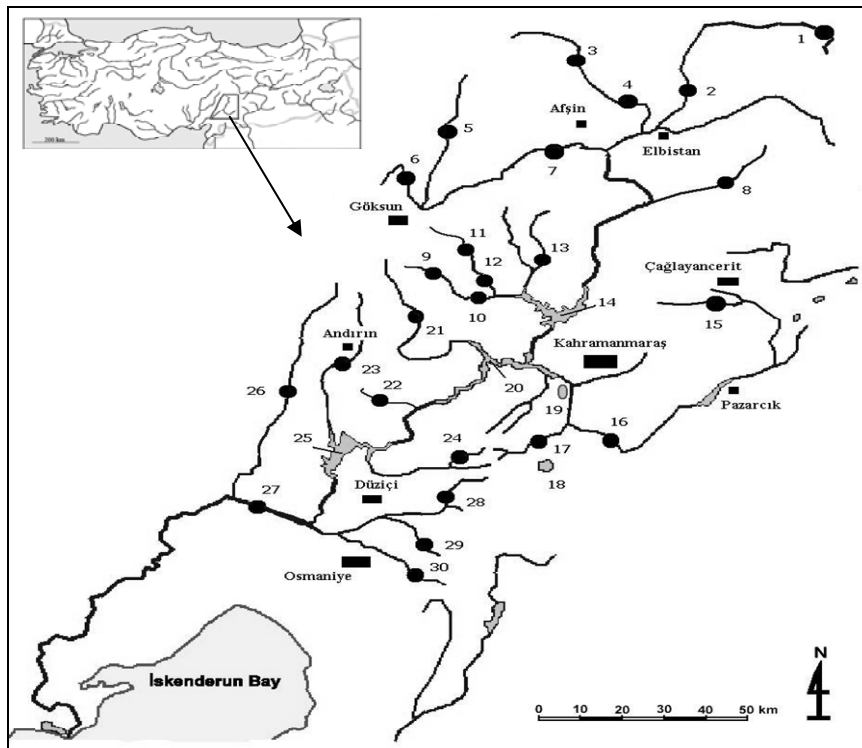


Figure 1. The map of the working area and streams locations.

1. Söğütlü Station I (A:1,475 m, N:38°09' E:37°36'), 2. Söğütlü Station II (A:1,350 m, N:38°07' E: 37°38'), 3. Hurman Station I (A:1,258 m, N:38°26' E:36°54'), 4. Hurman Station II (A:1145 m), 5. Kömür Station (A:1417 m) 6. Törbüzek Station (A:1390 m, N:38° 04' E:36° 27'), 7. Yazidere Station (A: 1,128 m N: 38°08' E: 37°00'), 8. Nergerle Station (A:1213 m, N:38°00', E:37°13'), 9. Fırnız Station I (A: 920 m, N: 37°45' E: 36°39'), 10. Fırnız Station II (A: 690 m, N: 37° 45' E:36° 41'), 11. Tekir Station I (A: 1125 m) 12. Tekir Station II (A: 750 m, N:37°48' E:36°48'), 13. Zeytin Station (A: 698 m, N: 37°48' E: 36°47'), 14. Menzelet reservoir (A: 594 m, N: 37°45' E: 36°46'), 15. Aksu Station I (A: 1,125 m, N: 37° 46' E: 37°21'), 16. Aksu Station II (A: 472 m, N: 37°30' E: 36°54'), 17. İmalı Station (A: 593 m, N: 37°20' E:36°46'), 18. Gavur Lake, 19. Kumaşır Lake, 20. Sır reservoir, 21. Körsulu Station (A: 560 m), 22. Karaçay Station (A: 482 m, N: 37°31' E: 36°59') 23. Andırın Station (A: 785 m), 24. Sabun Station (A: 223 m, N: 37°16' E: 36°27'), 25. Aslantaş reservoir, 26. Savrun Station (A: 295 m, N: 37°16' E: 36°27'), 27. Cevdediye Station (A: 136 m), 28. Hamus Station (A: 264 m, N: 37°10' E: 36°24'), 29. Yarpuz Station (A: 429 m, N: 37°07' E: 36°18'), 30. Karasu Station (A: 127 m, N: 37°02' E: 36°17').

electroshocker was used in streams and different gill nets (mesh size of 12x12 mm, 16x16 mm, 22x22 mm, 32x32 mm) were used in reservoirs and lakes. Geographical positions of the working stations were determined by hand GPS. The specimens were fixed in 4% formaldehyde solution and transferred into the laboratory. Morphometric measurements were carried out with a 0.1 mm digital compass. Standard length (SL), from upper jaw symphysis to middle base of caudal fin; barbel length (BL), predorsal distance (PD), predorsal length from upper jaw symphysis to origin of dorsal fin; dorsal fin depth (DFD), from base to tip of longest ray; nasal length (NL), from nasal aperture; eye diameter (ED), orbital horizontal diameter; head length (HL), from upper jaw symphysis to posterior tip of operculum; head depth (HD), depth of the posterior to the orbit; body depth (BD), at level of origin of the dorsal fin; caudal peduncle depth (CPD), at level of origin of anal fin; caudal peduncle length (CPL), from and of anal fin to middle base of caudal fin; dorsal fin width (DFW), distance from the base to tip of the longest ray of the dorsal fin were measured as morphometric character (Figure 2).

Identification of the specimens were determined by Fisher *et al.* (1987), Geldiay and Balık (1988), Balık (1988), Nelson (1994), Wildekamp *et al.* (1999), Erk'akan *et al.* (1999; 2007; 2008), Banarescu and Boutsckaya (2003), Bogutskaya *et al.* (2006), Turan *et al.* (2006; 2008, 2009). Voucher specimens are deposited in Kahramanmaraş Sütçü İmam University, Faculty of Science and Arts, Biology Department.

Results

In the study, a total of 2,414 specimens were collected from 30 stations in 18 streams, two reservoirs and two natural lakes in the Ceyhan River

basin (Figure 1). The 1,156 of 2,414 specimens were investigated diagnostic characteristics and 20 species belonging 10 families were identified. Diagnostic characteristics of the examined fish species and their distribution in the river system were given below. Diagnostic characteristics were given with mean values and minimum-maximum values in brackets.

Family: Anguillidae

Anguilla anguilla (Linnaeus, 1758)

Number of specimens: 3

Diagnostic characteristics: SL: 367.0(221.0-552.0) mm, SL/BD: 16.09(13.97-18.29), SL/HL: 7.36(6.07-8.44), SL/HD: 18.77(15.53-20.54), SL/PD: 3.30(2.65-3.78), HL/HD: 2.55 (2.40-2.72), D: 238-258, A: 179-198, P: 17-18, (Figure 3).

Distribution: Cevdediye irrigation canal (station 27)

Family: Salmonidae

Salmo trutta macrostigma (Duméril, 1858)

Number of specimens: 118

Diagnostic characteristics: SL: 154.33(56.26-343.0) mm, SL/HL: 4.15(1.23-8.78), SL/HD: 6.45(1.90-16.16), SL/PD: 2.33(0.69-5.22), HL/HD: 1.69(0.50-3.06), D: II-III 9-11, A: II-III 7-9, P: I-II 9-12, pelvic fins: I-II 7-9, line lat.: 116-118, line lat. trans.: 26(24-28)/19(18-20), pyloric caeca: 32 (29-42), (Figure 4).

Distribution: Fırnız (station 9), Aksu (station 15), Nergele (station 8), Hurman (stations 3 and 4), Törbüzek (station 6), Kömür (station 5), Söğütlü (stations 1 and 2).

Family: Cyprinidae

Cyprinus carpio (Linnaeus, 1758)

Number of specimens: 17

Diagnostic characteristics: SL:108.15 (71.59-136.49) mm, SL/HD: 4.48(4.29-4.63), SL/DFL: 3.29(2.55-6.20), SL/NL: 9.16(8.49-10.37), SL/PD: 1.91(1.84-1.99), HL/HD:1.41(1.31-1.45), SL/CPL: 5.24(4.74-

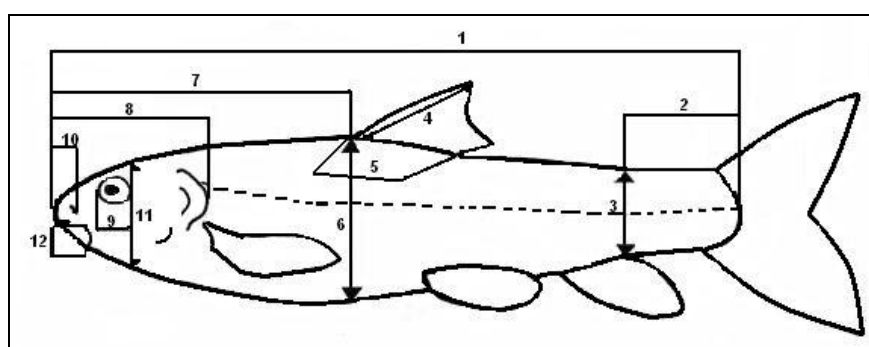


Figure 2. Morphometric measurements: 1. Standard length (SL), from upper jaw symphysis to middle base of caudal fin 2. Caudal peduncle length (CPL), from and of anal fin to middle base of caudal fin; 3. Caudal peduncle depth (CPD), at level of origin of anal fin; 4. Dorsal fin depth (DFD), from base to tip of longest ray; 5. Dorsal fin length (DFL), from base to dorsal fin; 6. Body depth (BD), at level of origin of dorsal fin; 7. Predorsal (PD), predorsal length from upper jaw symphysis to origin of dorsal fin; 8. Head length (HL), from upper jaw symphysis to posterior tip of operculum, 9. Eye diameter (ED), orbital horizontal diameter, 10. Nasal length (NL), from nasal aperture; 11. Head depth (HD), just posterior to orbit. 12. Barbel length (BL).

6.23), HL/NL: 2.83(2.69-2.97), HL/ED: 5.70(4.37-6.17), D: III 18-19, A: II 5, P: I 16-20, pelvic fins: I 8, line lat.: 39(38-40), pharyngeal teeth: 1.1.3-3.1.1., (Figure 5).

Distribution: Gavur Lake canals (station 18), Menzelet reservoir (station 14) and Sir reservoir (station 20).

***Acanthobrama* sp.**

Number of specimens: 18

Diagnostic characteristics: SL: 126.72 (114.69-158.51) mm, SL/BD: 3.85 (3.26-4.52), SL/HL: 3.99(3.66-5.66), SL/HD: 8.07 (7.52-9.73), SL/DFL: 8.63(7.75-10.73), SL/DFD: 5.28 (4.71-5.96), SL/DPD: 1.86(1.75-1.93), SL/CPL: 4.85 (3.63-5.36), SL/CPD: 11.36 (10.50-12.65), HL/HD: 2.03 (1.52-2.25), HL/ED: 3.55(2.64-3.97), D: II 7-8, A: II 13-14, P: I 13, C: 24, pelvic fins: I-8, L. lat.: 72 (70-74), gill rakers: 24(23-24), line lat. trans.:13(12-14)/7(6-8), pharyngeal teeth: 5-5., (Figure 6).

Distribution: Sir reservoir (station 20).

***Alburnus orontis* (Sauvage, 1882)**

Number of specimens: 52

Diagnostic characteristics: SL: 95.15(11.3-135.63)

mm, SL/BD: 4.34(0.42-5.25), SL/HL: 4.13(0.43-4.60), SL/HD: 7.19(0.95-12.36), SL/NL: 20.20(3.17-43.05), SL/DFL: 9.47(1.03-15.09), SL/DPD: 1.90(0.25-3.06), SL/CPL:3.96(0.52-5.90), HL/HD: 1.75(1.14-2.73), HL/NL: 4.85 (2.66-9.52), HL/ED: 3.88 (2.83-5.85), CPL/CPD: 2.64(2.23-3.18), D: II 8- 9, A: III 10-13, P: I 13-15, pelvic fins: I 7-8, C: 22-26, line lat.: 53 (46-56), line lat. trans.: 9(7-11)/5(4-7), gill rakers: 15 (14-16), pharyngeal teeth: 2.5-5.2., (Figure 7).

Distribution: Söğütlü (station 2), Tekir (station 11 and 12), Firmız (station 10), Aksu (station 15), Körsulu(station 21), Sabun (station 24), Karasu (station 30).

***Pseudophoxinus zekayi* (Bogutskaya et al., 2006)**

Number of specimens: 45

Diagnostic characteristics: SL: 94.7(49.03-140.76) mm, SL/BD:4.19(3.35-6.36), SL/HL: 4.23 (3.52-5.72), SL/HD:7.41(5.50-9.388), SL/NL: 23.14(13.36-34.16), SL/DFL: 9.28(6.47-12.95), SL/DPD: 2.02(1.78-4.99), SL/CPL: 4.40(3.34-10.99), HL/HD: 1.75(1.04-2.13), HL/ED: 3.66 (2.11-6.71), D: III 7, A: III 7, line lat.: 40(37-44), line lat. trans.: 9(8-10)/4(3-5), gill rakers: 8, pharyngeal teeth: 5-5.,(Figure 8).

Distribution: Tekir (station 12), Aksu (station 16), Zeytin (station 13), Körsulu (station 21), Sabun (station 24), Hamus (station 28), Yarpuz (station 29).



Figure 3. *Anguilla anguilla* (Linnaeus, 1758).



Figure 4. *Salmo trutta macrostigma* (Dumeril, 1858).



Figure 5. *Cyprinus carpio* (Linnaeus, 1758).



Figure 6. *Acanthobrama* sp.



Figure 7. *Alburnus orontis* (Sauvage, 1882).



Figure 8. *Pseudophoxinus zekayi* (Bogutskaya et al., 2006).

***Squalius kottelati* (Turan et al., 2009)**

Number of specimens: 5

Diagnostic characteristics: SL: 170.57(100.36-196.87) mm, SL/BD: 3.97(3.63-4.47), SL/HL: 3.61(3.31-3.96), SL/HD: 8.17(7.06-8.82), SL/NL: 19.58(17.49-22.03), SL/DFL: 8.60 (8.16-9.16), SL/PD: 1.85(1.78-1.98), HL/HD: 2.27(1.78-2.61), HL/NL: 5.43(4.99-6.54), HL/ED: 5.69(4.91-6.02), D: III 8, A: III 8-9, P: I 16-17, pelvic fins = I 8, line lat.: 46 (45- 47), line trans : 7(7-8)/4(3-4), gill rakers: 10(9-10), pharyngeal teeth: 5.2-2.5., (Figure 9).

Distribution: Menzelet reservoir (station 14), Sır reservoir (station 20).

***Garra rufa* (Heckel, 1843)**

Number of specimens: 135

Diagnostic characteristics: SL: 83.57(11.5-110.8) mm, SL/HD: 4.69(0.46-6.42), SL/HL: 4.36(0.41-12.44), SL/NL: 12.16(1.10-29.73), SL/DFL: 6.11(0.69-8.32), SL/PD: 2.15(0.21-2.94), SL/CPL: 4.04(0.31-7.86), HL/NL: 2.82(1.15-5.99), HL/ED: 5.07(1.58-7.15), CPL/CPD: 2.30(0.49-7.83), D: III 5-9, A: II 4-5, P: I 11-12, pelvic fins: I 7-8, C: 20-24, line lat.: 36(33-37), line lat. trans.: 5(4-6)/3(3-4), pharyngeal teeth: 2.4.5-5.4.2., (Figure 10).

Distribution: Tekir (station 12), Fırnız (station 10), Aksu (station 15), Zeytin (station 13), Körsulu (station 21), Sabun (station 24), Hamus (station 28), Yarpuz (station 29), Karasu (station 30), Savrun (station 26), Yazıdere (station 7), İmalı (station 17), Karaçay (station 22).

***Chondrostoma regium* (Heckel, 1843)**

Number of specimens: 9

Diagnostic characteristics: SL: 152.46(126.9-214.28) mm, SL/BD: 4.34(4.04-4.76), SL/HL: 4.78(4.51-5.03), SL/HD: 9.66(8.18-10.55), SL/NL: 26.07(23.43-29.65), SL/DFL: 9.12(8.10-10.06), SL/PD: 1.95(1.91-1.97), SL/CPL: 4.97(4.28-6.26), SL/CPD: 10.97

(10.66-11.28), HL/HD: 2.02(1.72-2.30), HL/NL: 5.47(4.81-6.32), CPL/CPD: 2.25(1.80-2.51), D: II 8-10, A: I-II 8-10, pelvic fins: I 8, P: I 12-13, C: 26, line lat.: 63(60-65), line lat. trans.: 9(9-10)/6(6-7), pharyngeal teeth: 7-7, (Figure 11).

Distribution: Sır reservoir (Station 20), Cevdediyi (station 27).

***Luciobarbus pectoralis* (Heckel, 1843)**

Number of specimens: 11

Diagnostic characteristics: SL: 185.82(164.14-205.1) mm, SL/BD: 4.32(3.94-4.65), SL/HL: 3.62(3.25-3.92), SL/HD: 7.46(5.85-9.55), SL/NL: 11.56(7.76-17.13), SL/DFL: 7.83(7.22-8.74), SL/PD: 1.96(1.88-2.02), SL/CPL: 4.96(4.60-5.20), HL/HD: 2.04(1.72-2.46), HL/NL: 3.14(2.3-4.36), HL/ED: 6.67(5.31-7.23), D: II 7-8, A: III 10-11, pelvic fins: I-II 7-8, P: I 17-19, C: 26, line lat.: 53(50-54), line lat. trans.: 10(10-11)/7(7-8), gill rakers: 17(17-18), pharyngeal teeth: 2.3.4-4.3.2., (Figure 12).

Distribution: Menzelet reservoir (station 14), Aksu (station 15), Zeytin (station 13), Sır reservoir (station 20).

***Capoeta angorae* (Hankó, 1925)**

Number of specimens: 137

Diagnostic characteristics: SL: 130.98(22.2-230.4) mm, SL/BD: 4.37(0.48-13.93), SL/HL: 4.31(1.81-11.12), SL/HD: 7.11(0.91-13.52), SL/NL: 25.82(4.68-58.12), SL/DFL: 25.37 (11.29-39.13), SL/PD: 2.20(0.38-5.74), SL/CPL: 5.12(0.50-14.07), HL/HL: 1.69(0.50-3.06), HL/NL: 2.28(0.88-3.75), HL/ED: 5.52(1.98-10.88), CPL/CPD: 1.93(0.81-4.79), SL/BL: 26.137(4.68-59.71), HL/BL: 6.11(2.50-13.96), D: II 8-10, A: II 4-6, pelvic fins: I-II 8-10, P: I 16-20, C: 22-24, line lat.: 68(64-75), line lat. trans.: 15(14-16)/11(10-12), pharyngeal teeth: 2.3.4-4.3.2, gill rakers: 20-23, (Figure 13).



Figure 9. *Squalius kottelati* (Turan et al., 2009).



Figure 10. *Garra rufa* (Heckel, 1843).



Figure 11. *Chondrostoma regium* (Heckel, 1843).



Figure 12. *Luciobarbus pectoralis* (Heckel, 1843).

Distribution: Söğütlü (station 2), Tekir (station 12), Fırnız (station 10), Aksu (station 15), Zeytin (station 13), Körsulu (station 21), Sabun (station 24), Hamus (station 28), Yarpuz (station 29), Karasu (station 30), Savrun (station 26), Andırın (station 23), Imalı (station 17), Yazıdere (station 7), Menzelet reservoir (station 14), Sır reservoir (station 20).

***Capoeta erhani* (Turan et al., 2008)**

Number of specimens: 18

Diagnostic characteristics: SL: 141.23(78.13-205.1) mm, SL/BD: 4.048(3.52-7.36), SL/HL: 4.25(3.88-4.61), SL/BD: 7.49(5.71-9.69), SL/NL: 16.41(10.35-26.02), SL/DFL: 6.46(3.45-7.17), SL/PD: 2.05(1.95-2.16), SL/CPL: 4.96(4.71-5.42), HL/HD: 1.75(1.39-2.25), HL/NL: 3.81 (2.54-5.98), HL/ED: 5.30(4.00-6.46), CPL/CPD: 1.85(1.58-2.14), HL/BL: 7.88(5.34-11.19), D: II-III 8-9, A: III 5, pelvic fins: I 7-9, P: I 14-18, C: 22-26, L. lat.: 68(64-75), L. lat. trans.: 12(12-14)/ 9(8-10), gill rakers:26-27, pharyngeal teeth: 4.3.2-2.3.4., (Figure 14).

Distribution: Tekir (station 12), Zeytin (station 13), Savrun (station 26), Menzelet reservoir (station 14), Sır reservoir (station 20).

Family:Cobitidae

***Cobitis evreni* (Erk'akan et al., 2008)**

Number of specimens: 19

Diagnostic characteristics: SL: 90.47(46.12-167.7) mm, SL/BD: 6.81(3.29-10.93), SL/HL: 5.43(3.63-8.89), SL/HD: 9.69 (7.73-15.50), SL/DFL: 11.74

(9.113-17.29), SL/PD: 1.96(1.29-3.23), SL/CPL: 6.43(2.57-9.81), HL/HD: 1.81(1.20-2.81), HL/ED: 6.37(5.30-7.92), CPL/CPD: 1.90 (1.06-4.44), D: II 6-7, A II 4-5, P: I 7-8, C: 16, pelvic fins: I 4-5, (Figure 15).

Distribution: Savrun (station 26), Törbüzek (station 6) Yazıdere (station 7), Hamus (station 28).

Family: Balitoridae

***Schistura ceyhanensis* (Erk'akan et al., 2007)**

Number of specimens: 6

Diagnostic characteristics: SL: 51.44(43.07-58.89) mm, SL/PD: 1.95(1.82-2.04), SL/BD: 4.99(4.33-5.499), SL/HL: 3.95(3.70-4.25), SL/ED: 15.88(13.47-18.80), SL/HD: 6.89(6.34-7.60), D III 8, A III 5, P I 10 (11-12), pelvic fins: II (6) 7, C 16-17, (Figure 16). Distribution: Söğütlü (station 2), Hurman (station 4), Kömür (station 5).

***Oxynemacheilus* sp.**

Number of specimens: 14

Diagnostic characteristics: SL: 50.54(43.01-54.16) mm, SL/BD: 4.78(4.24-5.66), SL/HL: 3.82(3.38-4.0), SL/HD: 7.24(6.27-8.27), SL/NL: 15.48(12.98-17.86), SL/DFL: 7.97(6.38-8.65), SL/PD: 2.14(1.57-4.39), SL/CPL: 4.93(4.20-5.99), HL/HD: 1.85(1.40-2.21), HL/NL: 3.96(2.91-4.63), D: II-III 9-10, A:II-III 5, pelvic fins: I 5-6, P: I 9, C 15-17, (Figure 17).

Distribution: Savrun (station 26), Törbüzek (station 6), Fırnız (station 10), Kömür (station 5), Körsulu (station 21).



Figure 13. *Capoeta angorae* (Hankó, 1925).



Figure 14. *Capoeta erhani* (Turan et al., 2008).

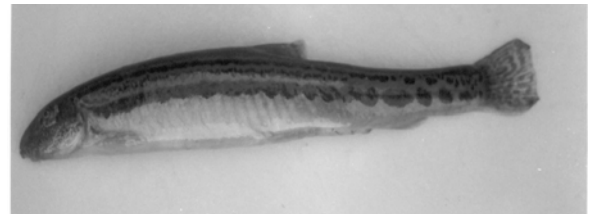


Figure 15. *Cobitis evreni* (Erk'akan et al., 2008).



Figure 16. *Schistura ceyhanensis* (Erk'akan et al., 2007).



Figure 17. *Oxynemacheilus* sp.

Family: Siluridae***Silurus glanis* (Linnaeus, 1766)**

Number of specimens: 245

Diagnostic characteristics: SL: 900.73(300.50-1790.00) mm, SL/PD: 3.55(3.50-3.58), SL/HL: 5.73(5.72-6.73), SL/BD: 4.69(4.3-5.25), D I 3-5, A I 86-95, P: I 15-16, C: 17, (Figure 18).

Distribution: Sır reservoir (station 20), Menzelet reservoir (station 14).

Family: Clariidae***Clarias gariepinus* (Burchell, 1822)**

Number of specimens: 7

Diagnostic characteristics: SL: 228.42(149.86-322.12) mm, SL/BD: 6.14(5.45-7.08), SL/HL: 4.35(3.93-4.6), SL/NL: 51.78(26.40-68.68), SL/DFL: 2.28(1.49-6.60), SL/PD: 2.88(2.71-3.03), SL/CPL: 28.75(16.75-41.58), HL/HD: 3.60(3.15-3.88), HL/ED: 10.84(8.43-12.37), D: 74, A: 52-53, V: I-8, P I-II, (Figure 19).

Distribution: Kumaşır Lake (station 19), Gavur Lake (station 18).

Family: Cyprinodontidae***Aphanius mento* (Heckel, 1843)**

Number of specimens: 12

Diagnostic characteristics: SL: 36.66(24.83-59.77) mm, SL/BD: 3.56(3.09-3.83), SL/HL: 3.27(2.88-3.69), SL/HL: 4.84(3.71-7.31), SL/DFL: 5.49(4.21-7.10), SL/DFD: 4.49(3.23-11.31), SL/PD: 1.86(1.76-1.94), SL/CPL: 4.02(3.46-4.78), SL/CPD: 6.42(5.55-7.33), HL/HD: 1.48 (1.11-2.11), HL/ED: 3.50(2.95-4.14), D

I 8-12, A I 7-12, pelvic fins: I-5, P I 10-14, line lat.: 26 (23-28), line lat. trans.: 3/5 (5-6), (Figure 20).

Distribution: Yazıdere (station 7), Gavur Lake canals (station 18), Kumaşır Lake (station 19), Hamus (station 28).

Family: Poeciliidae***Gambusia affinis* (Baird & Girard, 1853)**

Number of specimens: 10

Diagnostic characteristics: SL: 27.97(23.22-45.98) mm, SL/BD: 3.23(2.07-5.56), SL/HL: 3.40(2.28-4.57), SL/HD: 6.22(4.03-10.98), SL/NL: 11.07(6.43-15.46), SL/DFL: 9.79(7.31-12.46), SL/PD: 1.39(0.91-1.73), SL/CPL: 2.30(1.43-3.30), HL/HD: 1.91(0.96-3.52), HL/NL: 3.24(2.77-3.79), HL/ED: 3.56(2.48-4.30), D II 6-7, A III 7-8, P 12-13, line lat.: 30-32, gill rakers: 12, (Figure 21).

Distribution: Gavur Lake canals (station 18), Kumaşır Lake (station 19).

Family: Blenniidae***Salaria fluviatilis* (Asso, 1801)**

Number of specimens: 275

Diagnostic characteristics: SL: 60.27(26.21-89.88) mm, SL/PD: 3.58(2.49-4.77), SL/BD: 4.41(3.22-5.98), SL/HL: 3.71(2.79-5.00), SL/ED: 16.19(9.85-22.35), SL/NL: 13.73(8.94-27.53), (Figure 22).

Distribution: Tekir (station 12), Fırnız (station 10), Aksu (station 15), Zeytin (station 13), Sabun (station 24), Hamus (station 28), Yarpuz (station 29), Körsulu (station 21), Savrun (station 26).

Figure 18. *Silurus glanis* (Linnaeus, 1766).Figure 19. *Clarias gariepinus* (Burchell, 1822).Figure 20. *Aphanius mento* (Heckel, 1843).Figure 21. *Gambusia affinis* (Baird & Girard, 1853).Figure 22. *Salaria fluviatilis* (Asso, 1801).

Discussion

Anguilla anguilla present in Europe, North Africa coasts, the Mediterranean, Aegean, Marmara sea and the rivers flowing to Black Sea (Geldiay and Balık, 1988; Güven *et al.*, 2002; Küçük and İkiz, 2004; Sarı *et al.*, 2006; Polat *et al.*, 2008; Okur and Yalçın, 2008). However, some of the authors stated that *A. anguilla* populations rather decreased in Turkish freshwaters (Özuluğ, 1999; Küçük and İkiz, 2004; Balık *et al.*, 2005; Sarı *et al.*, 2006; Polat *et al.*, 2008; Okur and Yalçın, 2008). *A. anguilla* specimens in the present study were only caught from Hamus stream under the Aslantaş Dam and no *A. anguilla* specimen present in the upper basin of the Ceyhan River. This is resulted from dams and irrigation regulators constructed on the river system. Because, in recent years, many dams and irrigation regulators have been constructed on the Ceyhan River but there is no fish passages on these engineering facilities. These were negatively affected to the migration of *A. anguilla*. Morphometric characteristics of *A. anguilla* investigated in this study were similar to diagnostic features reported in the previous studies (Geldiay and Balık, 1988; Küçük and İkiz, 2004; Polat *et al.*, 2008).

S. t. macrostigma distributed in North Africa, South Europe, West Asia and Anatolia. This subspecies occurs in the upper streams of rivers and it was reported in the streams of River Çoruh (Tortonese, 1954; Aras, 1976), Çatak stream in the River Tigris (Tortonese, 1954; Çetinkaya, 1996), Kaz mountains in Edremit (Geldiay, 1968), Uludağ in Bursa, in streams of Antalya in Zindan Stream in Isparta (Balık, 1988) in Pülümür, Munzur and Tohma streams of the Euphrates river (Kuru, 1975; Bardakçı *et al.*, 1994; Kalkan and Erdemli, 1994). In the Ceyhan River, it was reported in Akdere stream, a tributary in Sivas (Bardakçı *et al.*, 1994) and the streams of Hurman, Nergele, Söğütlü, Kömür, Törbüzek, Fırnız and Aksu in Kahramanmaraş (Alp *et al.*, 2002; 2003; Kara and Alp, 2005). In this study *S. t. macrostigma* were determined in Fırnız, Aksu, Nergele, Hurman, Törbüzek, Kömür and Söğütlü streams belonging to Ceyhan streams upper branches (Figure 1).

The diagnostic characteristic of *S. t. macrostigma* reported by Tortonese (1954), Kuru (1975), Aras (1976), Ekingen (1976), Balık (1984, 1988), Geldiay and Balık (1988), Çetinkaya (1996) and Aras *et al.* (1997) are consistent with our results. However, diagnostic characteristics in *S. t. macrostigma* in Tohma stream reported by Erdemli and Kalkan (1996) differed from our finding. This may be resulted from habitat characteristics and fisheries pressures on the populations. Distributions of *S. t. macrostigma* were probably affected from river regulations and density of human populations, because they present only high mountain streams.

Two species of *Acanthobrama* (*A. mirabilis* and *A. marmid*) were reported in Turkish freshwaters by

Geldiay and Balık (1988). *A. mirabilis* was reported in Büyükmenderes River, while *A. marmid* has been declared in Tigris, Euphrates, Seyhan, Orontes river systems and Berdan water (Geldiay and Balık, 1988; Ünlü *et al.*, 1994; Aydın and Şen, 1995). In the Ceyhan River system there has been no record about this species so far. However, in this study, one species of *Acanthobrama* was determined in Ceyhan River and this was different form *A. mirabilis* and *A. marmid*. The diagnostic characteristics of *Acanthobrama* sp. defined in this study were similar to *A. marmid*, however, number of dorsal spin was different form *A. marmid*. In addition, first dorsal spin in *A. marmid* is too rigid, however in our results, first dorsal spin is much more soft than *A. marmid*. In Sır Reservoir, *Acanthobrama* sp., has an economic importance and it costituted important commercial catch in the reservoir fisheries.

Alburnus is distributed in a large part of Syria, Iran, Caucasia, Europe and Anatolia (Armantrout, 1969; Banarescu, 1977; Bogutskaya, 1990; Geldiay and Balık 1988; Wossughi, 1978). Diagnostic characteristics of *A. orontis* determined in the present study are consistent with the previous studies (Balık and Alp, 1994; Geldiay and Balık, 1988; Coad, 1996).

Phoxinellus kervillei was reported by Ladiges (1960) in the Ceyhan river and Kahramanmaraş region. This species is also reported as *Phoxinellus zeregii kervillei* by Geldiay and Balık (1988). However this species was described as *Pseudophoxinus zekayi* by Bogutskaya *et al.* (2006). So this is the endemic species for Ceyhan River and its biological characteristics and conservation status are not known.

Squalius kottelati was described form the Orontes, Ceyhan and Seyhan river systems as a new species by Turan *et al.* (2009). Our results on morphological characteristics of *S. kottelati* are consisten with the results of Turan *et al.* (2009). In this study, *S. kottelati* were found in Menzelet and Sır dam lakes while, it was not present in streams in Ceyhan river.

According to Goren and Ortal (1999), the origin of the *Garra rufa* is Asia and it is distributed in all of the South West Asia, the Africa and South East Asia. *G. rufa* was reported in Aras River (Kosswig, 1952), Tigris-Euphrates system (Bianco and Banarescu, 1982), Tigris river basin and Iran (Menon, 1964; Karaman, 1971). Geldiay and Balık (1988), reported that *Garra rufa* inhabited in Antakya, South East Anatolia district, Seyhan and Ceyhan River system. In this study, *G. rufa* distributed a very large distribution area in the Ceyhan river basin. Kuru (1986), reported that distribution of the *Garra rufa obtusa* and *Garra variabilis* is depended on water temprature. Diagnostic characteristics determined in the present study were similar to *G. rufa* reported by Dağlı and Erdemli (2003); Kalkan and Erdemli (1994); Coad (1997); Ekingen and Sarıyüpeoğlu (1981) and Kuru (1975). However, it was different form the population

in Sultansuyu (Kalkan and Erdemli, 1994).

C. regium is distributed in Asi, Tigris, Euphrates, Göksu, Seyhan and Ceyhan river systems (Geldiay and Balık, 1988). Diagnostic features of *C. regium* were similar to results of Erdemli and Kalkan (1996); Geldiay and Balık (1988) and Ekingen and Sarıeyyüboğlu (1981).

Barbus rajonarum has been reported in the Ceyhan River by Geldiay and Balık (1988). However this species was described as *Luciobarbus pectoralis* (Turan et al., 2008). *L. pectoralis* shows a limited distribution in the Ceyhan River and it present in the middle basin.

Capoeta is distributed in India and North of China, Afghanistan, Turkistan, Aral Lake, Middle East and Anatolia (Atamanalp et al., 2002). In Turkish waters, 6 *Capoeta* species and 6 subspecies were reported: *C. capoeta*, *C. antalyensis*, *C. trutta*, *C. barroisi*, *C. pestai*, *C. tinca* and *C. c. capoeta*, *C. c. bergamae*, *C. c. kosswigi*, *C. c. sieboldi*, *C. c. umbla* and *C. c. angorae* (Kuru, 1975; Geldiay and Balık, 1988; Küçük and İkiz, 2004). *C. c. angorae* inhabits in all parts of the Ceyhan River and it is distributed until trout zone. In recent years, *C. c. angorae* has been described as *Capoeta angorae* by Turan et al. (2006).

Diagnostic features of *C. angorae* in Ceyhan River were similar to data stated by Geldiay and Balık (1988). However, *C. trutta* and *C. c. umbla* living in Tohma and Şiro stream are rather different from diagnostic features of *C. c. angorae* in rivers of Antalya gulf (Erdemli and Kalkan, 1996; Dağlı and Erdemli, 2003; Küçük and İkiz, 2004). *C. angorae* constitutes intensive populations in Ceyhan River it is a commercial species in the region.

C. barroisi reported by Geldiay and Balık (1988) in Ceyhan River described as a new species, *Capoeta erhani* by Turan et al. (2008). This species had not a large distribution when compared with *C. angorae* and also they were not constitute intensive populations in region. Biological charactersitics and conservation status are not known of this endemic species. However, dam construction and small hydroelectric stations (HES) constructed on Ceyhan River have been probably affected *C. erhani*.

Ten Cobitidae species and 1 subgenus inhabit in Turkish waters (Erk'akan et al., 1999). In addition these, a new Cobitid species, *Cobitis evreni*, was recognised in Ceyhan River by Erk'akan et al. (2008). This species is endemic for Ceyhan River and its biological characteristics and conservation status are not known. *C. evreni* individuals were determined at four station tied to Ceyhan river system.

Another new species, *Schistura ceyhanensis* was described in Ceyhan River by Erk'akan et al. (2007). This species distributed in the upper river basin and it was collected from four stations, Savrun, Terbüzek, Fırnız and Körsulu streams.

Natural distribution of *Silurus glanis* are Caspian, Black, Aral, Aegean and Eastern

Mediterranean Sea, and it is also likely to include some Baltic Sea tributaries and the upper part of the river Rhine (Banarescu, 1989; Krieg et al., 2000). Two *Silurus* species inhabit Turkish freshwaters: *Silurus glanis* has a wide distribution that includes the Sakarya, Manyas, Apolyont, İznik, Gölhisar, Samsun, Kura, Aras, Seyhan and Ceyhan rivers (Kuru, 1975; Geldiay and Balık, 1988; Alp et al., 2004) and *Silurus tirostegus* inhabits the Euphrates basin (Ünlü and Bozkurt, 1996). In this study, *S. glanis* was obtained from Menzelet and Sır reservoirs. Diagnostic features of *S. glanis* were reported as D I 3, P I 17, pelvic fin rays I 11 in Büyükçekmece dam lake basin (Özuluğ, 1999). Diagnostic features of *S. glanis* individuals was stated as SL/BD: 5.45-6.36, SL/HL: 4.50-5.50, HL/ED: 8.33-8.64, D I 3(4), A I 85-92, P I 15-18, V I 11-12, C 15-18 in lower Kızılırmak basin (Polat et al., 2008). Also, Geldiay and Balık (1988) stated as D I 3-5, A I 85-95, P I 15-17, V I 10-12, C 17 diagnostic features of *S. glanis*. Mentioned diagnostic features for *S. glanis* individuals of different authors are similar to individuals living in Sır and Menzelet dam lakes.

Clarias specimens in this study showed similarity according to results of Teugels (1982). It was reported in lakes and rivers in Mediterranean coast (Spataru et al., 1987; Yalçın et al., 2001; Küçük and İkiz, 2004). Diagnostic characteristics of *C. gariepinus* individuals were similar to individuals in Orontes river basin (Yalçın et al., 2001).

Aphanius mento individuals mostly were found in lakes. They also were determined in Hamus stream, Ceyhan River (Yazıdere, station 7), Gavur and Kumaşır Lake. *A. mento* generally are found in aquatic plants at it's around and slow of stream spread of water. Diagnostic characteristics of *A. mento* were similar to features reported by Wildekamp et al. (1999).

Gambusia affinis is an exotic species. They were introduced firstly in Turkey in 1912 by French and then they were used on struggle with malaria in pursuance of vaccinated Amik and Gavur Lakes (Geldiay and Balık, 1988). In this study, it was determined very intensive populations in the irrigation canals in Gavur Lake. It was stated that *G. affinis* introduction had negative effects on the ecology of rivers and streams (Aldemir et al., 2003).

S. fluviatilis inhabits in streams and lakes which flowing the Mediterranean Sea (Changeux and Pont, 1995; Cote et al., 1999; Neat et al., 2003). It was reported that in our country, they are to state in rivers and Iznik Lake which near coast Mediterranean and Aegean coasts (Geldiay and Balık, 1988). Hernandez et al. (2000) investigated district which until 650 m altitude in Spain Jucar River basin and they stated that *S. fluviatilis* does not exist over 400 m altitude. In our study, *S. fluviatilis* is possible to find at districts which have 750 m altitude and lower of this in Ceyhan River. *S. fluviatilis* forms local and spread populations on little fluidly, smooth districts of rivers

width 2-5 m, not too deep which ground gravelly and stony (Freeman *et al.*, 1990; Cote *et al.*, 1999; Bianco, 1995; Elvira, 1995). Morphological differences between male and female individuals of *S. fluviatilis* were reported (Neat *et al.*, 2003; Alp and Kara, 2007).

Consequently, a total of 20 fish species were determined in the Ceyhan River and their distribution of the river basin was investigated. In recent years, four new fish species, *Pseudophoxinus zekayi*, *Capoeta erhani*, *Cobitis evreni* and *Schistura ceyhanensis* were described in the river system and these are the endemic species for the Ceyhan River. These have been described according to morphological data and their molecular characteristics are not known. So biological characteristics and conservation status of these endemic species should be determined for an effective conservation.

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