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A Study on the Bony Fishes Caught in the South of the Sea of Marmara by Bottom Trawling and their Morphologies

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Abstract: A total of 572 specimens of bony fish were obtained as a result of bottom trawling at 47 stations by R/V Arar of the University of Istanbul at the south of the Sea of Marmara, in 1992 and 1995. Upon analysis of these specimens, it was revealed that 49 bony fish species, including 5 subspecies, belonging to 30 families were found, and their diagnostic characteristics, the place and the depth where they were caught are given. The presence of *Alosa pontica* (Eichwald, 1838), known from the Black Sea, was determined in the Sea of Marmara in this study. The majority of fishes in terms of quantity caught by bottom trawling is composed of 9 economically important species and 6 economically unimportant species, and the rest are in the group of species with few individuals.

Key Words: Bony Fishes, Sea of Marmara, Bottom Trawl, Morphology.

Marmara Denizi'nin Güneyinde Dip Trolu ile Yakalanan Kemikli Balık Türleri ve Morfolojileri Üzerinde Bir Araştırma

Özet: 1992 ve 1995 yıllarında İstanbul Üniversitesi Arar Araştırma Gemisi ile yapılan 47 dip trolu çekiminden elde edilen toplam 572 örneğin incelenmesi sonucunda Marmara Denizi'nin güneyinde, 30 familyaya ait, 5'i alt tür olmak üzere 49 kemikli balık türü yakalanmış ve bunların tanınma özellikleri ile yakalandıkları yer ve derinlikler verilmiştir. Karadeniz'den bilinen *Alosa pontica* (Eichwald, 1838)'nın Marmara Denizi'ndeki varlığı bu çalışma ile saptanmıştır. Trollerde yakalanan balıkların, miktar olarak çokluğunu ekonomik öneme sahip 9 tür ve ekonomik önemi olmayan 6 tür oluşturmakta, diğerleri bireyce az olan türler grubuna girmektedir.

Anahtar Sözcükler: Kemikli Balıklar, Marmara Denizi, Dip Trolu, Morfoloji.

Introduction

The Sea of Marmara is an inland sea that separates Europe from Asia, and is joined to the Black Sea by the Bosphorus and to the Aegean Sea by the Dardanelles. For this reason, the characteristics of the Sea of Marmara are influenced by two neighboring seas. Though the Sea of Marmara has the smallest surface area and volume of the seas surrounding Turkey, it holds the second position, after the Black Sea, in terms of fishing.

Research on the sea fauna along the coasts of Turkey was initiated by foreign researchers at the beginning of the 20th century and entered an intensive stage with the participation of Turkish researchers in the 1940s. However, the fish fauna of the Turkish seas has still not been fully determined. Among the researches on the fish fauna in the Sea of Marmara are by Ninni (1), Devedjian (2), Sözer (3), Erazi (4, 5, 6, 7), Kosswig (8), Akşıray (9), Nümann (10, 11), Demir et al. (12), Slastenenko (13), Demir (14, 15), Atlı (16), Türgan (17), Erman (18, 19, 20, 21), Demir (22), Geldiay and Mater (23), Mengi (24), Ünsal (25, 26), Meriç (27, 28), Whitehead et al. (29, 30), Akşıray (31), Fischer et al. (32), Mater et al. (33), Benli et al. (34), Kocataş et al. (35), Meriç (36, 37), Mater and Meriç (38), Ünsal and Oral (39), Uysal et al. (40) and Meriç et al. (41). In addition to these, the presence of some fish species in the Sea of Marmara has been confirmed by research on fish eggs and larvae (Demir and Arım (42), Arım (43), Demir (44, 45, 46, 47, 48), Altun (49)).

The Aegean Sea waters pass through the Dardanelles and flow into the Sea of Marmara at a 20 m depth, and show the characteristics of the Mediterranean water with

its 38-39‰ salinity (50). Black Sea waters with low salinity coming through the Bosphorus mix with the surface waters of the Sea of Marmara and meet with a gradual increase in salinity. The salinity of the Black Sea waters in the northern Marmara is around 22‰ (51).

Fishes in the Sea of Marmara provide good fishing during migrations for feeding, spawning and wintering between the Aegean Sea and the Black Sea through the system of straits. After 1980, a substantial increase is observed in fishing, the number of fishing boats and their capacities (35). Although this increase initially generated a positive effect, later on it negatively affected the fishing due to the significant decrease in the yield per boat. In addition, the rise in pollution in the Sea of Marmara because of the increase in land development projects, discharge of domestic and industrial wastes into the sea, gradual increase in international maritime transport and the arrival of polluted waters of the River Danube to the Sea of Marmara by way of the Black Sea and the Bosphorus caused a decrease in yield in fishing. Therefore, it is necessary to determine the fish species in the Sea of Marmara caught by means of coastal fishing, medium depth trawl, large bag nets and bottom trawl, and biologically examine the economically significant ones among these species, determine the sea stock amounts and reorganize fishing accordingly.

This study was conducted for the purpose of determining the species of bony fishes caught by bottom trawling in the south of the Sea of Marmara and examining the morphologies of these fish with regard to taxonomy.

Materials and Methods

For the purpose of determining the species of bony fishes, specimens of fish were obtained in various seasons of 1992 and 1995 by bottom trawling performed at the places shown in Figure in the south of the Sea of Marmara, by the Arar research vessel of the University of Istanbul. Bottom trawling was performed at a total of 47 stations, at depths of 27-164 m. The dates on which work was done at the stations, station codes, periods of drawing the trawl depths, and locations are given in Table.

The obtained specimens of fish were fixed and preserved in 5% formaline. The colors of the fish were assessed through work on fresh specimens. In order to determine the genus, species and subspecies of fish samples brought to the laboratory, examinations were done on metric and meristic characteristics. During the analysis of the fish, the taxonomic order suggested by Nelson (52), species names suggested by Fischer et al. (32), Whitehead et al. (29, 30), Wheeler (53), Golani (54) and Eschmeyer (55), and the English common names sugested by Whitehead et al. (29, 30) and Wheeler (53) were used. Laevastu's (56) method was employed for the metric measurement of the dimensions, and compass and millimetric measurement board were

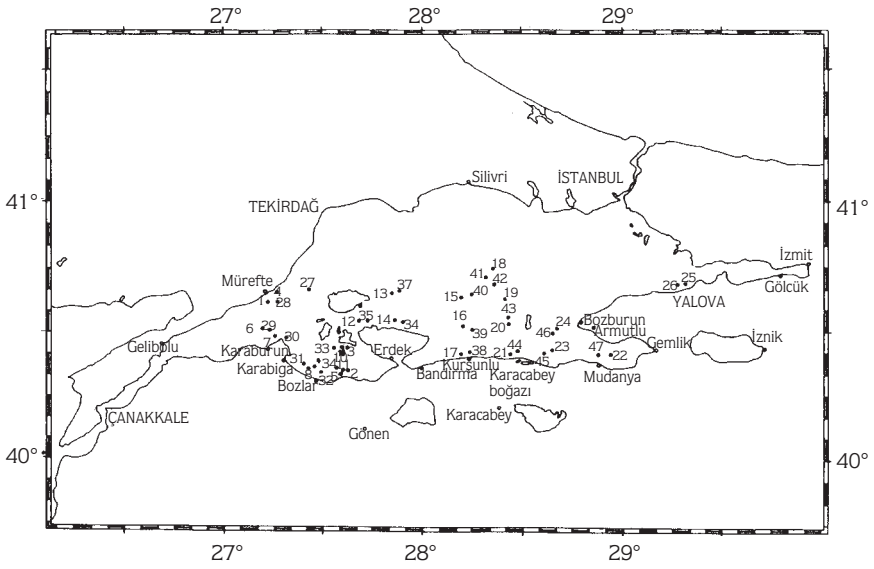

Figure: Research Stations in the South of the Sea of Marmara.

Table: Stations of Bottom Trawling in the South of the Sea of Marmara.

Station Number	Date	Co ordinates N/E	Time min	Depth m	Place
1	16.04.1992	40°37'20'' 27°13'12''	80	63	Offshore of Mürefte
2	17.04.1992	40°20'48'' 27°36'45''	120	33	Front of Gönen Stream
3	20.07.1992	40°26'33'' 27°36'40''	120	42	South of Paşalimanı Island
4	21.10.1992	40°39'30'' 27°15'20''	60	40	Offshore of Mürefte
5	23.10.1992	40°20'42'' 27°36'00''	80	29	Front of Gönen Stream
6	07.02.1995	40°31'24'' 27°11'32''	30	65	Offshore of Karabiga-Karaburun
7	07.02.1995	40°28'48'' 27°15'15''	30	55	Front of Karabiga-Karaburun
8	07.02.1995	40°21'51'' 27°26'12''	30	27	Front of Bozlar
9	07.02.1995	40°26'56'' 27°27'42''	30	55	Offshore of Bozlar
10	08.02.1995	40°26'33'' 27°36'39''	30	45	South of Paşalimanı Island
11	08.02.1995	40°20'48'' 27°36'42''	30	29	Front of Gönen Stream
12	08.02.1995	40°33'35'' 27°41'04''	30	65	Offshore of Marmara Island-Topağaç
13	09.02.1995	40°39'30'' 27°51'08''	30	64	Eastern waters of Marmara Island
14	09.02.1995	40°33'30'' 27°52'24''	30	59	Offshore of Kapıdağ Peninsula-Ormanköy
15	10.02.1995	40°38'10'' 28°12'38''	30	85	Offshore of Kurşunlu
16	10.02.1995	40°31'54'' 28°12'48''	30	54	Offshore of Kurşunlu
17	10.02.1995	40°24'35'' 28°12'19''	30	38	Front of Kurşunlu
18	11.02.1995	40°44'50'' 28°21'20''	30	164	North-west offshore of Imralı Island
19	11.02.1995	40°38'14'' 28°25'04''	30	85	North-west offshore of Imralı Island
20	11.02.1995	40°32'12'' 28°25'26''	30	51	Western waters of Imralı Island

Station Number	Date	Co ordinates N/E	Time min	Depth m	Place
21	11.02.1995	40°24'53'' 28°27'00''	30	30	Kocasu-Karacabey Strait
22	12.02.1995	40°25'10'' 28°56'30''	30	92	Offshore of Mudanya
23	12.02.1995	40°25'54'' 28°39'00''	30	56	South-east offshore of Imralı Island
24	12.02.1995	40°30'25'' 28°40'00''	30	40	Offshore of Armutlu-Bozburun
25	14.02.1995	40°41'10'' 29°19'20''	30	65	Front of Yalova
26	07.07.1995	40°40'55'' 29°17'30''	30	65	Front of Yalova
27	12.07.1995	40°39'37'' 27°24'18''	30	159	North-west offshore of Marmara Island
28	13.07.1995	40°36'54'' 27°15'42''	30	78	Offshore of Mürefte
29	14.07.1995	40°30'25'' 27°12'50''	30	65	Offshore of Karabiga-Karaburun
30	14.07.1995	40°28'00'' 27°17'40''	30	53	Front of Karabiga-Karaburun
31	14.07.1995	40°22'30" 27°24'10"	30	30	Front of Bozlar
32	14.07.1995	40°25'50" 27°28'55"	30	52	Offshore of Bozlar
33	15.07.1995	40°25'58" 27°34'00"	30	46	Offshore of Gönen Stream
34	15.07.1995	40°21'15" 27°34'50"	30	28	Front of Gönen Stream
35	16.07.1995	40°33'30" 27°43'00"	30	65	Offshore of Marmara Island-Topağaç
36	16.07.1995	40°33'00" 27°53'00"	30	59	Offshore of Kapıdağ Peninsula-Ormanköy
37	16.07.1995	40°40'09" 27°52'10"	30	76	Eastern waters of Marmara Island
38	17.07.1995	40°25'09" 28°14'22"	30	38	Front of Kurşunlu
39	17.07.1995	40°31'20" 28°14'20"	30	49	Offshore of Kurşunlu
40	17.07.1995	40°38'45" 28°13'50"	30	103	Offshore of Kurşunlu

Station Number	Date	Co ordinates N/E	Time min	Depth m	Place
41	17.07.1995	40°42'50'' 28°18'10''	30	160	North-west offshore of Imralı Island
42	17.07.1995	40°42'10'' 28°20'50''	30	137	North-west offshore of Imralı Island
43	18.07.1995	40°33'32'' 28°25'45''	30	51	Western waters Imralı Island
44	18.07.1995	40°25'30'' 28°28'05''	30	30	Kocasu-Karacabey Strait
45	18.07.1995	40°25'05'' 28°37'50''	30	55	South-east offshore of Imralı Island
46	18.07.1995	40°29'25'' 28°39'00''	30	39	Offshore of Armutlu-Bozburun
47	18.07.1995	40°25'00'' 28°52'55''	30	88	Offshore of Mudanya

used. Among metric characteristics, total length (TL), standard length (SL), fork length (FL), head length (LL`), preorbital distance (Pr.O), eye diameter (OO`), interorbital distance (IO), body depth (H), lateral line scale depth, pectoral fin length (PL), anal fin length and cleithral bone length were measured. Meristic counting was performed under a binocular microscope. Among meristic characteristics, fin rays, gill rakers (GR) and lateral line scales, total subdorsal rings, opercular bones, incisor and molar teeth were counted. All of the analysed specimens are conserved in the Hydrobiological Museum of the Department of Biology, Faculty of Science, the University of Istanbul.

Results

As a result of the examination of 572 fish samples caught by bottom trawl during this research at the stations in the south of the Sea of Marmara, the presence of 49 bony fish species (5 of which are subspecies) in 30 families was recorded and the diagnostic chracteristics were examined.

Family: Congridae

Conger conger ((Artedi, 1738) Linnaeus, 1758)

(Conger eel)

Conger conger: Slastenenko (13): 252–253, Fig. 46; Wheeler (57): 229–230, Fig.; Tortonese (58): 324-326, Fig. 130; Bauchot–Saldanha (59) in Whitehead et al., 1986: 569, Fig.; Fischer et al. (32): 1068, Fig.

Material examined

Offshore of Kurşunlu: Depth 103 m, 17 July 1995, 1 specimen. Size: 720 mm TL.

Family: Engraulidae

Engraulis encrasicolus (Linnaeus, 1758)

(Anchovy)

Engraulis encrasicolus ponticus: Slastenenko (13): 92–95, Fig. 20; Banarescu (60): 247–251, Fig. 108.

Engraulis encrasicholus: Tortonese (58): 107–110. Fig. 43.

Engraulis encrasicolus: Wheeler (57): 126, Fig.; Fischer et al. (32): 1081, Fig.; Whitehead (61) in Whitehead et al., 1989: 282-283, Fig.

Material examined

Western waters of Imralı Island: Depth 51 m, 11 February 1995, 1 specimen. Size: 100 mm SL, 107 mm FL, 116 mm TL.

Family: Clupeidae

Sardina pilchardus (Walbaum, 1792)

(Pilchard)

Sardina pilchardus sardina: Svetovidov (62): 206–209, Plate 6 (2); Slastenenko (13): 90–91, Fig. 19; Banarescu (60): 233–235, Fig. 102.

Sardina pilchardus: Wheeler (57): 130–131, Fig.; Tortonese (58): 93-97, Fig. 37; Fischer et al. (32): 1060, Fig.; Whitehead (63) in Whitehead et al., 1989: 276- 277, Fig.

D: IV / 14-16, A: III / 16-17, V: 8, GR: 51-61

n = 4

IO / LL` %: 21.5667 ± 1.0005

LL` / FL %: 24.2739 ± 0.6102

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 3 specimens.

Front of Gönen Stream: Depth 28 m, 15 July 1995, 1 specimen. Size: 100–115 mm SL, 108–123 mm FL, 118–133 mm TL, 4 specimens.

Sprattus sprattus phalericus (Risso, 1826)

(Sprat)

Spratella sprattus phalerica: Slastenenko (13): 79–82, Fig. 17.

Sprattus sprattus: Wheeler (57): 131–132, Fig.; Tortonese (58): 90-93, Fig. 36.

Sprattus sprattus phalericus: Svetovidov (62): 112-116, Plate 1 (2); Banarescu (60): 226–228, Fig. 98; Fischer et al. (32): 1064, Fig.; Whitehead (63) in Whitehead et al., 1989: 280-281, Fig.

D: IV – V / 11-14, A: II – IV / 14 -18, V: I / 6, GR: 32-42

n= 42

IO / LL` %: 18.6857 ± 0.1287

LL ` / FL %: 24.6614 ± 0.2173

Material examined

Offshore of Mürefte: Depth 78 m, 13 July 1995, 5 specimens.

Front of Kurşunlu: Depth 38 m, 17 July 1995, 37 specimens. Size: 86–118 mm SL, 92–125 mm FL, 98–135 mm TL, 42 specimens.

Alosa fallax nilotica (Geoffroy Saint – Hilaire, 1808)

(Twaite shad)

Alosa fallax: Wheeler (57): 128–129, Fig.

Alosa fallax nilotica: Svetovidov (62): 347–348, Plate 24 (1); Slastenenko (13): 77– 78, Fig. 16; Tortonese (58): 102-105, Fig. 43 A; Fischer et al. (32): 1054, Fig.; Whitehead (63) in Whitehead et al.,1989: 271-272, Fig.

D: IV / 16, A: III / 18 , GR: 34

n= 1

LL `/ FL %: 20.59

IO / LL ` %: 26.79

Material examined

Front of Gönen Stream: Depth 33 m, 17 February 1992, 1 specimen. Size: 265 mm SL, 272 mm FL, 312 mm TL.

Alosa pontica (Eichwald, 1838)

(Pontic shad)

Alosa kessleri pontica: Svetovidov (62): 316–328, Plate 21 (1).

Caspialosa pontica: Slastenenko (13): 67–69, Fig. 14.

Alosa pontica pontica: Banarescu (60): 239–244, Fig. 106.

Alosa pontica: Fischer et al. (32): 1055, Fig.; Whitehead (63) in Whitehead et al., 1989: 272, Fig.

D: IV / 13, A: III / 16, GR: 51-54

n= 2

IO / LL` %: 23.1681 ± 4.42

LL` / FL %: 24.5968 ± 1.2097

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 1 specimen.

Eastern waters of Marmara Island: Depth 76 m, 16 July 1995, 1 specimen. Size: 175–235 mm SL, 186–248 mm FL, 206–271 mm TL, 2 specimens.

Family: Phycidae

Gaidropsarus megalokynodon (Kolombatovic,1894)

(Mediterranean bigeye rockling)

Gaidropsarus biscayensis: Tortonese (58): 405-406, Fig. 163.

Antonogadus megalokynodon: Svetovidov (64) in Whitehead et al., 1986: 696, Fig.

Gaidropsarus megalokynodon: Fischer et al. (32): 1093, Fig.

D2: 51-55, A: 45-46, P: 19

n = 3

Material examined

North-west offshore of Marmara Island: Depth 159 m, 12 July 1995, 2 specimens.

Offshore of Mürefte: Depth 78 m, 13 July 1995, 1 specimen. Size: 132–149 mm SL, 3 specimens.

Family: Merluccidae

Merluccius merluccius (Linnaeus, 1758)

(Hake)

Merluccius merluccius: Slastenenko (13): 263–264, Fig. 48; Wheeler (57):281–282 , Fig.; Tortonese (58): 417-421, Fig. 171; Svetovidov (65) in Whitehead et al., 1986: 677-678, Fig.; Fischer et al. (32): 1173, Fig.

D1: 8-10 , D2: 35-40, A: 36-39, GR: 8-11 (total), 7-9 (lower branch)

n = 26

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 1 specimen.

Front of Karabiga - Karaburun: Depth 53 m, 14 July 1995, 7 specimens.

Front of Gönen Stream: Depth 28 m, 15 July 1995, 7 specimens.

Offshore of Kapıdağ Peninsula - Ormanköy: Depth 59 m, 16 July 1995, 7 specimens.

Eastern waters of Marmara Island: Depth 76 m, 16 July 1995, 4 specimens.

Size: 70 – 195 mm SL, 26 specimens.

Family: Gadidae

Merlangius merlangus euxinus (Nordmann,1840)

(Whiting)

Gadus merlangus euxinus: Slastenenko (13): 259–260, Fig. 47.

Merlangius merlangus: Wheeler (57): 267–269, Fig.

Odontogadus merlangus euxinus: Banarescu (60): 575–578, Fig. 246; Tortonese (58): 387 - 389, Fig. 153 B.

Merlangius merlangus euxinus: Svetovidov (64) in Whitehead et al., 1986: 688 - 689, Fig.; Fischer et al. (32): 1095, Fig.

D1: 13-16, D2: 16-21, D3: 17-21, A1: 25-32, A2: 18-23, GR: 18-23

n = 61

PL / SL %: 17.0399 ± 0.0935

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 28 specimens.

South of Paşalimanı Island: Depth 42 m, 20 July 1992, 1 specimen.

Offshore of Karabiga - Karaburun: Depth 65 m, 7 February 1995, 9 specimens.

Snout of Paşalimanı Island: Depth 45 m, 8 February 1995, 10 specimens.

Front of Kurşunlu: Depth 38 m, 10 February 1995, 6 specimens.

Front of Bozlar: Depth 30 m, 14 July 1995, 7 specimens. Size: 115–185 mm SL, 61 specimens.

Micromesistius poutassou (Risso, 1826)

(Blue whiting)

Micromesistius poutassou: Wheeler (57): 266, Fig.; Tortonese (58): 389 - 390, Fig. 155; Svetovidov (64) in Whitehead et al., 1986: 689, Fig.; Fischer et al. (32): 1096, Fig.

Material examined

Offshore of Kurşunlu: Depth 103 m,17 July 1995, 1 specimen. Size: 120 mm SL.

Trisopterus minutus capelanus (Lacepéde, 1826)

(Poor-cod)

Trisopterus minutus: Wheeler (57): 271-272, Fig.

Trisopterus minutus capelanus: Tortonese (58): 385-387, Fig. 153 A; Svetovidov (64) in Whitehead et al., 1986: 694–695, Fig.; Fischer et al. (32): 1102, Fig.

D1: 11, D2: 19, D3: 18, A1: 29, A2: 18, GR: 18

n=1

TL / LL`: 4.14

Material examined

South of Paşalimanı Island: Depth 42 m, 20 July 1992, 1 specimen. Size: 159 mm SL, 178 mm TL.

Family: Zeidae

Zeus faber Linnaeus, 1758

(Dory)

Zeus faber faber: Slastenenko (13): 284 – 286, Fig. 55.

Zeus faber: Banarescu (60): 632–633; Wheeler (57): 306–307, Fig.; Tortonese (58): 496 - 499, Fig. 196; Quéro (66) in Whitehead et al., 1986: 772, Fig.; Fischer et al. (32): 1421, Fig.

D: X / 23-24, A: IV / 20, V: I / 7

Scute scales D: 11, Scute scales A: 10

n = 2

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 1 specimen.

Western waters of Imralı Island: Depth 51 m, 11 February 1995, 1 specimen.

Size: 95 - 260 mm SL, 2 specimens.

Family: Caproidae

Capros aper (Linnaeus, 1758)

(Boar - fish)

Capros aper: Wheeler (57): 307–308, Fig.; Tortonese (58): 500-502, Fig. 197; Quéro (67) in Whitehead et al., 1986: 778–779, Fig.; Fischer et al. (32):1007 , Fig.

D: IX / 22, A: III / 21, V: I + 5

n= 1

SL / H: 1.84

Material examined

North-west offshore of İmralı Island: Depth 164 m, 11 February 1995, 1 specimen. Size: 80 mm SL.

Family: Syngnathidae

Syngnathus acus Linnaeus, 1758

(Greater pipefish)

Syngnathus acus rubescens: Tortonese (58): 446-448, Fig. 181 A.

Syngnathus acus: Wheeler (57): 245–246, Fig.; Dawson (68) in Whitehead et al., 1986: 635, Fig.

D: 34, P: 12

n= 1

Rings: 20 + 34, Total sub dorsal rings: 8

Material examined

Western waters of İmralı Island: Depth 51 m, 11 February 1995, 1 male specimen. Size: 217 mm TL.

Family: Scorpaenidae

Helicolenus dactylopterus (Delaroche, 1809)

(Blue-mouth)

Helicolenus dactylopterus dactylopterus: Hureau - Litvinenko (69) in Whitehead et al., 1986: 1212-1213, Fig.

Helicolenus dactylopterus: Wheeler (57): 477, Fig.; Tortonese (70): 426-428, Fig. 186; Fischer et al. (32): 1294, Fig.

D: XII / 13, A: III / 5, P: 18, GR (lower branch): 18, (upper branch): 8

Material examined

North–west offshore of Marmara Island: Depth 159 m, 12 July 1995, 1 specimen. Size: 225 mm SL.

Scorpaena porcus Linnaeus, 1758

(Black scorpion - fish)

Scorpaena porcus: Slastenenko (13): 503–505; Banarescu (60): 867–870, Fig. 382; Wheeler (57): 475; Tortonese (70): 430-431, Fig. 188; Hureau-Litvinenko (69) in Whitehead et al., 1986: 1220, Fig.; Fischer et al. (32): 1297, Fig.

D: XI – XII / 9-11, P: 16-17, GR (lower branch): 7-8, (upper branch): 5-6

n= 7

SL / LL`: 2.4138 ± 0.0532

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 6 specimens.

Kocasu – Karacabey Strait: Depth 30 m, 18 July 1995, 1 specimen. Size: 42-137 mm SL, 7 specimens.

Scorpaena scrofa Linnaeus, 1758

(Red scorpion - fish)

Scorpaena scrofa: Slastenenko (13): 507, Fig. 129; Wheeler (57): 478, Fig.; Tortonese (70): 431-433, Fig. 189; Hureau-Litvinenko (69) in Whitehead et al., 1986: 1221, Fig.; Fischer et al. (32): 1298, Fig.

D: XII / 9, A: III / 5, P: 18, V: I / 5

n = 1

Material examined

North–west offshore of Marmara Island: Depth 159 m, 12 July 1995, 1 specimen. Size: 285 mm SL, 350 mm TL.

Family: Triglidae

Eutrigla gurnardus (Linnaeus, 1758)

(Grey gurnard)

Trigla gurnardus: Slastenenko (13): 513–514, Fig. 132.

Eutrigla gurnardus: Wheeler (57): 485, Fig.; Tortonese (70): 446-447, Fig. 197; Hureau (71) in Whitehead et al., 1986: 1233–1234, Fig.; Fischer et al. (32): 1412, Fig.

D1: VIII – IX , D2: 18 – 19, A: 17 – 19, LL: 73 - 75

GR (lower branch): 14 –15, (upper branch): 2 – 3

n = 28

Material examined

Offshore of Karabiga - Karaburun: Depth 65 m, 14 July 1995, 5 specimens.

Front of Karabiga - Karaburun: Depth 53 m, 14 July 1995, 5 specimens.

Front of Bozlar: Depth 30 m, 14 July 1995, 3 specimens.

Offshore of Bozlar: Depth 52 m, 14 July 1995, 2 specimens.

Front of Gönen Stream: Depth 28 m, 15 July 1995, 4 specimens.

Offshore of Marmara Island - Topağaç: Depth 65 m,16 July 1995, 4 specimens.

Kocasu – Karacabey Strait: Depth 30 m, 18 July 1995, 5 specimens. Size: 63-207 mm SL, 75–242 mm TL, 28 specimens.

Lepidotrigla cavillone (Lacepéde, 1801)

(Large – scaled gurnard)

Lepidotrigla cavillone: Tortonese (70): 451-452, Fig. 200 A; Hureau (71) in Whitehead et al., 1986: 1234 , Fig.; Fischer et al. (32): 1413, Fig.

D1: VIII – IX, D2: 14 – 16, A: 16, GR: 7 – 11

n = 10

CL / SL %: 15.9955 ± 0.3198

Material examined

Front of Karabiga - Karaburun: Depth 53 m, 14 July 1995, 10 specimens. Size: 91 –104 mm SL, 42 specimens.

Trigla lucerna Linnaeus, 1758

(Tub gurnard)

Trigla lucerna: Slastenenko (13): 510–512, Fig. 130; Banarescu (60): 872–875, Fig. 384; Wheeler (57): 490; Tortonese (70): 443-444, Fig. 195; Hureau (71) in Whitehead et al., 1986: 1235–1236, Fig.; Fischer et al. (32): 1415, Fig.

D1: VIII – IX , D2: 16 –18, A: 15 – 17, GR: 9 – 11

n = 45

Material examined

Front of Karabiga - Karaburun: Depth 55 m, 7 February 1995, 2 specimens.

Front of Karabiga – Karaburun: Depth 53 m, 14 July 1995, 4 specimens.

Front of Kurşunlu: Depth 38 m, 17 July 1995, 6 specimens.

Kocasu–Karacabey Strait: Depth 30 m, 18 July 1995, 33 specimens. Size: 74–165 mm SL, 45 specimens.

Trigla lyra Linnaeus, 1758

(Piper)

Trigla lyra: Wheeler (57): 489, Fig.; Tortonese (70): 442-443, Fig. 194; Hureau (71) in Whitehead et al., 1986: 1236–1237, Fig.; Fischer et al. (32): 1416, Fig.

D1: IX, D2: 17, A: 16

n = 4

Material examined

Offshore of Karabiga - Karaburun: Depth 65 m, 14 July 1995, 3 specimens.

Front of Bozlar: Depth 30 m, 14 July 1995, 1 specimen. Size: 345–440 mm SL, 410–505 mm TL, 4 specimens.

Trigloporus lastoviza (Brünnich, 1768)

(Streaked gurnard)

Trigloporus lastoviza: Wheeler (57): 486, Fig.; Tortonese (70): 445-446, Fig. 196 ; Hureau (71) in

Whitehead et al., 1986: 1237–1238, Fig.; Fischer et al. (32): 1417, Fig.

D1: IX, D2: 16, A: 16, GR: 8

n = 1

Material examined

Offshore of Armutlu - Bozburun: Depth 39 m, 18 July 1995, 1 specimen. Size: 157 mm SL.

Family: Serranidae

Serranus hepatus (Linnaeus, 1758)

(Brown comber)

Serranus (Paracentropristis) hepatus: Tortonese (70): 75 – 76, Fig. 28 C.

Serranus hepatus: Tortonese (72) in Whitehead et al., 1986: 791, Fig.; Fischer et al. (32): 1318, Fig.

D: X / 12, A: III / 7, LL: 46 – 50, GR: 13 - 15

n = 28

Material examined

Front of Yalova: Depth 65 m, 7 July 1995. Size: 93–119 mm SL, 28 specimens.

Family: Pomatomidae

Pomatomus saltator (Linnaeus, 1766)

(Blue fish)

Pomatomus saltatrix: Slastenenko (13): 344–346, Fig. 69; Banarescu (60): 727– 729, Fig. 319; Fischer et al. (32): 1247, Fig.

Pomatomus saltator: Tortonese (70): 151–153, Fig. 63; Tortonese (73) in Whitehead et al., 1986: 812, Fig.

D1: VII, D2: I / 22 – 25, A: II / 24 – 25, LL: 95 – 96, GR: 11 – 16

n= 5

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, Size: 137–170 mm SL, 5 specimens.

Family: Carangidae

Trachurus trachurus (Linnaeus, 1758)

(Scad (horse mackerel))

Trachurus trachurus trachurus: Banarescu (60): 736–739, Fig. 322.

Trachurus trachurus: Slastenenko (13): 348–351, Fig. 70; Wheeler (57): 331–332, Fig.; Tortonese (70): 163-165, Fig. 68 A; Smith - Vaniz (74) in Whitehead et al., 1986: 842–843, Fig.; Fischer et al. (32): 1030, Fig.

D1: VIII, D2: I / 29 – 31, A: II, I / 25 – 28, LL (total): 67–75, GR: 43–48 n = 34

SH / SL %: 7.5073 ± 0.0526

Material examined

North west offshore of İmralı Island: Depth 164 m, 11 February 1995, 1 specimen.

Front of Yalova: Depth 65 m, 7 July 1995, 19 specimens.

Offshore of Bozlar: Depth 52 m, 14 July 1995, 5 specimens.

Offshore of Kapıdağ Peninsula-Ormanköy: Depth 59 m, 16 July 1995, 6 specimens.

Offshore of Kurşunlu: Depth 49 m, 17 July 1995, 3 specimens. Size: 104–155 mm SL, 111–160 mm FL, 34 specimens.

Family: Sparidae

Diplodus annularis (Linnaeus, 1758)

(Annular sea bream)

Sargus annularis: Slastenenko (13): 371–373, Fig. 80;

Diplodus annularis: Banarescu (60): 700–702, Fig. 305; Tortonese (70): 105-107, Fig. 42 A; Bauchot - Hureau (75) in Whitehead et al., 1986: 891, Fig.; Fischer et al. (32): 1359, Fig.

D: XI / 11 – 12, A: III / 11, LL: 50 – 54,

GR (lower branch): 9, (upper branch): 7 - 8

Teeth (incisor): 8, (molar(lower): 2–3, (upper)): 3-4

n = 3

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 2 specimens.

Front of Gönen Stream: Depth 29 m, 23 October 1992, 1 specimen. Size: 73–124 mm SL, 3 specimens.

Pagellus erythrinus (Linnaeus, 1758)

(Pandora)

Pagellus erythrinus: Slastenenko (13): 375–376, Fig. 82; Banarescu (60): 709–711 , Fig. 311; Wheeler (57): 353, Fig.; Tortonese (70): 97-98, Fig. 40 A; Bauchot-Hureau (75) in Whitehead et al., 1986: 901, Fig.; Fischer et al. (32): 1369, Fig.

D: XII / 11, A: III / 9, LL: 60,

GR (lower branch): 8, (upper branch): 6

Teeth (molar (lower: 2, upper: 2))

n = 1

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 1 specimen. Size: 127 mm SL.

Family: Centracanthidae

Spicara flexuosa Rafinesque, 1810

Spicara smaris flexuosa: Slastenenko (13): 379–382;

Spicara flexuosa: Tortonese (70): 126-128, Fig. 50; Tortonese (76) in Whitehead et al., 1986: 910, Fig.; Fischer et al. (32): 1034, Fig.

D: XI / 11, A: III / 9–10, LL: 69–77

n = 10

SL / H: 3.5458 ± 0.0382

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 5 specimens.

Offshore of Karabiga - Karaburun: Depth 65 m, 7 February 1995, 2 specimens.

Front of Karabiga–Karaburun: Depth 53 m, 14 July 1995, 2 specimens.

Front of Gönen Stream: Depth 28 m, 15 July 1995, 1 specimen. Size: 108–134 mm SL, 10 specimens.

Spicara smaris (Linnaeus, 1758)

Spicara smaris: Banarescu (60): 712–714, Fig. 312; Tortonese (70): 130-131, Fig. 52–53; Tortonese (76) in Whitehead et al., 1986: 911, Fig.; Fischer et al. (32): 1036, Fig.

D: XI / 11, A: III / 10, LL: 77

n = 1

Material examined

Front of Gönen Stream: Depth 29 m, 23 October 1992, 1 specimen. Size: 67 mm SL.

Family: Sciaenidae

Umbrina cirrosa (Linnaeus, 1758)

(Shi drum)

Sciaena cirrhosa: Slastenenko (13): 357–359, Fig. 75;

Sciaena cirrosa: Banarescu (60): 715–717, Fig. 313;

Umbrina cirrosa: Wheeler (57): 340, Fig. 112; Tortonese (70): 144-145, Fig. 59; Labbish Ning Chao (77) in Whitehead et al., 1986: 873, Fig.; Fischer et al. (32): 1260, Fig.

Material examined

Front of Bozlar: Depth 27 m, 7 February 1995, 2 specimens. Size: 115–127 mm SL.

Family: Mullidae

Mullus barbatus Linnaeus, 1758

(Red mullet)

Mullus barbatus ponticus: Slastenenko (13): 383–386, Fig. 84; Banarescu (60):

722–726, Fig. 317.

Mullus barbatus: Wheeler (57): 343, Fig. 113 B; Tortonese (70): 136-137, Fig. 55 A; Hureau (78) in Whitehead et al., 1986: 878, Fig.; Fischer et al. (32): 1197, Fig.

D1: VIII, D2: I / 8, A: II / 6, LL: 32–35, GR: 19–23

n = 26

LL` / TL %: 20.9973 ± 0.1724

Material examined

Offshore of Mürefte: Depth 63 m, 16 April 1992, 4 specimens.

Offshore of Karabiga–Karaburun: Depth 65 m, 14 July 1995, 1 specimen.

Front of Karabiga–Karaburun: Depth 53 m, 14 July 1995, 9 specimens.

Front of Bozlar: Depth 30 m, 14 July 1995, 8 specimens.

Offshore of Bozlar: Depth 52 m, 14 July 1995, 2 specimens.

Eastern waters of Marmara Island: Depth 76 m, 16 July 1995, 1 specimen.

Offshore of Armutlu-Bozburun: Depth 39 m, 18 July 1995, 1 specimen.

Size: 108–166 mm SL, 131–204 mm TL, 26 specimens.

Mullus surmuletus Linnaeus, 1758

(Red mullet)

Mullus barbatus surmuletus: Slastenenko (13): 386–387, Fig. 85;

Mullus surmuletus: Wheeler (57): 344-345, Fig.; Tortonese (70): 137-139, Fig. 56; Hureau (78) in Whitehead et al., 1986: 879, Fig.; Fischer et al. (32): 1198, Fig.

D1: VIII, D2: I / 7–8, A: II / 6, LL: 33–36 , GR: 19–23

n = 10

LL` / TL %: 23.5525 ± 0.0036

Material examined

Offshore of Mürefte: Depth 63 m, 16 April 1992, 9 specimens.

Eastern waters of Marmara Island: Depth 76 m, 16 July 1995, 1 specimen.

Size: 117–153 mm SL, 145–183 mm TL, 10 specimens.

Family: Cepolidae

Cepola rubescens Linnaeus, 1766

(Red band-fish)

Cepola macrophthalma: Fischer et al. (32): 1041, Fig.

Cepola rubescens: Wheeler (57): 359–360, Fig.; Tortonese (70): 147-148, Fig. 61 A; Tortonese (79) in Whitehead et al., 1986: 810-811, Fig.

D: 67–68, A: 60

n = 25

TL / H: 15.0249 ± 0.5206, LL` / OO`: 3.0436 ± 0.0670

Material examined

Offshore of Karabiga–Karaburun: Depth 65 m, 14 July 1995, 6 specimens.

Front of Karabiga-Karaburun: Depth 53 m, 14 July 1995, 3 specimens.

Offshore of Gönen Stream: Depth 46 m, 15 July 1995, 11 specimens.

Offshore of Marmara Island–Topağaç: Depth 65 m, 16 July 1995, 5 specimens.

Size: 192–517 mm SL, 215–565 mm TL, 25 specimens.

Family: Trachinidae

Trachinus draco Linnaeus, 1758

(Greater weever)

Trachinus draco: Slastenenko (13): 408–410, Fig. 95; Banarescu (60): 763–766, Fig. 335; Wheeler (57): 382–383, Fig.; Tortonese (70): 232, Fig. 96 A; Tortonese (80) in Whitehead et al., 1986: 953, Fig.; Fischer et al. (32): 1397, Fig.

D1: VI–VII, D2: 29, A: II / 28, LL: 80-82

GR (lower branch): 15–16, (upper branch): 8

n = 3

SL / H: 5.6527 ± 0.0645

Material examined

South of Paşalimanı Island: Depth 42 m, 20 July 1992, 3 specimens.

Size: 182–201 mm SL.

Family: Uranoscopidae

Uranoscopus scaber Linnaeus, 1758

(Stargazar)

Uranoscopus scaber: Slastenenko (13): 411–412, Fig. 96; Banarescu (60): 768–772, Fig. 337; Tortonese (70): 237-239, Fig. 98; Hureau (81) in Whitehead et al., 1986: 955-956, Fig.; Fischer et al. (32): 1418, Fig.

D1: IV, D2: 14–15, A: I / 12–13

n = 5

LL`/ SL %: 35.4922 ± 0.7260, OO`/ LL` %: 16.3816 ±0.4785

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 2 specimens.

Front of Karabiga-Karaburun: Depth 53 m, 14 July 1995, 1 specimen.

Front of Bozlar: Depth 30 m, 14 July 1995, 1 specimen.

Offshore of Armutlu-Bozburun: Depth 39 m, 18 July 1995, 1 specimen.

Size: 122–206 mm SL, 152–255 mm TL, 5 specimens.

Family: Bleniidae

Blennius ocellaris Linnaeus, 1758

(Butterfly blenny)

Blennius (Blennius) ocellaris: Wheeler (57): 437, Fig.

Blennius ocellaris: Slastenenko (13): 425–426, Fig. 102; Tortonese (70): 256-258, Fig. 107; Zander (82) in Whitehead et al., 1986: 1098, Fig.; Fischer et al. (32): 986, Fig.

D: XI / 14–15, A: II / 16–17, V: I / 3, P: 12

n = 8

Material examined

Snout of Paşalimanı Island: Depth 42 m, 20 July 1992, 2 specimens.

Offshore of Karabiga-Karaburun: Depth 65 m, 14 July 1995, 3 specimens.

Offshore of Bozlar: Depth 52 m, 14 July 1995, 1 specimen.

Eastern waters of Marmara Island: Depth 76 m, 16 July 1995, 1 specimen.

Offshore of Kurşunlu: Depth 49 m, 17 July 1995, 1 specimen. Size: 92–118 mm SL, 8 specimens.

Parablennius tentacularis (Brünnich, 1768)

Blennius tentacularis: Slastenenko (13): 421–422, Fig. 100; Banarescu (60): 782– 783, Fig. 343; Tortonese (70): 265-266, Fig. 113.

Parablennius tentacularis: Zander (82) in Whitehead et al., 1986: 1110–1111, Fig.; Fischer et al. (32): 990, Fig.

D: XII / 21–22, A: II / 22–23, V: I / 3, P: 14

n = 2

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 1 specimen.

Front of Gönen Stream: Depth 29 m, 23 October 1992, 1 specimen. Size: 62–64 mm SL, 2 specimens.

Family: Callionymidae

Callionymus lyra Linnaeus, 1758

(Dragonet)

Callionymus lyra: Wheeler (57): 434, Fig.; Tortonese (70): 241-243, Fig. 100; Fricke (83) in Whitehead et al., 1986: 1088-1089, Fig.; Fischer et al. (32): 1004, Fig.

D1: IV, D2: 9–10, A: 9, V: 6, P: 19-21

n = 32

LL` /OO`: 2.7292 ± 0.0709, PrO / OO`: 1.1230 ± 0.0461

Material examined

Offshore of Bozlar: Depth 55 m, 7 February 1995, 3 male specimens, 8 female specimens.

Front of Gönen Stream: Depth 29 m, 8 February 1995, 1 male specimen, 8 female specimens.

Offshore of Kurşunlu: Depth 49 m, 17 July 1995, 1 male specimen, 11 female specimens. Size: 72–170 mm SL, 86–214 mm TL, 32 specimens.

Callionymus maculatus Rafinesque, 1810

(Spotted dragonet)

Callionymus maculatus: Wheeler (57): 433, Fig.; Tortonese (70): 243-244, Fig. 101; Fricke (83) in Whitehead et al., 1986: 1089-1090, Fig.; Fischer et al. (32): 1005, Fig.

D1: IV–V, D2: 9–10, A: 9, V: 6, P: 19

n = 18

LL` / OO`: 2.5614 ± 0.0593, PrO / OO`: 1.0338 ± 0.0207

Material examined

Offshore of Bozlar: Depth 55 m, 7 February 1995, 1 male specimen.

Western waters of Imralı Island: Depth 51 m, 11 February 1995, 5 male specimens.

Offshore of Karabiga-Karaburun: Depth 65 m, 14 July 1995, 3 male specimens, 1 female specimen.

Front of Karabiga-Karaburun: Depth 53 m, 14 July 1995, 1 male specimen.

Offshore of Bozlar: Depth 52 m, 14 July 1995, 2 male specimens.

Offshore of Kurşunlu: Depth 49 m, 17 July 1995, 4 male specimens, 1 female specimen. Size: 55–87 mm SL, 67–108 mm TL, 18 specimens.

Family: Gobiidae

Gobius niger Linnaeus, 1758

(Black goby)

Gobius (Gobius) niger: Wheeler (57): 419.

Gobius niger jozo: Fischer et al. (32): 1111, Fig.

Gobius niger: Slastenenko (13): 470–471, Fig. 116; Banarescu (60): 828–829, Fig. 366; Tortonese (70): 299–300, Fig. 131; Miller (84) in Whitehead et al., 1986: 1042-1043, Fig.

D1: VI, D2: I / 12, A: I / 12, P: 16–19, LS: 35–42

n = 16

Material examined

Front of Gönen Stream: Depth 29 m, 23 October 1992, 7 specimens.

Front of Yalova: Depth 65 m, 7 July 1995, 4 specimens.

Front of Gönen Stream: Depth 28 m, 15 July 1995, 1 specimen.

Eastern waters of Marmara Island: Depth 76 m, 16 July 1995, 1 specimen.

Offshore of Kurşunlu: Depth 49 m, 17 July 1995, 1 specimen.

Kocasu–Karacabey Strait: Depth 30 m, 18 July 1995, 1 specimen.

Offshore of Armutlu-Bozburun: Depth 39 m, 18 July 1995, 1 specimen.

Size: 57–122 mm SL, 16 specimens.

Family: Scombridae

Scomber scombrus Linnaeus, 1758

(Mackerel)

Scomber scombrus: Slastenenko (13): 439–448, Fig. 108; Banarescu (60): 800–802, Fig. 352; Wheeler (57): 395–396, Fig.; Tortonese (70): 346–348, Fig. 152 A; Collotte (85) in Whitehead et al., 1986: 991-992, Fig.; Fischer et al. (32): 1275, Fig.

Material examined

Offshore of Bozlar: Depth 52 m, 14 July 1995, 1 specimen. Size: 169 mm SL.

Family: Citharidae

Citharus linguatula (Linnaeus, 1758)

(Spotted flounder)

Citharus linguatula: Tortonese (70): 483–485, Fig. 209 A; Nielsen (86) in Whitehead et al., 1986: 1286, Fig.; Fischer et al. (32): 1047, Fig.

D: 65–70, A: 44–48, V: I / 5, LL: 37–42, GR: 11–12

n = 25

Material examined

Offshore of Mürefte: Depth 78 m, 13 July 1995, 1 specimen.

Offshore of Karabiga-Karaburun: Depth 65 m, 14 July 1995, 4 specimens.

Offshore of Marmara Island-Topağaç: Depth 65 m, 16 July 1995, 10 specimens.

Offshore of Kapıdağ Peninsula-Ormanköy: Depth 59 m, 16 July 1995, 1 specimen.

Eastern waters of Marmara Island: Depth 76 m, 16 July 1995, 9 specimens.

Size: 75–171 mm SL, 25 specimens.

Family: Bothidae

Arnoglossus laterna (Walbaum, 1792)

(Scaldfish)

Arnoglossus laterna: Erazi (6): 258, Fig. 19; Wheeler (57): 527-528, Fig.; Tortonese (70): 497–499, Fig. 215 A; Nielsen (87) in Whitehead et al., 1986: 1296, Fig.; Fischer et al. (32): 996, Fig.

D: 87–92, A: 65–72, V: 6, LL: 50–55, GR: 11

LL` / SL %: 29.5130 ± 0.5297, OO` /LL` %: 20.2936 ± 0.7774

n = 16

Material examined

Offshore of Karabiga-Karaburun: Depth 65 m, 14 July 1995, 1 specimen.

Front of Bozlar: Depth 30 m, 14 July 1995, 4 specimens.

Front of Gönen Stream: Depth 28 m, 15 July 1995, 1 specimen.

Eastern waters of Marmara Island: Depth 76 m, 16 July 1995, 4 specimens.

Kocasu–Karacabey Strait: Depth 30 m, 18 July 1995, 6 specimens. Size: 95–147 mm SL, 16 specimens.

Family: Scophthalmidae

Scophthalmus maximus (Linnaeus, 1758)

(Turbot)

Scophthalmus maeoticus: Erazi (6): 259, Fig. 20–21; Slastenenko (13): 525–530; Banarescu (60): 897–901, Fig. 395.

Psetta maxima: Tortonese (70): 487–489, Fig. 211; Nielsen (88) in Whitehead et al., 1986: 1290-1291, Fig.; Fischer et al. (32): 1287, Fig.

Scophthalmus maximus: Wheeler (57): 517-518, Fig.; Wheeler (53):16,22.

D: 65–68, A: 47–52, V: 7, P: 13, C: 17

n = 2

Material examined

Front of Gönen Stream: Depth 28 m, 15 July 1995, 2 specimens. Size: 365–395 mm SL, 460–485 mm TL, 2 specimens.

Family: Pleuronectidae

Pleuronectes flesus luscus Pallas, 1811

(Flounder)

Flesus vulgaris: Erazi (6): 250, Fig. 10.

Platichthys flesus: Wheeler (57): 536-537, Fig.

Platichthys flesus luscus: Tortonese (70): 504–506, Fig. 217; Nielsen (89), Whitehead et al., 1986: 1304-1305, Fig.; Fischer et al. (32): 1242, Fig.

Pleuronectes flesus: Wheeler (53): 16, 22.

Pleuronectes flesus luscus: Slastenenko (13): 534–538. Fig. 136; Banarescu (60): 904–908, Fig. 399;

D: 53–61, A: 39–42, LL: 80–82

GR (lower branch): 7–8, (upper branch): 3

n = 6

Material examined

Front of Gönen Stream: Depth 29 m, 23 October 1992, 6 specimens.

Size: 123–175 mm SL, 150–209 mm TL.

Family: Soleidae

Microchirus variegatus (Donovan, 1808)

(Thickback sole)

Solea variegata: Erazi (6): 243-244, Fig. 3; Tortonese (70): 512–513, Fig. 220 A;

Microchirus variegatus: Wheeler (57): 557, Fig.; Quéro et al. (90) in Whitehead et al., 1986: 1316, Fig.; Fischer et al. (32): 1333, Fig.

D: 63–72, A: 51–56, P (eyed side) 4, (blind side): 3, LL: 81–89

n = 6

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 1 specimen.

North–west offshore of Marmara Island: Depth 159 m, 12 July 1995, 1 specimen.

Offshore of Bozlar: Depth 52 m, 14 July 1995, 4 specimens. Size: 95-117 mm SL, 6 specimens.

Buglossidium luteum (Risso, 1810)

(Solenette)

Solea lutea: Erazi (6): 244, Fig. 2; Tortonese (70): 514, Fig. 220 B.

Buglossidium luteum: Wheeler (57): 555-556, Fig.; Quéro et al. (90) in Whitehead et al., 1986: 1311, Fig.; Fischer et al. (32): 1330, Fig.

D: 73, A: 56, P (eyed side): 5, LL: 66

n = 1

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 1 specimen. Size: 83 mm SL.

Solea lascaris (Risso, 1810)

(Sand sole)

Pegusa lascaris: Wheeler (57): 553, Fig.

Solea nasuta: Erazi (6): 248-249; Slastenenko (13): 539–541, Fig. 137; Quéro et al. (90) in Whitehead et al., 1986: 1321, Fig.; Fischer et al. (32): 1339, Fig.

Solea lascaris: Banarescu (60): 909–910, Fig. 401; Ben-Tuvia (91): 955-958, Fig. 3.

D: 71–75, A: 59–61, P (eyed side): 9, (blind side): 8

LL: 113-117

n = 4

Material examined

Front of Gönen Stream: Depth 29 m, 23 October 1992, 4 specimens. Size: 137-167 mm SL.

Solea solea (Linnaeus, 1758)

(Sole)

Solea vulgaris: Tortonese (70): 509–511, Fig. 218; Quéro et al. (90) in Whitehead et al., 1986: 1322-1323, Fig.; Fischer et al. (32): 1341, Fig.

Solea solea: Wheeler (57): 554-555, Fig.; Ben-Tuvia (91): 948-952, Fig. 1.

D: 76–81, A: 61–67, P (eyed side): 8, (blind side): 7

LL: 133–140

n = 6

Material examined

Front of Gönen Stream: Depth 33 m, 17 April 1992, 3 specimens.

Front of Gönen Stream: Depth 29 m, 23 October 1992, 2 specimens.

Offshore of Mürefte: Depth 78 m, 13 July 1995, 1 specimen.

Size: 152–250 mm SL, 6 specimens.

Discussion

Another purpose of this research carried out to determine the bony fish species caught by bottom trawl in the south of the Sea of Marmara is to contribute to the determination and protection of the fish variety in that sea.

Since bottom trawl was used in the research, while it was expected for benthic fish species to be caught, some pelagic fish species living within the trawled field were also caught. Definite stock evaluation of benthic and pelagic fish species was not carried out. However, stock amounts of economically significant fish species have been considered. During the research voyages in the south of the Sea of Marmara in 1992, the stock amounts of the economically significant fish species caught by means of bottom trawl offshore of Mürefte and in front of Gönen Stream are as follows in order of magnitude: *Merluccius merluccius, Merlangius merlangus euxinus, Sprattus sprattus phalericus, Trigla lucerna, Trigla lyra, Diplodus annularis* and *Mullus surmuletus*; during the research voyages in 1995, the stock amounts of the same offshore of Karabiga-Karaburun, in front of Gönen Stream, in the eastern waters of Marmara Island, offshore of Kapıdağ Peninsula-Ormanköy, in front of Kurşunlu, in the western waters of Imralı Island, in Kocasu-Karacabey Strait, Offshore of Mudanya, south-east offshore of Imralı Island and in front of Yalova are as follows in order of magnitude: *Merluccius merluccius, Merlangius merlangus euxinus, Trachurus trachurus, Sprattus sprattus phalericus, Mullus barbatus, Mullus surmuletus* and *Trigla lucerna*. In addition, some other fish species which are not economically significant but which draw attention with their stock amounts are as follows in order of magnitude: *Serranus hepatus, Cepola rubescens, Citharus linguatula, Arnoglossus laterna, Lepidotrigla cavillone* and *Eutrigla gurnardus*.

Erazi (5) reported 171 bony fish species in the Sea of Marmara and Slastenenko (13) reported 161. Akşıray (31) reported 382 bony fish species along the coasts of Turkey without indicating the seas which they live in. Kocataş et al. (35) reported 150 bony fish species and Mater and Meriç (38) reported 169.

As a result of the examination of 572 fish samples caught by bottom trawl during this research at 47 stations in the south of the Sea of Marmara, 49 bony fish species in 30 families have been recorded. Since detailed examinations on morphological characteristics of the fishes along the coasts of Turkey have been carried out on few species, descriptive characters of the fishes have been given in order to help fill this gap. *Alosa pontica*, known in the Black Sea but not recorded in the Sea of Marmara up to now, is given as the first record for this sea in the relevant literature.

According to Svetovidov (62) ratios of interorbital distance to head length and head length to fork length of *Sardina pilchardus* of Clupeidae family have been given as 16.7-21.4% and 18.6-20.9% respectively. In the 4 samples examined in this study, the ratio of interorbital distance to head length is 19.35-24.00% with an average of 21.5667%, and the ratio of head length to fork length is 22.52-25.20% with an average of 24.2739%. Other characteristics examined conform to the relevant literature. The number of lower gill rakers on the first gill arch of *Sprattus sprattus phalericus* is 30-41 according to Tortonese (58), Whitehead (63) and Fischer et al. (32), while it is 34-40 according to Svetovidov (62). In the 42 samples examined, the number of lower gill rakers was found to be 32-42. Again according to Svetovidov (62),

the ratio of interorbital distance to head length is 15.3-17.8% and the ratio of head length to fork length is 22.0%. In the 42 samples examined, the ratio of interorbital distance to head length was found to be 17.24-20.83% with an average of 18.6857%, and the ratio of head length to fork length was 21.74-28.87% with an average of 24.6614%. For *Alosa fallax nilotica*, Svetovidov (62) has given the ratio of interorbital distance to head length as 18.6-22.9% with an average of 20.3%. In the only sample examined, the ratio of interorbital distance to head length was found to be 26.79%. All metric and meristic characteristics examined in the 2 samples of *Alosa pontica*, which is a new record for the Sea of Marmara, conform to the relevant literature. However, Svetovidov (62) has given the ratio of interorbital distance to head length as 14.4-22.9% while this ratio was found to be 18.75-27.59% with an average of 23.1681% in the 2 samples examined in this study.

For *Merluccius merluccius,* of the family Merluccidae, the number of first dorsal fin rays has been given as 9-11 by Slastenenko (13), 9-10 by Wheeler (57), 9-11 by Tortonese (58) and 8-11 by Svetovidov (65). In the 26 samples examined, the number of first dorsal fin rays was found to be 8-10. While Wheeler (57) has given the number of second dorsal fin rays as 37-40, it was found to be 35-40 in the 26 samples examined in this study, as in other studies in the literature. For *Merlangius merlangius euxinus* of the family Gadidae, the number of second dorsal fin rays has been given as 16-20, and the number of first anal fin rays as 27-32 by Slastenenko (13); the number of first dorsal fin rays as 14-17, the number of second dorsal fin rays as 16-19, the number of third dorsal fin rays as 18-22, and the number of first anal fin rays as 28-32 by Banarescu (60); the number of second dorsal fin rays as 16-19, the number of third dorsal fin rays as 18-22, and the number of first anal fin rays as 28-32 by Tortonese (58); the number of first dorsal fin rays as 14-17, the number of second dorsal fin rays as 16-19, the number of third dorsal fin rays as 18-22, and the number of first anal fin rays as 28-32 by Svetovidov (64). In the 61 samples examined, number of first dorsal fin rays was found to be 13-16, the number of second dorsal fin rays was 16-21, the number of third dorsal fin rays was 17-21, and the number of first anal fin rays was 25-32.

For *Lepidotrigla cavillone*, Hureau (71) and Fischer et al. (32) have given the number of gill rakers on the first gill arch as 4-9. In the 10 samples examined, the number of gill rakers was found to be 7-11. For *Pomatomus saltator*, the number of dorsal fin rays has been given as I + 23-25 (27) by Slastenenko (13), I + (22) 23-25 (26) by Banarescu, (60), I + 25-28 by Tortonese (70), I + 23-28 by Tortonese (73), and 23-28 by Fischer et al. (32). In the 5 samples examined, it was found to be I + 22-25.

For *Spicara flexuosa*, the number of lateral line scales has been given as 72-82 by Slastenenko (13), 68-73 by Tortonese (70), 68-73 by Tortonese (76), and 68-73 by Fischer et al. (32). In the 10 samples examined, the number of lateral line scales was found to be 69-77. The body height in standard length has been given as 4.3-4.7 fold by Slastenenko (13), and 3-3.5 fold by Fischer et al. (32). In the 10 samples examined, the body height in standard length was found to be 3.35-3.78 fold with an average of 3.5458. Thus, it can be seen that the ratio given by Slastenenko (13) is different from the ratio in the relevant literature and from the ratio obtained in this study.

For *Cepola rubescens*, the number of dorsal fin rays has been given as 77-79 by Wheeler (57), 67-69 by Tortonese (70), 67-70 by Tortonese (79), and 67-70 by Fischer et al. (32). In the 25 samples examined, this was found to be 67-68. In addition, while Fischer et al. (32) have given the body height in total length as 13 fold, it was found to be 11.85-19.48 with an average of 15.0249 in the 25 samples examined. For *Uranoscopus scaber*, Hureau (81) has given the ratio of head length to standard length as 33% and the ratio of ophthalmic diameter to head length as 13-17%. In the 5 samples examined, the ratio of head length to standard length was found to be 33.51-37.78% with an average of 35.422% and the ratio of eye diameter to head length was 15.49-18.18% with an average of 16.3816%.

For *Citharus linguatula*, the number of lateral line scales has been given as 35-39 by Nielsen (86), 35-39 by Fischer et al. (32), and 50 by Tortonese (70). In the 25 samples examined, this was found to be 37-42. For *Arnoglossus laterna*, Fischer et al. (32) have given the ratio of head length to standard length as 25-30% and the ratio of eye diameter to head length as 18-24%. In the 16 samples examined, the ratio of head length to standard length was found to be 23.71-31.33% with an average of 29.5130%, and the ratio of eye diameter to head length was 17.39-30.43% with an average of 20.2996.

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