

HISTORICAL AND CONTEMPORARY RECORDS OF SHARKS FROM THE SEA OF MARMARA, TURKEY

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ABSTRACT

Twenty species of sharks, with either confirmed or questionable presence in the Sea of Marmara, comprise nearly the 8 % of the total ichthyofauna of Marmaric waters. Regarding their species numbers, squaliform and carcharhiniform sharks, each represented by 7 species, dominated the species composition of sharks in Marmaric waters. Squaliform sharks, scyliorhinid *Galeus melastomus*, and adult individuals of *Hexanchus griseus*, have been mostly captured over the deeper parts of shelf and upper slope on the northern side, while *Mustelus asterias* and *M. mustelus*, and scyliorhinids, *Scyliorhinus canicula* and *S. stellaris*, as well as the young individuals of *H. griseus*; and *Squatina squatina* have been mostly captured in the southern part of Marmara. *Alopias vulpinus* is the only pelagic species recorded in the present research. The current presence of 5 species, *Carcharodon carcharias*, *Lamna nasus*, *Galeorhinus galeus*, *Prionace glauca* and *Echinorhinus brucus*, is questionable, and for the time being it is not possible to say whether their Mediterranean distribution still extends to Marmaric waters. Southern part of the Sea of Marmara appears a suitable shark nursery, in particular for scyliorhinid and triakid species.

Key words: sharks, distribution, shark bycatches, shark nurseries, Sea of Marmara

SEGNALAZIONI STORICHE E CONTEMPORANEE DI SQUALI NEL MAR DI MARMARA, TURCHIA

SINTESI

Venti specie di squali, sia che la loro presenza sia confermata o dubbia nel Mar di Marmara, costituiscono quasi l'otto per cento dell'ittiofauna totale di tali acque. Per quanto riguarda squali squaliformi e carcariniformi, ognuno di essi rappresentato da sette specie, essi dominano la composizione di specie di squali in acque marmariche. Squali squaliformi, il boccanera *Galeus melastomus*, e individui adulti dello squalo capopiatto *Hexanchus griseus*, sono stati catturati principalmente nelle parti più profonde del piano e del pendio superiore nella parte settentrionale, mentre *Mustelus asterias* e *M. mustelus*, gli sciliorinidi *Scyliorhinus canicula* e *S. stellaris*, giovani individui di *H. griseus*, nonché *Squatina squatina*, sono stati catturati principalmente nella parte meridionale di Marmara. *Alopias vulpinus* è l'unica specie pelagica riscontrata nella presente ricerca. La presenza di 5 specie, *Carcharodon carcharias*, *Lamna nasus*, *Galeorhinus galeus*, *Prionace glauca* e *Echinorhinus brucus*, risulta dubbia, pertanto non è per il momento possibile ipotizzare un ampliamento della loro distribuzione mediterranea anche al Mar di Marmara. La parte meridionale del Mar di Marmara appare idonea alla funzione di nursery, soprattutto per sciliorinidi e triachidi.

Parole chiave: squali, distribuzione, catture di squali, nursery per squali, Mar di Marmara

INTRODUCTION

Although the origin of the ichthyological studies in the Sea of Marmara dates back to nearly a century (see Bilecenoğlu *et al.*, 2002, for review), very few specific studies on sharks of this unique inland sea have been produced to date. Our knowledge about sharks of the Sea of Marmara is limited to the general ichthyological works (Ninni, 1923 [in Bilecenoğlu *et al.*, 2002]; Devedjian, 1926; Ayaşlı, 1937; Erazî, 1942; Akşiray, 1987; Bauchot, 1987; Kocataş *et al.*, 1993; Meriç, 1995; Mater & Meriç, 1996), or to a few specific studies on sharks of this sea (Benli *et al.*, 1993; Okuş *et al.*, 1996; Uysal *et al.*, 1996; Kabasakal, 1998). According to the most recent list of elasmobranch species of the seas of Turkey, 15 confirmed and one questionable species of sharks are present in the Sea of Marmara (Kabasakal, 2002), while the presence of another 4 species of sharks, *Galeorhinus galeus*, *Prionace glauca*, *Echinorhinus brucus* and *Squatina oculata*, from Marmaric waters have also been reported in some pioneering works and in a single recent ichthyological work dealing with

Turkish seas (Ninni, 1923 [Bilecenoğlu *et al.*, 2002]; Devedjian, 1926; Ayaşlı, 1937; Meriç, 1994 [in Bilecenoğlu *et al.*, 2002]). With the exception of *S. oculata*, whose presence was described in a recent report (Meriç, 1994 [Bilecenoğlu *et al.*, 2002]), the status of the remaining 3 species, *G. galeus*, *P. glauca* and *E. brucus*, is uncertain and regarding their presence in the Sea of Marmara (Ninni, 1923 [Bilecenoğlu *et al.*, 2002]; Devedjian, 1926; Ayaşlı, 1937), it would be proper to consider them as "doubtful species".

The main objective of the present work is to provide information on the basis of a number of historical and contemporary shark records from the Sea of Marmara, and to update the species list with the addition of new data.

MATERIAL AND METHODS

The area encompassed by the present research is a subunit of the Mediterranean Sea and known as the Sea of Marmara (Fig. 1). It is connected with the Mediterranean Sea via the Dardanelles and with the Black Sea

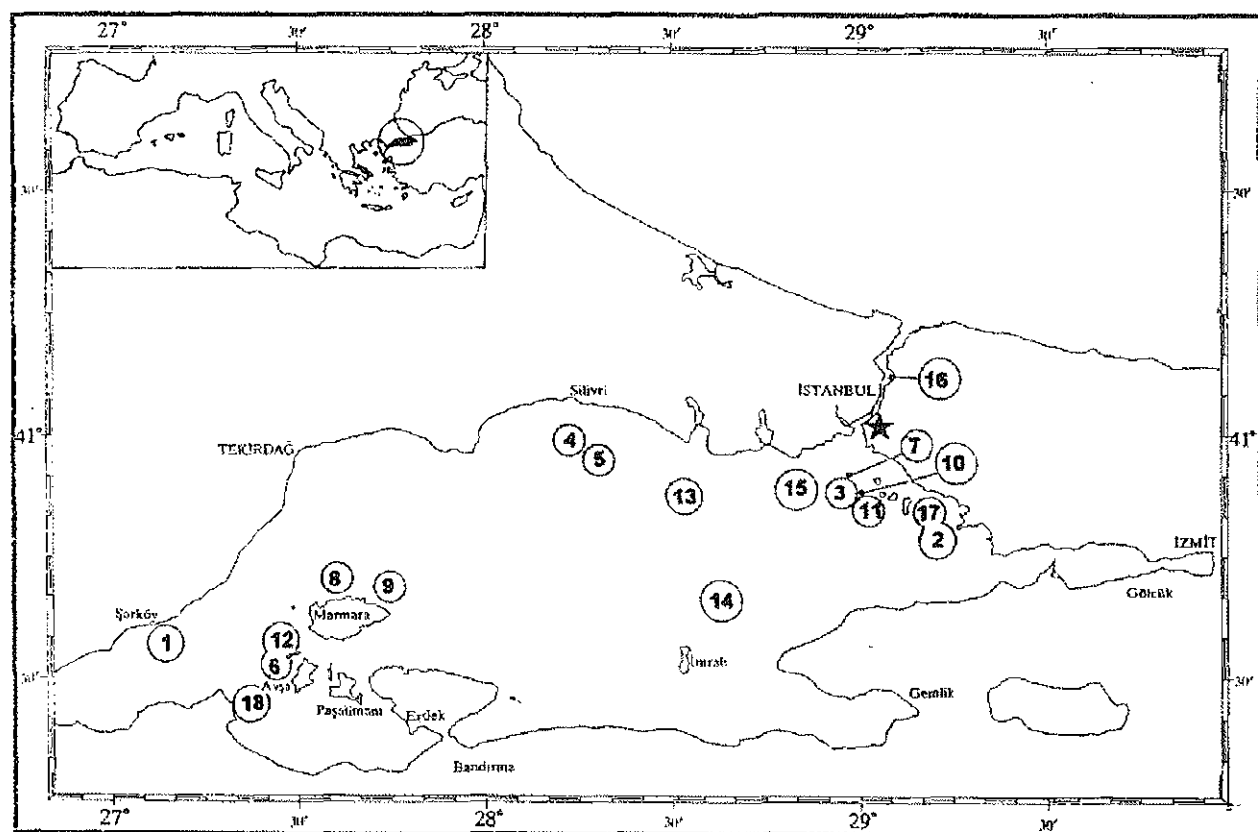


Fig. 1: Map of the study area; circled numbers indicate the sampling locations; ★ indicates the stranding site of *Carcharodon carcharias* in the Bosphorus Strait in February 1881.

Sl. 1: Zemljevid preučevanega območja; obkrožene številke označujejo posamezna vzorčišča; ★ ponazarja mesto v Bosporski ožini, kjer je februarja 1881 nasedel beli morski volk *Carcharodon carcharias*.

through the Bosphorus Strait. While Marmara's surface waters are affected by the Black Sea, its deeper layers remain under the influence of the Mediterranean (Kocataş *et al.*, 1993). According to Öztürk & Öztürk (1996), the Sea of Marmara is an ecological barrier, a transition zone or an acclimatisation area, influencing the dispersal of species between the Mediterranean and Black Seas.

An extensive field survey was carried out between 1991 and 1999 along the coast of Sea of Marmara (Fig. 1) to collect or examine sharks. Whenever possible, the author joined fishermen (mostly purse-seiners, gill-netters and bottom long-liners) to collect shark samples. Sharks delivered to the Istanbul Fish Market were also analysed for the purpose of this research. Furthermore, the available ichthyological literature on the Sea of Marmara was critically reviewed. The following data were recorded for each species: total length (TOT) in cm, sex of the animal, date and location of the capture. Total length of the specimens was measured with the caudal fin in the depressed position. Whenever possible, teeth and skin samples were also collected, now kept in the author's personal collection. Capture locations of the examined specimens, as well as those of recent records are shown in circled numbers in figure 1. Dashed lines in figure 1 indicate northern and southern borders of the bycatch area of *C. carcharias*, *L. nasus*, *A. vulpinus* and *P. glauca*, reported by Devedjian (1926), Ayaşlı (1937), Güney (1974), Üner (1984) and Akşiray (1987) from the Sea of Marmara.

For an easier understanding, status of occurrence of sharks recorded from the Sea of Marmara was classified under the following categories: (A) species examined in the present study; and (B) species cited by other researchers but not examined in the present study. Status of occurrence of each species is denoted in parentheses after its scientific name. The absence of a species in the recent catch records or in the recent general ichthyological lists, concerning exclusively the fish fauna of the Sea of Marmara, at least for the last 25 years, was used as the criteria for considering the species as "questionable".

Identification of the species follows Whitehead *et al.* (1984) and Compagno (1984a, b). Taxonomic nomenclature follows *European Register of Marine Species, Chondrichthyes brief checklist* (<http://erms.biol.soton.ac.uk/lists/>). All photographs (Fig 2-9) were taken by the author.

RESULTS AND DISCUSSION

Field surveys and review of the available literature have revealed the presence, either confirmed or questionable, of 20 shark species, representing 11 families in the Sea of Marmara. Relevant details about these species are given below.

Order Hexanchiformes

Family Hexanchidae

1. *Hexanchus griseus* (Bonnatere, 1788) (A)

Previous recordings: Ninni (1923, [Bilecenoglu *et al.*, 2002]), Devedjian (1926, as *Notidanus griseus*), Üner (1984), Meriç (1995), Kabasakal (1998, 2002).

Material examined: 1 ♂ (TOT 250 cm) captured on February 20, 1997, off the coast of Şarköy (40°09'50" N, 27°18'40" E) at a depth of 50 m (Kabasakal, 1998) (Fig. 1, stat. 1); 1 ♀ (TOT 125 cm), captured in March 1997 off the coast of Şarköy (same location as the previous specimen, Fig. 1, st. 1); 2 ♀ (TOT 380 and 450 cm, respectively) captured off the coast of Tuzla, at a depth of 200 m (Fig. 1, st. 2), second specimen is shown in figure 2; 1 ♀ (TOT 420 cm) captured in December 1999 off the coast of Yassiada at a depth of 220 m (Fig. 1, st. 3).

According to Üner (1984), bluntnose sixgill shark is one of the common and largest sharks of the Sea of Marmara. Meriç (1995) recorded this species from the catches at depths between 120 to 350 m by gill-netting over the northern continental slope, describing it as a rare bycatch by demersal fishing gear.

Order Lamniformes

Family Lamnidae

2. *Carcharodon carcharias* (Linnaeus, 1758) (B)

Previous recordings: Devedjian (1926, as *Carcharodon Rondeletii*), Güney (1974), Üner (1984), Akşiray (1987), Fergusson (1996), Bilecenoglu *et al.* (2002).

Devedjian (1926) reported on a great white shark (TOT 400 cm) captured in the Sea of Marmara, and added that its stomach content included a number of bonitos. According to Güney (1974) and Üner (1984), *C. carcharias* is present in the Sea of Marmara in all seasons and it approaches Marmaric entrance of the Bosphorus Strait especially in winter. One of the common points stated by these three authors was that the great white shark was usually a common bycatch by tuna handliners in the Sea of Marmara, and this one was captured incidentally as a result of chasing schools of tunas and bonitos. Üner (1984) also reported that most of the great white shark captures were made between December and late March, and that most of the individuals were captured around the Prince Islands (Fig. 1) and near the Bosphorus Strait. According to Akşiray (1987), *C. carcharias* inhabits the Sea of Marmara and rarely occurs near the Pontic entrance of the Bosphorus Strait. Fergusson (1996) reported the capture of three individuals of *C. carcharias* in the Sea of Marmara. These are: one stranded individual (TOT 391 cm) near Beyler-

beyi coast (Bosporus Strait) in February 1881 (★ in Fig. 1); 1 ♀ (TOT 470 cm, W 1500 kg), captured on November 17, 1881; and 1 ♀ (TOT 500+ cm, W 3750 kg), captured in February 1962. Fergusson (1996) stated that the weight of the last individual was no doubt an error. No contemporary record of *C. carcharias* is available, and no individual of this species was captured or even sighted during the field surveys. Although the presence of *C. carcharias* in the Sea of Marmara has been reported by Bilecenoğlu *et al.* (2002) in the *Checklist of the marine fishes of Turkey*, the information given herewith is probably based on previous recordings. Therefore, its current presence in Marmaric waters is "questionable" and requires confirmation.

3. *Lamna nasus* (Bonnaterre, 1788) (B)

Previous recordings: Ninni (1923, [Bilecenoğlu *et al.*, 2002]), Devedjian (1926, as *Lamna cornubica*), Güney (1974), Üner (1984), Akşiray (1987), Bauchot (1987), Mater & Meriç (1996), Bilecenoğlu *et al.* (2002), Kabasakal (2002).

Although no capture information on *L. nasus* individuals is available, porbeagle is, according to Devedjian (1926), Güney (1974), Üner (1984) and Akşiray (1987), yet another common lamnoid shark of the Sea of Marmara, with most of its captures made around the Prince Islands and near the Marmaric entrance to the Bosporus Strait (Fig. 1). Güney (1974) and Üner (1984) also reported that, as for *C. carcharias*, bycatches of *L. nasus* by tuna fishing gear occurred mostly in the winter, as a result of chasing schools of tunas and bonitos. The

recording of *L. nasus* by Kabasakal (2002) from the Sea of Marmara is based on previous recordings of this species by other researchers. Although the presence of *L. nasus* in the Sea of Marmara has been reported by Bilecenoğlu *et al.* (2002), the information given herewith is probably based on previous recordings. No individual of this species was captured or even sighted during the field surveys. Therefore, its current presence in Marmaric waters is "questionable" and requires confirmation.

Family Alopiidae

4. *Alopias vulpinus* (Bonnaterre, 1788) (A)

Previous recordings: Ninni (1923, [Bilecenoğlu *et al.*, 2002]), Devedjian (1926, as *Alopias vulpes*), Erazi (1942, as *Alopias vulpes*), Üner (1984), Kocataş *et al.* (1993), Kabasakal (2002).

Material examined: 1 ♂ (TOT 190 cm) captured on April 12, 1997, off the coast of Silivri (Fig. 1, st. 4).

Devedjian (1926) reported on some enormous *A. vulpinus* individuals ending at the Istanbul Fish Market, without giving information on their size or biology. Its presence in the Sea of Marmara was possibly the result of chasing the pelagic fish schools. As *A. vulpinus* is a highly migratory shark (Compagno, 1984a), it is necessary to investigate its movements in detail to figure out whether its presence in the Sea of Marmara is regular or just incidental. Despite this uncertainty, *A. vulpinus* is the only confirmed pelagic shark species recorded in Marmaric waters during the present research.

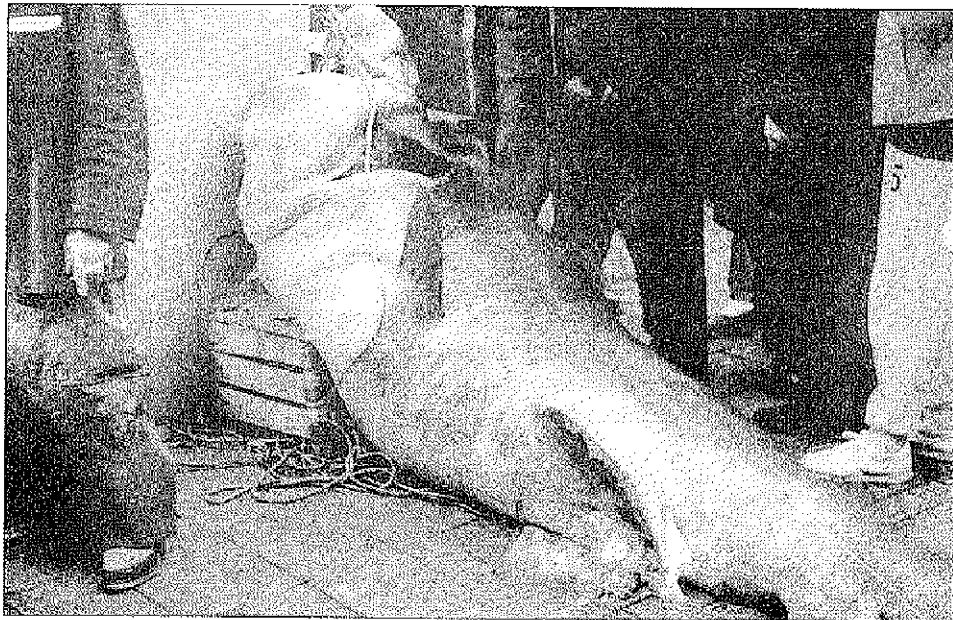


Fig. 2: *Hexanchus griseus* (Bonnaterre, 1788) (♀, TOT 450 cm) displayed at a fish market in Istanbul.
Sl. 2: *Hexanchus griseus* (Bonnaterre, 1788) (♀, TOT 450 cm), postavljen na ogled na istanbulski ribji tržnici.

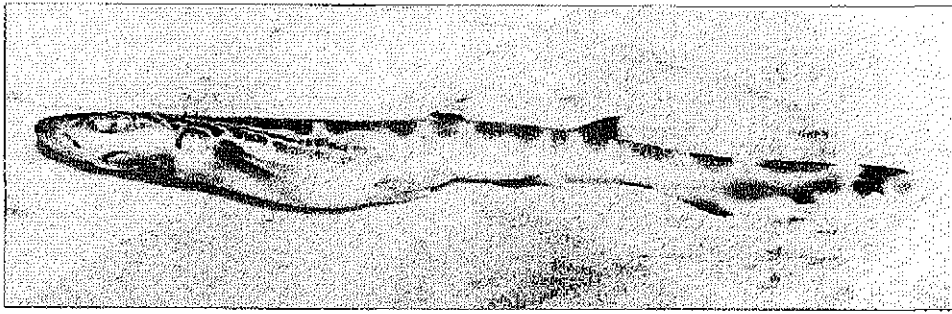


Fig. 3/Sl. 3: *Galeus melastomus* Rafinesque, 1810 (♂, TOT 22 cm).

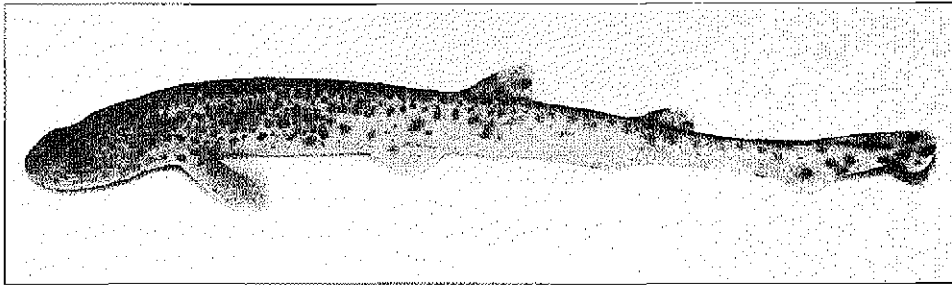


Fig. 4/Sl. 4: *Scyliorhinus canicula* (Linnaeus, 1758) (♂, TOT 20.5 cm).

Order Carcharhiniformes

Family Scyliorhinidae

5. *Galeus melastomus* Rafinesque, 1810 (A)

Previous recordings: Akşiray (1987), Bauchot (1987), Kocataş *et al.* (1993), Meriç (1995), Mater & Meriç (1996), Uysal *et al.* (1996), Kabasakal (2002).

Material examined: 2 ♂ (TOT 22 and 30 cm, respectively; first specimen shown in Fig. 3), captured on October 20, 1996, off the coast of Silivri (40°57'00" N, 28°16'15" E) (Fig. 1, st. 5) at a depth of 350 m.

Meriç (1995) reported a bycatch of *G. melastomus* in bottom set gill-nets over the northern continental slope between depths of 120 to 350 m. According to Uysal *et al.* (1996), *G. melastomus* is a rare shark in the Sea of Marmara, captured at depths greater than 200 m.

6. *Scyliorhinus canicula* (Linnaeus, 1758) (A)

Previous recordings: Devedjian (1926, as *Scyllium canicula*), Ayaşlı (1937), Erazi (1942, as *Scyllium canicula*), Akşiray (1987), Bauchot (1987), Kocataş *et al.* (1993), Meriç (1995), Mater & Meriç (1996), Okuş *et al.* (1996), Kabasakal (2002).

Material examined: 2 ♂ (TOT 20.5 and 40.7 cm, respectively); first specimen shown in Fig. 4) and 12 ♀ (TOT 20 to 38 cm) captured in June 1991 off the western coast of Ekinlik Island at a depth of 47 m (Fig. 1, st. 6); 6 ♂ (TOT 20 to 36 cm) and 2 ♀ (TOT 30 and 30.2

cm, respectively) captured in October 1994 off the northern coast of Yassıada at depth of 87 m (Fig. 1, st. 7). Many egg capsules, attached to the gorgonians and black corals, were observed at Ekinlik station (Fig. 1, st. 6).

Smallspotted catshark is the most common scyliorhinid species in the Sea of Marmara and most of its bycatches were made in the south-western part of this sea (Okuş *et al.*, 1996). It has also been caught in bottom set gill-nets over the northern continental slope, although in insignificant numbers (Meriç, 1995).

7. *Scyliorhinus stellaris* (Linnaeus, 1758) (A)

Previous recordings: Ninni (1923, [Bilecenoğlu *et al.*, 2002]), Akşiray (1987), Bauchot (1987), Kocataş *et al.* (1993), Mater & Meriç (1996), Kabasakal (2002).

Material examined: 1 ♀ (TOT 83 cm, Fig. 5) captured in March 1997 off the southern coast of Ekinlik Island at a depth of 47 m (Fig. 1, st. 6); one egg capsule was observed in each uteri; jaws preserved.

S. stellaris is a rare scyliorhinid shark in the Sea of Marmara and its records are generally confined to the south-western part of this sea.

Family Triakidae

8. *Galeorhinus galeus* (Linnaeus, 1758) (B)

Previous recordings: Ninni (1923, [Bilecenoğlu *et al.*, 2002]), Devedjian (1926, as *Galeus canis*).

Although the presence of *G. galeus* in the Sea of Marmara has been reported by Bilecenoğlu *et al.* (2002), the information given herewith is probably based on previous recordings. In his monumental work, Akşray (1987) placed *G. galeus* and other triakids in *Carcharhinidae*, but while reporting on the presence of tope shark in Turkish seas, the author gave no specific information whether it was still present in the Sea of Marmara. Furthermore, no contemporary records of *G. galeus* from this sea are available. No individual of this species was captured or even sighted during the field surveys. Therefore, the current presence of *G. galeus* in Marmaric waters seems "questionable" and requires confirmation.

9. *Mustelus asterias* Cloquet, 1821 (A)

Previous recordings: Meriç (1995), Mater & Meriç (1996), Kabasakal (2002).

Material examined: 1 ♀ (TOT 125 cm; Fig. 6) captured in November 1997 off the northern coast of Marmara Island at a depth of 100 m (Fig. 1, st. 8); embryos carrying yolk sacs were observed in uteri.

Meriç (1995) reported *M. asterias* from slope waters of the northern Marmara. Compared with the following congeneric species, it is quite rare in the Sea of Marmara.

10. *Mustelus mustelus* (Linnaeus, 1758) (A)

Previous recordings: Devedjian (1926, as *Mustelus vulgaris*), Erazi (1942, as *Mustelus vulgaris*), Kocataş *et al.* (1993), Meriç (1995), Mater & Meriç (1996), Okuş *et al.* (1996), Kabasakal (2002).

Material examined: 1 ♀ (TOT 120 cm) captured in the winter of 1995 off the northern coast of Marmara Island at a depth of 90 m (Fig. 1, st. 9), jaws of this specimen preserved; 1 ♀ (TOT 36 cm) captured in June 1999 off the northern coast of Yassiada at a depth of 80 m (Fig. 1, st. 10); unhealed umbilical scar observed on this specimen.

Meriç (1995) reported on *M. mustelus* from slope waters of the northern Marmara. According to Okuş *et al.* (1996), distribution of this shark is prevalent in the south-western part of the Sea of Marmara.

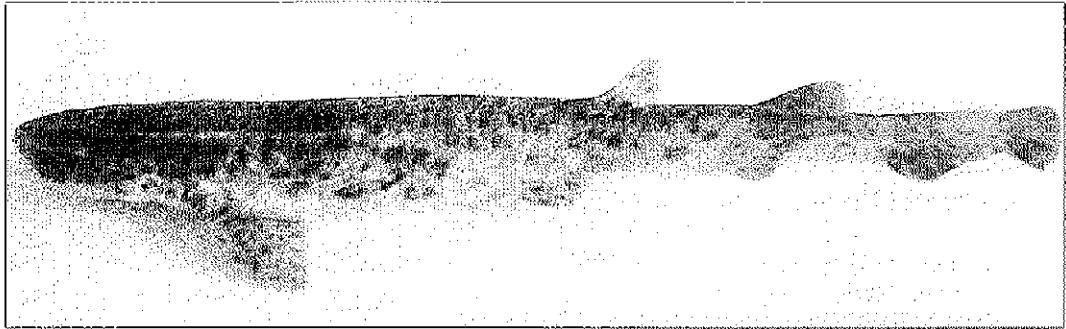


Fig. 5/Sl. 5: *Scyliorhinus stellaris* (Linnaeus, 1758) (♀, TOT 83 cm).

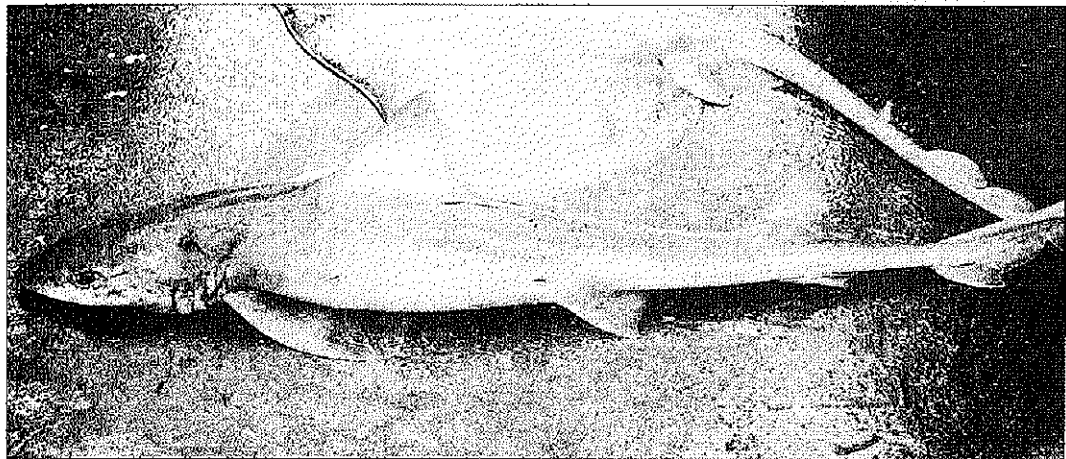


Fig. 6/Sl. 6: *Mustelus asterias* Cloquet, 1821 (♀, TOT 125 cm).

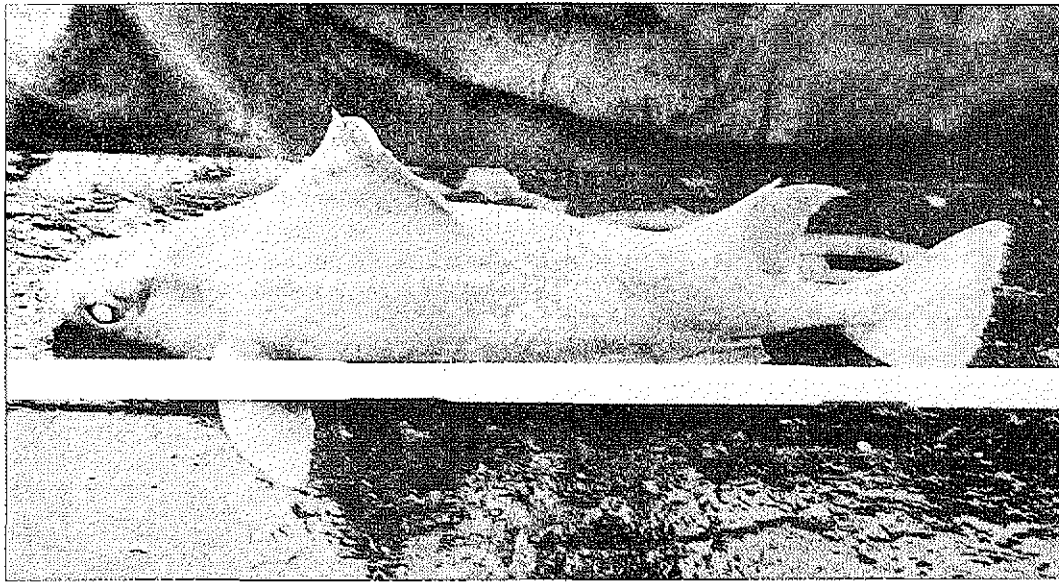


Fig. 7/Sl. 7: *Oxynotus centrina* (Linnaeus, 1758) (♀, TOT 40 cm).

Family Carcharhinidae

11. *Prionace glauca* (Linnaeus, 1758) (B)

Previous recordings: Ninni (1923, [Bilecenoglu et al., 2002]), Devedjian (1926, as *Carcharias glaucus*), Ayasli (1937, as *Carcharias glaucus*), Güney (1974), Üner (1984), Bilecenoglu et al. (2002).

Record of an enormous blue shark (TOT 800 cm) delivered to the Istanbul Fish Market (Ayasli, 1937). The author stated that the stomach content of this individual included remains of tuna fish and dolphin. However, regarding the maximum confirmed size (383 cm) of the blue shark and the unconfirmed reports on larger 480 to 650 cm long individuals (Compagno, 1984b), the size of this individual reported by Ayasli (1937) seems "unreasonable". Furthermore, we could hypothesize that by considering the size (TOT 800 cm) and stomach contents (tuna fish and dolphin), *Prionace glauca* reported by Ayasli (1937) was actually a *Carcharodon carcharias*. No photographs or parts of this individual have been preserved. Güney (1974) and Üner (1984) reported that, as far as lamnoid sharks are concerned, bycatches of *P. glauca* in tuna fishing gear mostly occurred around the Prince Islands and near the Marmaric entrance to the Bosphorus Strait. No individual of *P. glauca* was captured or even sighted during the field surveys, and no contemporary record of this shark from this sea is available. Although the presence of *P. glauca* in the Sea of Marmara has been reported by Bilecenoglu et al. (2002), the information given herewith is probably based on previous recordings. Its current presence in the Sea of Marmara seems "questionable" and requires confirmation.

Order Squaliformes

Family Dalatiidae

12. *Oxynotus centrina* (Linnaeus, 1758) (A)

Previous recordings: Erazi (1942, as *Squalus centrina*), Mater & Meriç (1996), Kabasakal (2002).

Material examined: 1 ♀ (TOT 40 cm, Fig. 7) captured in November 1994 off the northern coast of Yassiada at a depth of 90 m (Fig. 1, st. 11); 2 ♂ (TOT 35 to 41 cm, respectively) captured in February 1996 off the western coast of Ekinlik Island at a depth of 60 m (Fig. 1, st. 12).

O. centrina is a rare bycatch by bottom set gill-nets and long-lines in the Sea of Marmara.

13. *Dalatias licha* (Bonnaterre, 1788) (B)

Previous recordings: Meriç (1995), Kabasakal (2002).

Meriç (1995) reported on a single male (TOT 34.5 cm) captured on July 5, 1991, off the coast of Büyükçekmece (Fig. 1, st. 13) at a depth of 270 m. No *D. licha* individual was captured during the field surveys. It is very rare in the Sea of Marmara, and no information is available on its distribution in the Sea of Marmara.

Family Centrophoridae

14. *Centrophorus granulosus* (Bloch & Schneider, 1801) (B)

Previous recordings: Benli et al. (1993), Meriç (1995), Mater & Meriç (1996), Kabasakal (2002).

C. granulatus has been recorded for the first time in the Sea of Marmara by Benli *et al.* (1993); the record is based on 5 specimens captured in the autumn of 1992 at a depth of 400 m (40°36'05" N, 28°36'03" E) (Fig. 1, st. 14). Meriç (1995) reported that gulper sharks were rarely captured by bottom set gill-nets between depths of 120 to 350 m over the northern continental slope of the Sea of Marmara. No individual of *C. granulatus* was captured during the field surveys. It is very rare in the Sea of Marmara, and no information is available on its distribution in the Sea of Marmara.

15. *Centrophorus uyato* (Rafinesque, 1810) (B)

Previous recordings: Meriç (1995), Kabasakal (2002).
Meriç (1995) reported on a female (TOT 44.2 cm) captured on May 19, 1989, off the coast of Yeşilköy (Fig. 1, st. 15) at a depth of 150 m and on a male (TOT 45.3 cm) captured on August 11, 1991, off the coast of Büyükkçekmece (Fig. 1, st. 13) at a depth of 270 m. No individual of *C. uyato* was captured during the field surveys. It is very rare in the Sea of Marmara, and no information is available on its' Marmaric distribution.

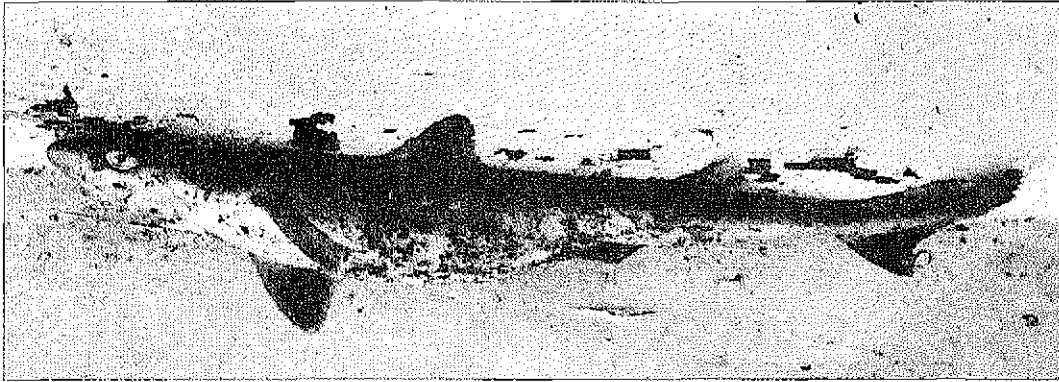


Fig. 8/Sl. 8: *Squalus acanthias* Linnaeus, 1758 (♂, TOT 45 cm).

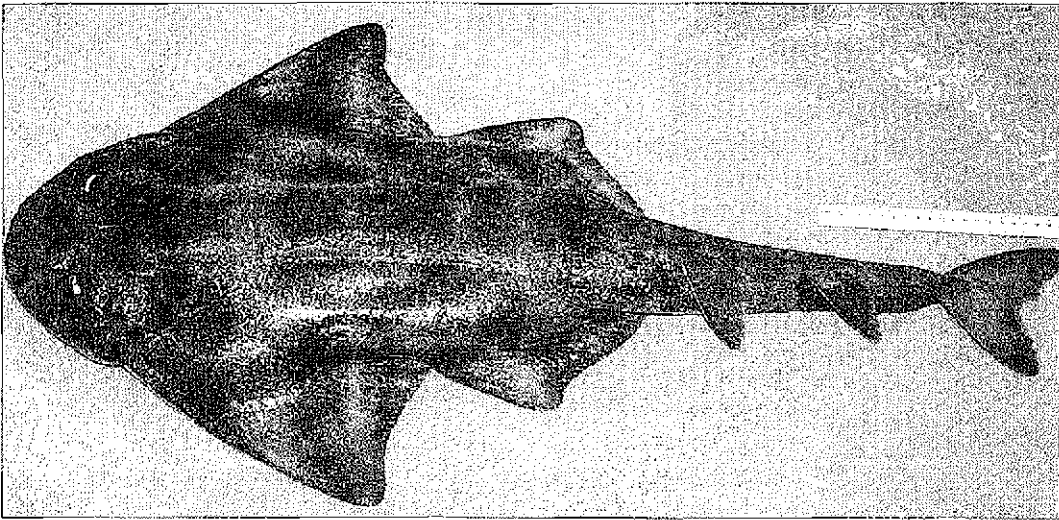


Fig. 9/Sl. 9: *Squatina squatina* (Linnaeus, 1758) (♀, TOT 87 cm).

Family Squalidae

16. *Squalus acanthias* Linnaeus, 1758 (A)

Previous recordings: Ninni (1923, [Bilecenoğlu *et al.*, 2002]), Devedjian (1926, as *Acanthias vulgaris*), Erazi (1942), Bauchot (1987), Meriç (1995), Mater & Meriç (1996), Kabasakal (2002).

Material examined: 1 ♂ (TOT 45 cm) captured in September 1994 in the Bay of Beykoz at a depth of 50 m (Fig. 1, st. 16), specimen shown in Fig. 8; 1 ♀ (TOT 105 cm) captured in October 1995 off the eastern coast of Büyükkada at a depth of 65 m (Fig. 1, st. 17); 1 ♂ (TOT 85 cm) captured in June 1999 off the northern coast of Yassıda at a depth of 80 m (Fig. 1, st. 10).

Spiny dogfish is one of the well-known sharks of the

Sea of Marmara and a common bycatch by bottom set gill-nets and long-lines. In terms of sea fishery in the Sea of Marmara, Kocataş *et al.* (1993) considered this species a commercially important demersal fish. Meriç (1995) reported it as common over the northern continental slope.

17. *Squalus blainvillei* (Risso, 1826) (A)

Previous recordings: Devedjian (1926, as *Acanthias blainvillii*), Erazi (1942), Bauchot (1987), Kocataş *et al.* (1993), Meriç (1995), Mater & Meriç (1996), Okuş *et al.* (1996), Kabasakal (2002).

Material examined: 2 ♀ (TOT 65 and 73 cm, respectively) captured in June 1999 off the northern coast of Yassiada at a depth of 80 m (Fig. 1, st. 10).

Meriç (1995) reported *S. blainvillei* from slope waters of the northern Marmara. (2002). According to Okuş *et al.* (1996), it is distributed mostly in the south-western part of this sea. In comparison with the preceding congeneric species, Kocataş *et al.* (2002) consider it an economically important species, but its occurrence in Marmaric waters is quite rare.

Family Echinorhinidae

18. *Echinorhinus brucus* (Bonnaterre, 1788) (B)

Previous recordings: Ninni (1923, [Bilecenoğlu *et al.*, 2002]), Devedjian (1926, as *Echinorhinus spinosus*).

According to Devedjian (1926), *E. brucus* is a common shark in Marmaric waters. Although the bramble shark's presence in the Sea of Marmara has been reported by Bilecenoğlu *et al.* (2002), the information given herewith is probably based on previous recordings. Although Aksıray (1987) claims that *E. brucus* is present in Turkish seas, the author has not given any specific information whether it is still present in the Sea of Marmara. Furthermore, no contemporary recording indicating the bramble shark's presence in this sea is available, and neither was any individual of this species captured or even sighted during the field surveys. Therefore, the current presence of *E. brucus* in the Sea of Marmara seems "questionable" and requires confirmation.

Order Squatiniformes

Family Squatinidae

19. *Squatina oculata* Bonaparte, 1840 (B)

Previous recordings: Slstenenko (1955-1956, [Bilecenoğlu *et al.*, 2002]), Meriç (1994, [cited in Bilecenoğlu *et al.*, 2002]).

While no *S. oculata* individual was captured or

sighted during the field surveys, its presence in the Sea of Marmara is based on a recent report by Meriç (1994). No current information, however, is available on its distribution in the Sea of Marmara.

20. *Squatina squatina* (Linnaeus, 1758) (A)

Previous recordings: Ninni (1923, [Bilecenoğlu *et al.*, 2002]), Devedjian (1926, as *Rhina squatina*), Erazi (1942), Roux (1984), Kocataş *et al.* (1993), Mater & Meriç (1996), Kabasakal (2002).

Material examined: 1 ♀ (TOT 87 cm; Fig. 9) captured in November 1995 off the coast of Karabiga at a depth of 50 m (Fig. 1, st. 18).

It is a quite common and economically important demersal shark in the Sea of Marmara.

CONCLUSIONS

Twenty species of sharks, with either confirmed or questionable presence in the Sea of Marmara, comprise nearly 8% of the total ichthyofauna (a total of 249 species, reported by Bilecenoğlu *et al.*, 2002) of Marmaric waters. Regarding their species numbers, squaliform and carcharhiniform sharks, each represented by 7 species, dominated the shark species composition in Marmaric waters.

In the Sea of Marmara, the continental shelf on the southern side is wide and extends nearly to the centre of the sea, while on the northern side the shelf is narrow, with the slope's depth exceeding 1000 m (1335 m at its deepest point) with a steep inclination (Kocataş *et al.*, 1993). The topographic structure of the Sea of Marmara has no doubt influenced the distribution of demersal sharks in this sea. With the exception of *E. brucus*, a species not recorded in this research, the remaining squaliform sharks, scyliorhinid *G. melastomus*, and the adult individuals of *H. griseus*, have been mostly captured over the deeper parts of the shelf and upper slope on the northern side. Squaliform sharks, recorded in this research, mostly prefer to live over the continental shelf and the upper slope. Maximum range of the depth distribution of *C. granulatus*, *C. uyato* and *D. licha* exceeds 1000 m (Compagno, 1984a). Furthermore, it is known that, while *H. griseus* lives at depths from the surface down to 1800 m, adults prefer waters deeper than 100 m (Compagno, 1984a), and *G. melastomus* lives at depths between 55 and 1000 m, with preference to deeper parts of the shelf and the upper slope (Compagno, 1984b). Regarding depth distribution of the above mentioned species, the northern slope of the Sea of Marmara thus offers a suitable habitat for them. On the other hand, triakids, *M. asterias* and *M. mustelus*, and scyliorhinids, *S. canicula* and *S. stellaris*, as well as the young individuals of *H. griseus* and *S. squatina* have been mostly captured in the southern part of Marmara.

Although maximum range of depth distribution of *S. canicula* and *M. mustelus* can exceed 200 m, both scyliorhinids and triakids as well as squatinids prefer moderate depths over the continental slope (Compagno, 1984a,b). Moreover, young individuals of *H. griseus* mostly occur in shallow waters (Compagno, 1984a). Therefore, the extended continental shelf on the southern part offers a suitable habitat for the mentioned species. Okuş *et al.* (1996) also reported that the distribution of scyliorhinids and triakids prevailed along the southern coast of the Sea of Marmara.

One of the special characteristics of the southern Marmara is the presence of areas occupied by rich growth of gorgonians and black corals (Öztürk & Bourquet, 1990). These sedentary organisms offer suitable spawning grounds for oviparous sharks, such as scyliorhinids. Many egg cases attached to gorgonians or black corals, as well as juveniles of *S. canicula*, and a gravid female of *S. stellaris*, were observed in the southern Marmara, mostly along the coasts of the southern Marmara islands (Fig. 1) during the field surveys, and these findings indicate a nursery ground of scyliorhinid sharks in the southern part of this sea. This area may also be a nursery ground for *H. griseus* and *M. asterias*, as some young sixgill sharks and a gravid female of *M. asterias* were also captured here. The capture of a newborn individual of *M. mustelus*, bearing an unhealed umbilical scar, off the northern coast of Yassiada (Fig. 1, st. 10) indicate the presence of another nursery ground for the triakids in the northern Marmara. The current fisheries act prohibits any fishery action for the black corals, which is no doubt a beneficial limitation regarding the conservation of shark nurseries in the Sea of Marmara. However, extensive investigations are needed for the exact mapping of shark nurseries in this sea.

The actual status of pelagic sharks in the Sea of Marmara has always been a point of discussion. Although some previous records of pelagic sharks are at

hand, their contemporary records from Marmaric waters are scarce. *A. vulpinus* is the only pelagic species recorded during the present research. According to the available data, bycatch of pelagic sharks in the Sea of Marmara has been paralleled with tuna fishery in the past. However, due to the drastic decline in the bluefin tuna populations and other pelagic bony fishes, the fishery of this commercially important species in Marmaric waters has almost ended since the 1980's (Karakulak & Oray, 1994), and the latest records of pelagic shark captures from Marmara correspond with these years (Üner, 1984). This drastic decline in pelagic teleosts has certainly resulted in the loss of important food source of these apex predators in Marmaric waters, the same as the end of the mentioned tuna fishery resulted in the loss of bycatch possibility as far as pelagic sharks are concerned. The capture of a young *A. vulpinus* individual on April 12, 1997, off the coast of Silivri (Fig. 1, st. 4) is probably the only confirmed pelagic shark record from the Sea of Marmara in the last 20 years.

Consequently, among the 20 shark species recorded in the Sea of Marmara, the current presence of 5 species, i.e. *C. carcharias*, *L. nasus*, *G. galeus*, *P. glauca* and *E. brucus*, is questionable, and for the time being it is not possible to say whether their Mediterranean distribution still extends to Marmaric waters. Although the occurrence of *O. centrina*, *D. licha*, *C. granulatus*, *C. uyato* and *S. oculata* was not considered questionable in the present study, they should be considered rare sharks, since each of the species has been recorded either by the author of this contribution or by other researchers only once or twice in the Sea of Marmara during the last decade.

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STAREJŠI IN NOVEJŠI PODATKI O POJAVLJANJU MORSKIH PSO
V MARMARSKEM MORJU, TURČIJA

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POVZETEK

Dvajset vrst morskih psov, katerih pojavljanje v Marmarskem morju je bodisi potrjeno bodisi vprašljivo, obsega skoraj 8% celotne marmarske ihtiofavne. Kar zadeva število vrst teh psov, so v teh vodah prevladovali trneži in vrste iz družine Carcharhinidae, oboji s po 7 vrstami. Trneži, morska mačka *Galeus melastomus* in odrasli osebkni šesteroškrjarja *Hexanchus griseus* so bili večinoma ujeti nad globljimi deli morske police in gornjim pobočjem na severni strani Marmarskega morja, pegasti morski pes *Mustelus asterias*, navadni morski pes *M. mustelus*, morski mački *Scyliorhinus canicula* in *S. stellaris* kot tudi mladiči šesteroškrjarja *H. griseus* in navadni sklat *Squalina squatina* pa večinoma v južnem delu Marmarskega morja. Morska lisica *Alopias vulpinus* je edina pelagična vrsta, ki je bila zabeležena med pričujočimi raziskavami. Trenutno pojavljanje 5 vrst, *Carcharodon carcharias*, *Lamna nasus*, *Galeorhinus galeus*, *Prionace glauca* in *Echinorhinus brucus*, je vprašljivo, tako da trenutno ne vemo, ali se njihova razširjenost v Sredozemskem morju nadaljuje tudi v marmarskih vodah. Južni del Marmarskega morja se zdi ustrezno razmnoževalno okolje, predvsem za *Scyliorhinidae* in *Triakidae*.

Ključne besede: morski psi, razširjenost, naključno ujetje, razmnoževalno okolje, Marmarsko morje

REFERENCES

- Aksıray, F. (1987):** Türkiye Deniz Balıkları ve Tayin Anaharı. 2nd Edition. Publications of İstanbul University, no. 3490, İstanbul, 811 pp.
- Ayaşlı, S. (1937):** Boğaziçi Balıkları. Cumhuriyet Matbaası, İstanbul, 72 pp.
- Bauchot, M. -L. (1987):** Requins. In: Fischer, W., M. Schneider & M.-L. Bauchot (eds.): Fiches FAO d'identification des espèces pour les besoins de la pêche. (Révision 1). Méditerranée et mer Noire. Zone de pêche 37. Vol. II. Vertébrés. FAO, Roma, p. 767-843.
- Benli, H. A., B. Cihangir & K.C. Bizsel (1993):** A new record for the Sea of Marmara; (Family: Squalidae) *Centrophorus granulosus* (BLOCH & SCHNEIDER, 1801). Tr. J. Zool., 17(2), 133-135.
- Bilecenoglu, M., E. Taskavak, S. Mater & M. Kaya (2002):** Checklist of the marine fishes of Turkey. Zootaxa 113. Magnolia Press, Auckland, 194 pp.
- Compagno, L. J. V. (1984a):** FAO species catalogue. Vol. 4. Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Part 1. Hexanchiformes to Lamniformes. FAO Fish. Synop., 125(4), 1-249.
- Compagno, L. J. V. (1984b):** FAO species catalogue. Vol. 4. Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Part 2. Carcharhiniformes. FAO Fish. Synop., 125(4), 251-655.
- Devedjian, K. (1926):** Pêche en Pêcheries en Turquie. Imprimerie de l'Administration de la Dette Publique Ottomane, İstanbul, 480 pp.
- Erazi, R. A. R. (1942):** Marine fishes found in the Sea of Marmara and in the Bosphorus. Revue de la Faculté des Sciences de l'Université d'Istanbul, B, 7(1/2), 103-115.
- Fergusson, I. K. (1996):** Distribution and autecology of the white shark in the eastern North Atlantic Ocean and the Mediterranean Sea. In: Klimley, A. P. & D. G. Ainley (eds.): Great white sharks: The biology of *Carcharodon carcharias*. San Diego, Academic Press, p. 321-345.
- Güney, K. (1974):** Balıklarımız. Redhouse Yayınevi, İstanbul, 46 pp.
- Kabasakal, H. (1998):** The first record of the bluntnose six-gill shark [*Hexanchus griseus* (BONNATERRE, 1788)] in the Sea of Marmara. Acta Adriat., 39(1), 67-70.
- Kabasakal, H. (2002):** Elasmobranch species of the seas of Turkey. Annales Ser. hist. nat., 12(1), 15-22.
- Karakulak, F. S. & I. K. Oray (1994):** The length-weight relationship of the bluefin tunas (*Thunnus thynnus* L., 1758) caught in Turkish waters. İstanbul University, Journal of Aquatic Products, 8(1-2), 159-171.
- Kocataş, A., T. Koray, M. Kaya & Ö. F. Kara (1993):** Review of the fishery resources and their environment in the Sea of Marmara. Studies and Reviews, General Fisheries Council for the Mediterranean, 64, Fisheries and Environmental Studies in the Black Sea. FAO, Roma, p. 87-143.

- Mater, S. & N. Meriç (1996):** Deniz Balıkları. In: Kence, A. & C. C. Bilgin (eds.): Türkiye Omurgalıları Tür Listesi, TÜBİTAK, Ankara, 183 pp.
- Meriç, N. (1994):** Some uncommon fishes from the Turkish seas. XII. Ulusal Biyoloji Kongresi, Edirne, p. 295-299.
- Meriç, N. (1995):** A study on existence of some fishes on the continental slope of the Sea of Marmara. Tr. J. Zool., 19(2), 191-198.
- Ninni, E. (1923):** Primo contributo allo studio dei pesci e della pesca nelle acque dell'impero Ottomano. Missione Italiana per l'esplorazione dei Mari di Levante, Venezia, 187 pp.
- Okuş, E., A. Uysal & A. Yüksek (1996):** Marmara Denizinde köpekbalığı dağılımı. XIII. Ulusal Biyoloji Kongresi, September 17-20, 1996. Book of Abstracts, University of İstanbul, Faculty of Sciences, İstanbul, p. 31.
- Öztürk, B. & J. P. Bourguet (1990):** Données préliminaires sur le corail noir, *Gerardia savaglia* (BERTOLINI, 1819) de la Mer de Marmara. İstanbul University, Journal of Aquatic Products, 4(2), 45-48.
- Öztürk, B. & A. A. Öztürk (1996):** On the biology of the Turkish straits system. Bull. Inst. Oceanogr. Monaco, No. spécial 17, 205-221.
- Roux, C. (1984):** Squatinidae. In: Whitehead, P. J. P., M.-L. Bauchot, J.-C. Hureau, J. Nielsen & E. Tortonese (eds.): Fishes of the North-eastern Atlantic and the Mediterranean. Vol. I, UNESCO, Paris, p. 148-150.
- Slastenenko, E. (1955-56):** The fishes of the Black Sea basin. Et ve Balık Kurumu Umum Müd. Yayınları, İstanbul, 711 pp.
- Uysal, A., A. Yüksek & E. Okuş (1996):** Marmara Denizinde ender rastlanan üç elasmobranchii türü ve dağılımları (*Raja naevus* MULLER & HENLE, 1842; *Raja oxyrinchus* LINNAEUS, 1758; *Galeus melastomus* RAFINESQUE, 1809). XIII. Ulusal Biyoloji Kongresi, September 17-20, 1996. Book of Abstracts, University of İstanbul, Faculty of Sciences, İstanbul, p. 28.
- Üner, S. (1984):** Balık avcılığı ve yemekleri. Say Yayıncılık, İstanbul, 143 pp.
- Whitehead, P. J. P., M.-L. Bauchot, J.-C. Hureau, J. Nielsen & E. Tortonese (eds.) (1984):** Fishes of the North-eastern Atlantic and the Mediterranean. Vol. I. UNESCO, Paris, 510 pp.