

Cephalopod Fauna of the Eastern Mediterranean

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Abstract: Studies on the cephalopods of Turkish coasts have been going on since 1988. As a result of these studies, a total of 43 species have been determined, comprising 11 species from the Sea of Marmara, 38 from the Aegean Sea and 24 from the Mediterranean Sea. With respect to other studies carried out excluding Turkish coasts, the eastern Mediterranean cephalopod fauna has increased to 51 species.

Among the species determined, *Ancistrocheirus lesueurii* and *Ancistroteuthis lichtensteini* are new records for the eastern Mediterranean; *Sepietta obscura*, *Ancistrocheirus lesueurii*, *Ancistroteuthis lichtensteini* and *Tremoctopus violaceus* for the Aegean Sea; and *Alloteuthis media*, *Rossia macrosoma* and *Eledone cirrhosa* for the Mediterranean coast of Turkey.

Key Words: Cephalopoda, Fauna, Turkish seas, Eastern Mediterranean.

Doğu Akdeniz Cephalopoda Faunası

Özet: Türkiye kıyılarının Cephalopoda faunası üzerine 1988 yılında başlatılan çalışmalar günümüze kadar devam etmiştir. Bu çalışmalar sonucu, Marmara Denizi'nden 11, Ege Denizi'nden 38 ve Akdeniz kıyılarından 24 olmak üzere toplam 43 tür saptanmıştır. Türkiye kıyıları dışında yapılan diğer çalışmaların da değerlendirilmesiyle birlikte Doğu Akdeniz Cephalopoda faunası 51 türe yükseltilmiştir.

Saptanan türlerden *Ancistrocheirus lesueurii* ve *Ancistroteuthis lichtensteini*'nin doğu Akdeniz için, *Sepietta obscura*, *Ancistrocheirus lesueurii*, *Ancistroteuthis lichtensteini* ve *Tremoctopus violaceus*'un Ege Denizi için, *Alloteuthis media*, *Rossia macrosoma* ve *Eledone cirrhosa*'nın Türkiye'nin Akdeniz kıyıları için, yeni kayıt türler olduğu görülmüştür.

Anahtar Sözcükler: Cephalopoda, Fauna, Türkiye denizleri, Doğu Akdeniz.

Introduction

The cephalopod fauna of the world comprises approximately 700 species. An important portion of the Mediterranean cephalopod fauna is formed of Atlantic originated species (1) and in a study evaluating Mediterranean cephalopod fauna, 59 species were reported from the western Mediterranean, 38 from the Adriatic and 47 from the eastern Mediterranean, and the nonexistence of cephalopod species in the Black Sea was pointed out. The difference in number of species between the western and eastern basins of the Mediterranean is related to the lack of scientific studies in the eastern Mediterranean, as expressed by Mangold and Boletzky (2). Studies on the eastern Mediterranean cephalopods have so far been limited (1, 3-8).

The cephalopod fauna of the eastern Mediterranean is becoming more diverse with the recent contributions from both Turkish coasts (9-16) and the seas surrounding Turkey, other than Turkish coasts (17-21).

In this context, the cephalopod fauna of Turkish seas and the eastern Mediterranean is revealed, based on both our research conducted at the Sea of Marmara, Aegean Sea and Mediterranean Sea coasts of Turkey and a review of other studies carried out in the same regions.

Material and Methods

Three different sampling methods have been used on board the R/V K. Piri Reis, in our still continuing studies since 1988. A Turkish-Italian type bottom trawl with a

mesh size of 20 mm (knot-to-knot) at the cod end is used in the majority of samplings, where trawling hauls are performed in the Aegean and Mediterranean Seas at depths ranging from 0 to 500 m. The trawl net was followed by a Scanmar Net Sounder during the samplings. Dorsal Mantle Lengths (ML) of specimens collected are given in mm.

A beam trawl with a mesh size of 10 mm (knot-to-knot) at the cod end and a mouth width of 1.50 m was used at depths exceeding 500 m as the second sampling method, since a bottom trawl is technically useless at such depths. As a third sampling method, a bathypelagic scoop net with a mesh size of 10 mm (at the cod end) and a diameter of 1.80 m was used for pelagic samplings. The sampling stations during the research period are shown in the Figure.

Species identifications of samples are based on different studies (1, 22, 23, 24), while systematic categories are from Sweeney and Roper (25).

Findings

A total of 43 species have been determined during our studies carried out along Turkish coasts since 1988,

comprising 11 species from the Sea of Marmara, 38 from the Aegean Sea and 24 from the Mediterranean Sea. Each of these species are indicated with an asterisk in the Table. Among these species, *Ancistrocheirus lesueurii* (adult specimens) and *Ancistroteuthis lichtensteini* are recorded for the first time from the eastern Mediterranean, while *Alloteuthis media*, *Rossia macrosoma* and *Eledone cirrhosa* are new for the Mediterranean coast of Turkey, and *Sepietta obscura*, *Ancistrocheirus lesueurii*, *Ancistroteuthis lichtensteini* and *Tremoctopus violaceus* are new for the Aegean Sea. The newly recorded species are as follows:

Order: SEPIOLIDA

Family: Sepiolidae

Sepietta obscura Naef, 1916

Material: 1♂ 18 mm ML (38°23'5 N / 26°47'5 E) 10 m, 14. 10. 1998 Urla Harbor - İzmir.

Family: Sepiolidae

Rossia macrosoma (Delle Chiaje, 1829)

Material: 2♂, 31-42 mm ML; 1♀ 45 mm ML, (36°23' N / 34° 20' E) 260m, 25. 08. 1991 (Mersin).

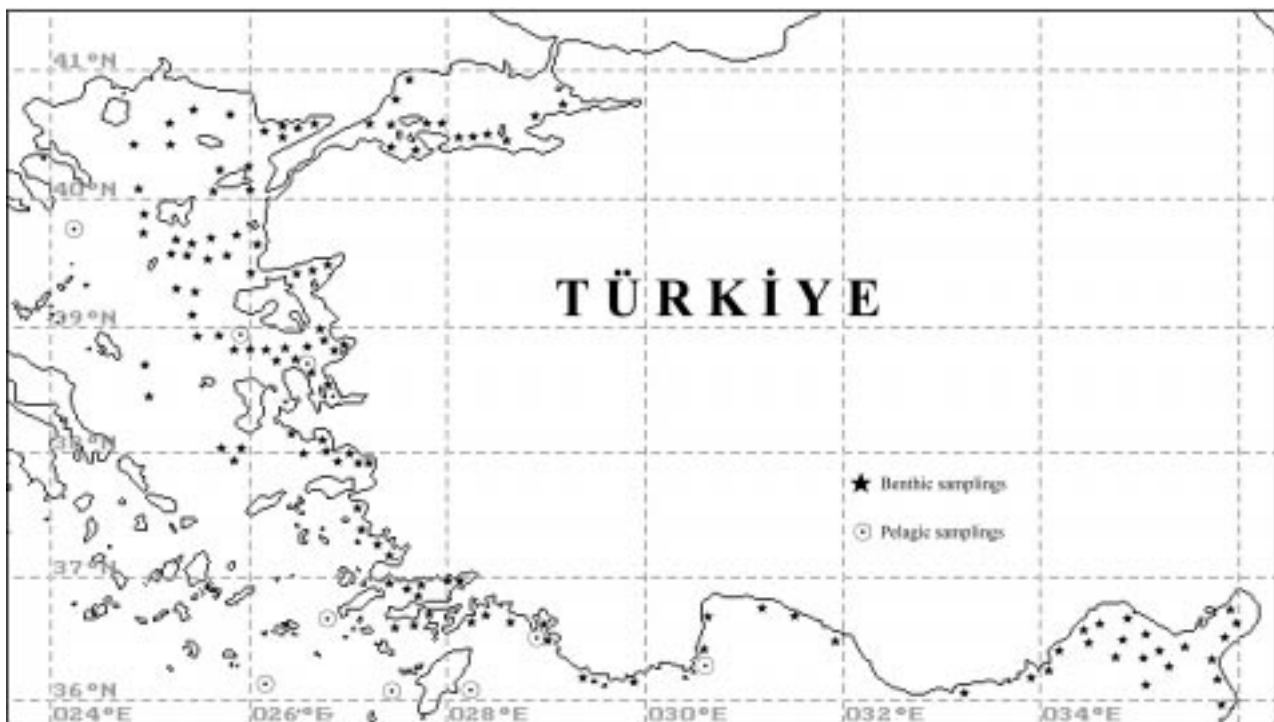


Figure 1. Sampling Satations

1♀ 63 mm ML (36°18' N / 34 18' E) 320m, 25. 04. 1992; (Mersin).

Order: TEUTHIDA

Family: Loliginidae

Alloteuthis media (Linnaeus, 1758)

Material: 3♂, 40-55 mm ML; 15♀ 47-65 mm ML, (36°30' N / 29° 02' E) 285m, 03. 05. 1992 (Antalya); 2♂, 53-66 mm ML; 5♀, 57-68 mm ML (36°34' N / 35°43' E) 70m., 21. 04. 1992; (İskenderun Bay).

Family: Ancistrocheiridae

Ancistrocheirus lesueurii (Férussac & Orbigny, 1835)

Material: 1 spec, 27 mm ML (39°46'2 N / 24°21'0 E) 1100 m, 12. 09. 1988, (northern Aegean Sea); 1♀, 223 mm ML (36°09'5 N / 27°23'0 E) 1200 m, 15. 05. 1993, (southern Aegean Sea) (from the surface during nighttime).

Family: Onychoteuthidae

Ancistroteuthis lichtensteini (Férussac & Orbigny, 1835)

Material: 1 spec, 52 mm ML, (40°17'5 N / 25°45'0 E) 890 m, 10. 06. 1996 (northwest İmroz Island) (from the surface during nighttime).

Order: OCTOPODIDA

Family: Octopodidae

Eledone cirrhosa (Lamarck, 1798)

Material: 1♂, 71 mm ML (36°30' N / 29° 02' E) 285 m, 03. 05. 1992 (Antalya)

Family: Tremoctopodidae

Tremoctopus violaceus Delle Chiaje, 1830

Material: 1♀, 91 mm ML, inner Karaburun Harbor (from the surface) 06. 07. 1990; 1♀, 95 mm ML, inner Güzelbahçe Harbor, İzmir (from the surface) 14. 07. 1991; 1♀, 120 mm ML, inner Urla Harbor, İzmir (from the surface) 09. 07. 1992; 1♀, 84 mm ML, inner Urla Harbor, İzmir (from the surface) 22. 07. 1996

A review of the recent studies carried out both at Turkish coasts and in seas surrounding Turkey revealed the presence of 19 species in the Sea of Marmara, 47 in the Aegean Sea, 38 at Mediterranean coasts of Turkey and 51 species in the eastern Mediterranean (Table).

Table. The distribution of the cephalopods in the Eastern Mediterranean (S. M. = Sea of Marmara; A. S. = Aegean Sea; L. S. =Levantine Sea). (* Species determined from Turkish coasts).

Species	S. M.	A. S	L. S.
SEPIIDA			
Sepiidae			
* <i>Sepia officinalis</i> Linnaeus, 1758	4, 24	9, 11, 13, 19, 20	5, 6, 9, 17, 21
* <i>Sepia elegans</i> Blainville, 1827	3, 16, 24	9, 11, 13, 19, 20	5, 6, 9, 21
* <i>Sepia orbignyana</i> Ferrussac, 1826	16, 24	9, 11, 13, 19, 20	5, 6, 9, 21
SEPIOLIDA			
Sepiolidae			
* <i>Rossia macrosoma</i> (Della Chiaje, 1839)	-	9, 13, 19, 20	9, 25
* <i>Neorossia caroli</i> (Joubin, 1902)	-	13, 19, 20	9
* <i>Heteroteuthis dispar</i> (Rüppell, 1845)	-	2, 9, 11, 20, 23	5, 6, 7, 9
<i>Sepiola affinis</i> Naef, 1912	-	13, 19	-
<i>Sepiola ligulata</i> Naef, 1912	-	13, 19	-
* <i>Sepiola intermedia</i> Naef, 1912	-	19, 20	-
* <i>Sepiola robusta</i> Naef, 1912	-	9, 20	6, 9, 21
* <i>Sepiola rondeletii</i> Leach, 1834	4, 24	9, 13, 19, 20	6, 9
* <i>Sepiola steenstrupiana</i> Lévy, 1912	-	9	8, 9, 21
* <i>Sepietta oweniana</i> Naef, 1916	1, 16, 24	9, 11, 13, 19, 20	5, 6, 9, 21
* <i>Sepietta neglecta</i> Naef, 1916	3, 16, 24	9, 20	6, 9
* <i>Sepietta obscura</i> Naef, 1916	1, 16, 24	25	8
* <i>Rondeletiola minor</i> (Naef, 1912)	16, 24	9, 11, 13, 19, 20	8, 9

Table. continued

TEUTHIDA				
Loliginidae	* <i>Loligo vulgaris</i> Lamarck, 1798	4, 16, 24	9, 11, 13, 19, 20	5, 6, 9, 17, 21
	* <i>Loligo forbesi</i> Steenstrup, 1856	-	9, 13, 19, 20	9, 21
	* <i>Alloteuthis media</i> (Linnaeus, 1758)	3, 4, 16, 24	11, 13, 19, 20	5, 6, 9, 21, 25
	* <i>Alloteuthis subulata</i> (Lamarck, 1798)	-	9, 13, 19, 20	6, 9
Enoploteuthidae	* <i>Abralia veranyi</i> (Rüppell, 1844)	-	13, 19, 20	5, 6, 9
	* <i>Abraliopsis pfefferi</i> (Verany, 1837)	-	2, 9	2, 5, 6, 9
	* <i>Pyroteuthis margaritifera</i> (Rüppell, 1844)	-	9, 19, 23	2, 6, 7, 9
Ancistrocheiridae	* <i>Ancistrocheirus lesueurii</i> (Orbigny, 1839)	-	23, 25	-
Octopoteuthidae	<i>Octopoteuthis sicula</i> Rüppell, 1848	3, 24	-	2, 6, 9
	* <i>Octopoteuthis megaptera</i> (Verrill, 1885)	-	22	-
Onychoteuthidae	<i>Onychoteuthis banksi</i> (Leach, 1817)	-	2, 9	2, 5, 6, 7, 9
	* <i>Ancistroteuthis lichtensteini</i> (Orbigny, 1839)	-	25	-
Histiotteuthidae	* <i>Histiotteuthis bonnellii</i> (Ferrussac, 1835)	-	19, 20, 23	-
	* <i>Histiotteuthis reversa</i> (Verrill, 1880)	-	9, 13, 19, 20, 23	9
Ctenopterygidae	<i>Ctenopteryx sicula</i> (Verany, 1851)	-	9	2, 5, 6, 9
Ommastrephidae	* <i>Illex coindetii</i> (Verany, 1839)	2, 16, 24	9, 13, 19, 20	5, 6, 9, 21
	* <i>Todaropsis eblanae</i> (Ball, 1841)	16, 24	9, 13, 19, 20	5, 6, 9, 21
	* <i>Todarodes sagittatus</i> (Lamarck, 1798)	4, 24	9, 11, 13, 19, 20	9, 21
	* <i>Ommastrephes bartramii</i> (Lesueur, 1821)	-	14	14
Brachiotteuthidae	<i>Brachiotteuthis riisei</i> (Steenstrup, 1882)	-	-	6, 9
Chiroteuthidae	<i>Chiroteuthis veranii</i> (Férussac, 1835)	2, 24	9, 23	5, 6
Cranchiidae	<i>Taonidium pfefferi</i> Russel, 1909	-	-	2, 6
OCTOPODIDA				
Octopodidae	* <i>Octopus cf. aegina</i> Gray, 1849	-	-	22
	* <i>Octopus vulgaris</i> Cuvier, 1797	2, 4, 24	9, 10, 11, 13, 19, 20, 23	5, 6, 9, 17, 21
	* <i>Octopus macropus</i> Risso, 1826	4, 24	9, 10, 19, 20	6, 9
	* <i>Octopus salutii</i> Verany, 1837	-	9, 13, 19, 20, 23	6, 9
	* <i>Octopus defilippi</i> Verany, 1851	-	9	5, 6, 9
	* <i>Scaevargus unicolor</i> (Orbigny, 1840)	-	9, 13, 19, 20	5, 6, 9, 21
	* <i>Pteroctopus tetracirrhus</i> (Delle Chiaje, 1830)	-	9, 13, 19, 20	5, 6, 9
	* <i>Eledone moschata</i> (Lamarck, 1799)	3, 4, 16, 24	9, 10, 11, 13, 19, 20	5, 6, 9, 10, 21
	* <i>Eledone cirrhosa</i> (Lamarck, 1798)	1, 24	13, 19, 20, 25	9, 25
	* <i>Bathypolypus sponsalis</i> (P. et H. Fischer, 1892)	-	13, 19, 20	-
Tremoctopodidae	* <i>Tremoctopus violaceus</i> Della Chiaje, 1829	-	9, 25	9, 15
Ocythoidae	* <i>Ocythoe tuberculata</i> Rafinesque, 1814	-	9, 11, 18	6, 9
Argonautidae	* <i>Argonauta argo</i> Linnaeus, 1758	-	9, 20	5, 6, 9, 12, 21
Total	51	19	47	43

**Ostroumoff (1896)=1; Degner (1925)=2; Digby (1949)=3; **Demir (1952)=4; Adam (1967)=5; Ruby & Knudsen (1972)=6; Roper (1974)=7; Knudsen (1981)=8; Mangold & Boletzky (1987)=9; Barash & Danin (1988)=10; Katağan & Kocataş (1990)=11; Popper et al., (1990)=12; D'Onghia et al., (1992)=13; Katağan et al., (1992)=14; Knudsen (1992)=15; Katağan et al., (1993)=16; Gücü & Bingel (1994)=17; **Corsini & Lefkatitou (1995)=18; D'Onghia et al., (1996)=19; Salman et al., (1997)=20; Salman et al., (1998)=21; Salman et al., (1999)=22; Lefkatidou et al., (1999)=23; Ünsal et al., (1999)=24; Present study=25.

(The studies marked with two asterisks are included in consecutive order in the reference list (35, 36, 37)).

Results and Discussion

The number of cephalopod species reported from the Mediterranean by Mangold and Boletzky (1) was 59, which increased to 64 species by the contributions of *Stoloteuthis leucoptera* recorded by Orsi and Massi (26), *Spirula spirula* by Bello (27), *Sepiolo atlantica* by Wurtz et al. (28), *Octopus cf. aegina* and *Octopoteuthis megaptera* by Salman et al. (15). A later work of Voss et al. (29), who revised the family Histioteuthidae, revealed that *Histioteuthis elongata* (previously treated as a distinct species) is the adult form of *Histioteuthis reversa*. Thus, members of the family Histioteuthidae, previously known to comprise 3 species, were reduced to 2 species by this study. In this context, the Mediterranean cephalopod fauna also decreased to 63 species. An investigation of species distribution maps given by Mangold and Boletzky (1) indicates the presence of 32 species in Turkish seas, which increased to 43 species with the present study. This number forms 68% of the Mediterranean cephalopod fauna, which is represented by 63 species.

The existence of 19 species (30% of the Mediterranean) in the Sea of Marmara is in accordance with the opinions of Kocataş et al. (30), who stated that the Sea of Marmara, which forms the Turkish straits system, has its own topographical, hydrographical characters and a limited biological diversity primarily due to extreme pollution.

The Aegean Sea, which is separated from the Mediterranean Sea by the Ionian and Levant Seas, possesses a richer biodiversity due to its topographical, hydrographical and ecological characteristics (31). In agreement with this statement, the Aegean Sea is represented by 47 cephalopod species (74% of the Mediterranean). *A. lesueurii* was first reported by Bello et al. (32) from the Messina Strait, and the prelarval stage

of the species was reported from the Aegean Sea by Lefkadiou et al. (33). In the present study, an adult specimen of *A. lesueurii* is reported for the first time from the Aegean Sea and for the second time from the Mediterranean Sea. Thus, an adult specimen of this species is reported for the first time in the eastern Mediterranean Sea.

According to Por and Dimentman (34), the Levant Sea possesses the most oligotrophic waters of the Mediterranean, resulting in a decrease in the diversity of marine biota and a synchronous increase in Lessepsian immigrants. This is in accordance with the fact that the fauna of the Levant Sea and the Mediterranean coasts of Turkey is represented by 43 species (68% of the Mediterranean). The relatively low number of species in the Aegean Sea and the occurrence of the Lessepsian migrant *Octopus cf. aegina* along Aegean coasts supports these statements.

The eastern Mediterranean fauna increases to 51 species (Table) by the addition of *Brachioteuthis riisei* (1, 6) and *Taonidium pfefferi* (3, 6) recorded from the Levant Sea to the already known 49 species in Turkish seas. Consequently, the eastern Mediterranean Sea contains 81% of the Mediterranean cephalopod fauna.

The separate investigation of ecological characteristics and depth distributions of species known from the western Mediterranean but hitherto unrecorded from the eastern Mediterranean revealed that these species either inhabit very shallow waters or deep-sea system and pelagic zone. In this respect, we believe that new records for the eastern Mediterranean cephalopod fauna will be added with further examinations of the relevant marine environments and new samplings to be carried out at Turkish coasts.

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