Chapter 7

# Deep-Sea Biodiversity in the Aegean Sea

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**Abstract**

The present chapter aims to describe macrofauna in the Aegean deep waters. The review is based mainly on the studies of deep waters below 200 m. A total of 386 species are included on the present checklist belonging to 9 phyla. Among these species, Porifera has 9 species, Cnidaria 4, Brachiopoda 3, Bryozoa 1, Polychaeta 34, Mollusca 92, Arthropoda 86, Echinodermata 30 and Pisces 127 species.

**Keywords:** Aegean Sea, deep sea, macrofauna, biodiversity, geology

## 1. Introduction

The Aegean Sea is an arm of the Mediterranean Sea located between the mainland of Greece and Turkey. Therefore, it has strategic, economic and political importance for these two neighboring countries. It is connected to the Sea of Marmara via the Çanakkale Strait (max depth 105 m) in the northeast, while several deeper gateways provide communications to the rest of the Eastern Mediterranean Sea in the south [1]. These gateways are between the Argolid Peninsula situated in Greece in the Peloponnesus and Elafonisos island (42 m, 0.3 nm), Elafonisou strait located between Elafonisos island and Kythira island (291 m, 4.5 nm), Kythira strait located between Kythira island and Antikythira island (263 m, 17 nm), Antikythira strait located between Antikythira island and Crete island (725 m, 16.5 nm), Kasou strait located between Crete island and Kasos island (1100 m, 26.5 nm), between Kasos island and Karpathos island (55 m, 3.5 nm), Karpathos strait located between Karpathos island and Rhodes island (896 m, 23.5 nm), between Rhodes island and Bozburun Peninsula situated in Turkey (439 m, 10 nm).

The Aegean Sea has a very irregular coastline with a number of small and large bays, peninsulas and islands or islets. This irregular coastline forms small basins and passages. It covers about 191,000 km$^2$ in area and measures about 610 km longitudinally and 300 km latitudinally.

The total water area is 193,950.33 km$^2$. While there are only 96 islands and rocks belonging to Turkish waters, there are 460 of them belonging to Greek waters [2]. The sea was traditionally known as "Archipelago" because of many islands, while in some south Slavic languages it is often called White Sea [3]. Deep sea is often described to begin at the edge of the continental shelf, which varies around the world, but in average it is around 200 m of depth [4]. It also defined as a portion of the ocean that stands below 200 m of depth, both in the water column and in the benthos [5]. Deep sea is almost totally devoid in light which means that it is also a dark sea. Thus, photosynthesis may not act there with enough efficiency to sustain life. This level, called compensation depth, is found at about 150–200 m of depth in the clearest ocean waters and, it is shallower in more turbid waters. Deep sea remains largely unexplored. Most scientific research so far focused on the sunlight zone of the oceans and seas.

Deep zones are considered as lifeless domains, while deep-sea habitats are considered as exceptional ecosystems [6]. The first data on the bathyal species was recorded by Risso in France at depth between 600 and 1000 m [7].

## 2. Geographic setting and morphology of the Aegean deep sea

The Aegean Sea is surrounded by the Anatolia from the east, the Thrace and Eastern Macedonia from the north, the Thessaly and Peloponnesus peninsula from the west and the islands including Crete and Rhodes from the south [2]. Approximately 33.6% of the Aegean Sea is shallower than 200 m, while the mean depth is 362 m [8]. The continental shelf is represented by two types, narrow (1–10 km) and broad (25–95 km). While narrow shelf occurs along the western coast, broad one dominates the northeastern Aegean Sea [8].

The Aegean Sea is a volcanically active region, characterized by above average continental heat-flow values. It has deeper Moho depths compared to the Eastern Mediterranean and Black Sea [9]. The Aegean Volcanic Arc is situated on the north of the Hellenic Arc, and swinging to northeast toward mainland Turkey [10].

The present form of the Mediterranean Sea is the result of continuous interaction of complex geodynamic processes during the last 50–70 myr. The eastern Mediterranean Basin (Ionian and Levantine) is the only true remnant of the older Tethys Ocean, which is being actually consumed along the active Hellenic, Cypriotic and Calabrian arcs. The East Mediterranean Ridge represents the accretionary prism formed above the shallow, north-northeastward dipping subduction of the oceanic Mediterranean crust below the Aegean microplate. The rest of the Mediterranean basins, like the Aegean, resulted from back-arc extension behind the southward migrating Hellenic Arc and the east-southeastward migrating Calabrian Arc [11].

After the disintegration of the Pangae, the Eastern Mediterranean Sea made up the southern boundary of the Tethys Ocean for the last 200 myr. The history of the Aegean Sea began during Oligocene about 35 myr ago. The Island of the Aegean actually started being formed in the middle Miocene about 12–11 myr after the sea began to penetrate to single land mass of Aegeis. The Island was formed at the end of the Miocene 6—5.3 myr. Main causes of the change in the Aegean region's geography were eustatism and tectonism during the Pleistocene, from 1.8

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to 0.9 myr. As the sea level rises, the Aegean region gradually acquires its current geography during the Holocene. Eastern Aegean islands were cut off from Asia Minor and the Cyclades islands were permanently isolated from one another [9].

The formation and distribution of the deep south Aegean basins are the result of the geotectonic regime, which was active over the region during the last 5 myr. Nevertheless, the tectonic and seismic activity in the southern Aegean is presently much lower in respect to the northern Aegean. Tectonic activity has migrated southward and affected the Island Arc with faulting, which is responsible for uplift or subsidence of successive regions along the arc. The tectonic fragmentation of the Island Arc has resulted in the formation of relatively shallow straits, west and east of Crete, which enable water exchange between the Aegean Sea and the eastern Mediterranean.

The Aegean Sea has a complex nature of the shoreline and sea-mountain tops emerging from the seabed. Among a number of basins, five major basins are clearly identified (**Figure 1**).

1. The Karpathos basin is the deepest basin located on the southernmost part of the Aegean Sea, with a maximum depth of 2500 m. The basin is bordered by a steep faulted slope toward Karpathos Island.
2. The Kamilonisi basin is located between the northern coast of eastern Crete and the Kamilonisi Islet. Its depth reached 2200 m.
3. The Chios basin, in the central Aegean Sea.
4. The Skyros basin, situated in the central part of the Aegean Sea.
5. The North Aegean basin, with depths reaching 1500 m.

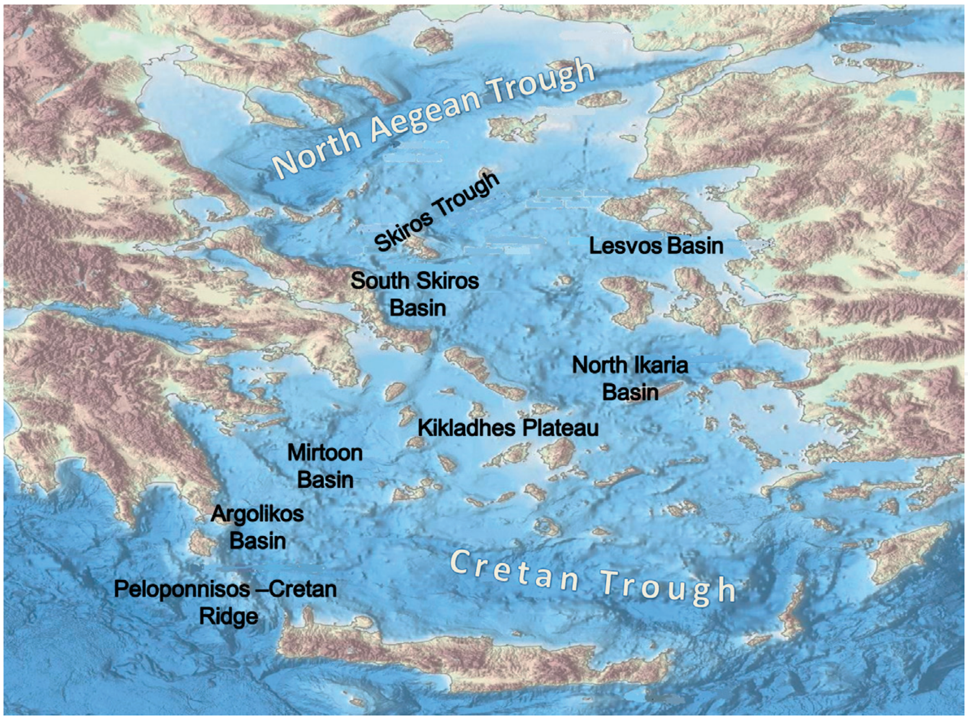


**Figure 1.** Morphology of the Aegean deep sea.

The Aegean Sea is topographically divided in two basins approximately along the 38° parallel: the north and south Aegean Sea. The hydrological and topographical conditions differ strongly between the two basins. The Aegean Sea can be divided into three distinct regions with different morphological characteristics as well as geotectonic regimes: the northern, the central and the southern part. The current morphological shape of the Aegean Sea was processed by means of three main parameters: the tectonism, the volcanic activity and the eustatism [9].

Eventhough the northern part of the Aegean Sea is characterized by an extreme continental shelf, the north Aegean Trough is the dominant morphological character in this part. The trough is elongated along the trace of the Northern Anatolian Fault and includes a series of three main depressions [12]. The eastern depression is a narrow but long feature which extends from the Limnos Island to the Gulf of Saros and reaches 1500 m of depth. Another depression named The Athos Basin is located on the south of the Chalcidice Peninsula with an average depth of 1200 m. The Sporades Basin is the western depression reaching depths of 1468 m. All of the depressions in the North Aegean Trough are separated from each other by morphological heights, a sill of 350 m from the 800 m deep North Skyros Basin, on their south. The southern slopes of the trough contact the 100–300 m shallow platform extending between the Sporades islands to the west and the Limnos and Gokceada islands to the east. In addition, there are many basins between the trough and the Central Aegean Plateau [13]: the 1000 m deep Skopelos Basin (2), the 800 m deep Kymi Basin (3), the 800 m deep S. Skyros Basin (4), the 1000 m deep N. Skyros Basin (5), the 800 m deep Psara Basin (6). The Ikaria Basin is the southernmost deep basin of the northern Aegean region, toward the shallow Central Aegean Plateau.

All the above-mentioned basins are surrounded by steep slopes and isolated morphological depressions separated from each other by 200–400 m shallow platforms.

The Central Aegean Plateau shows a curved shape and extends throughout from Evvoia Island in Greece to the Menderes region in Asia Minor. The southern limit of the Plateau bordering the Volcanic Arc consists of the Nisyros, Santorini, Milos, Poros and Aigina Islands along with smaller islets and submarine volcanos [13, 14].

The South Aegean Sea consists of a series of deep elongated basins which are distributed between the Aegean Volcanic Arc to the north and the Hellenic Arc to the south. The Hellenic Arc extends from the Argolikos Gulf, off the eastern Peloponnesus, over the Cretan Sea, between Crete and Santorini Islands, and continues to the Sea of Karpathos, west of Karpathos Island. This concave row of islands characterizes the morphology of the southern Aegean Sea. The Aegean Arc extends from mainland Greece toward the broadly arcuate Cyclades islands and thereafter swings northeast toward mainland Turkey [10]. The Aegean Sea is the deepest in the Karpathos Basin (2500 m) which is bordered by a steep faulted slope toward Karpathos Island. A 1300 m deep shallow ridge separates the Karpathos Basin from the 2200 m deep Kamilonisi Basin. The latter is located between the northern coast of eastern Crete and the Kamilonisi Islet. Next to this and north of central Crete, the 1800 m deep Irakleio Basin occupies the central part of the southern Aegean Sea. The Cretan Trough is situated between the Hellenic Arc and the Aegean Volcanic Arc, composed of a series of smaller sub-basins. The depression depth in the trough generally exceeds 1000 m. Further to the west, a shallower but long and narrow basin follows the shallow ridge, which connects western Crete with the Antikythira and Kythira Islands and the eastern Peloponnesus [11].

## 3. Deep-sea biodiversity

The Mediterranean Sea is the area of the first deep-sea explorations. In 1843, Forbes conducted numerous dredge operations in the sea floor of the Aegean Sea. The abyssal was defined as azoic since no living organism in the area could be observed. At the beginning of the 1800s, Antoine Risso, the first naturalist to describe deep Mediterranean species, recorded deep-sea fishes and crustaceans from the Gulf of Genova at depths between 600 and 1000 m [15].

The eastern basin was later investigated by the Russian Vessel Vitiaz in 1889, and the Austrian Vessel Pola between 1890 and 1893. Danish expeditions conducted with the Vessel Thor in 1908–1910 entering the Black Sea through the Mediterranean and completed in 1921 and 1922 with the Dana Cruises [15].

Tselepides represented that the macrofaunal species composition and mean benthic biomass, in the Cretan deep water to the depth of 1600 m was similar to the western Mediterranean and the neighboring Atlantic. Ben-Eliahu and Fiege found significant correlations between macrofauna diversity and food availability while the positive correlations is found to be the principle regulating factor in the system [16]. Although Mediterranean ecosystems are among the most studied areas of the world, deep-sea fauna research lags behind those of other areas [17].

It is not possible to understand the fauna of the Mediterranean Sea deep water, without considering its geological history. The present Mediterranean Sea is the only remnant of the Tethys Ocean. The Ocean existed till the Miocene. Approximately 6 myr ago (the end of the Miocene) the connection between the Mediterranean and Atlantic Ocean closed. The Mediterranean Sea dried up until there was almost no water left. Abiotic conditions affected all marine life, especially brachi. Finally, 5.3 myr ago the connection between the Mediterranean and Atlantic Ocean reopened. The Mediterranean basin was refilled with Atlantic waters and it started to take its current state.

Thus, the Mediterranean deep-sea is very young compared to other oceans. The youngest basin in the Mediterranean is the Aegean Sea, which mostly developed during the Pliocene and Quaternary, from 5 myr to the present [14].

The Mediterranean Sea is an oligotrophic marine system, while the eastern Mediterranean basin being its most oligotrophic part [18]. A similar trend of decreasing primary production values is present along the N–S transect of the Aegean Sea [19]. In the northern Aegean Sea, nutrients are supplied by freshwater runoff of rivers and by inflow of nutrient-rich Black Sea surface waters [20, 21]. Most of the deep sea is heterotrophic except the hydrothermal vents, thus the life of the deep-sea benthos depends on the food supply derived from surface production [22]. As a consequence, even though the Mediterranean Sea is oligotrophic, the northern Aegean Sea is more productive. Higher faunal densities are expected in this area. The biodiversity of deep benthic communities is also related to depth and sediment characteristics.

The quantity and quality of the descending organic matter that reaches the deep-sea floor are a function of a variety of factors, including primary production, phytoplankton sinking rate, zooplankton grazing rate, water column depth, mixed layer depth and proximity to land and input sources [23, 24].

The richness of the Mediterranean deep benthic fauna is decreasing gradually from west to east [15]. Food availability seems to be the major factor influencing the structure and function of macrofauna communities for deep and oligotrophic areas, such as the eastern Mediterranean [25].

The current Mediterranean deep-water fauna is less closely related to the Atlantic bathyal fauna than it was in the Pleistocene [23], due to the lack of Atlantic deep water fauna entering the Mediterranean Sea [26].

Bouchet and Taviani claim that much of the Mediterranean deep-sea fauna are made up of non-reproducing pseudopopulations that have entered the Mediterranean as meroplankton with the Atlantic inflow at Gibraltar [27]. The populations of the most common benthic molluscs at depths greater than 1000 m off the Israeli coast are composed of both adult and juvenile specimens. One particular species, *Yoldia micrometrica* Seguenza G., 1877, the most common and abundant species in the eastern Mediterranean, is not recorded in the westernmost part of the Sea [26]. Therefore, benthic decapod crustaceans and egg carrying fishes were collected from the depths of the Levantine Sea [25, 28].

The onset of current hydrological conditions in the Holocene led to the almost complete extermination of the richer Mediterranean deep-sea fauna, which was more similar to the present Atlantic fauna [27].

The close affinity between Mediterranean and Atlantic congeneric deep-water species suggests that the ancestors of the Mediterranean bathyal endemic species moved from the Atlantic when conditions were favorable [29].

Despite the presence of bathyal and abyssal species in the Mediterranean, typical deep-sea groups are absent [15]. According to Coll, the Mediterranean deep water has only 20–30 genuine abyssal species. In the western basin, where the depth does not exceed 3000 m, the abyssal fauna is less abundant than in the deeper eastern basin, where abyssal species are dominant in the Matapan trench, reaching to 5050 m depth [29].

The fauna of the Aegean Sea represents a distinct and separate subsystem in relation to the Mediterranean fauna [4]. The native fauna of the Aegean Sea is enriched both with Indo-Pacific immigrants and with Atlantic origin species [30]. The Aegean Sea can be considered as a separate subsystem of the eastern Mediterranean Sea and is isolated from it by extremely deep waters, high evaporative loss and its climatic, hydrographic and geomorphological diversity and faunal make-up [31]. Although the Aegean Sea is distant from the Strait of Gibraltar (the main pathway of enrichment for the Mediterranean Sea), it is inhabited by a greater number of species. According to Koukouras, main reasons for this may be its communication with the western basin and the high temperature and salinity variations [30]. In addition, The Aegean Sea (especially its northern sector) also shows high invertebrate species richness, which is otherwise low in most of the remaining central and eastern basin [29].

The Aegean Sea is isolated from the deep Atlantic waters by the shallow Gibraltar Strait, the African-Sicilian threshold and the topographical/hydrological barrier of the Hellenic trench. Atlanto-Mediterranean species dominate the deep waters of the Aegean Sea. Drivers of biodiversity in the deep Mediterranean are within three main categories: (1) bathymetric gradients, which are associated with increasing pressure and decreasing food availability in deeper sediments; (2) geographical and physico-chemical features, which are responsible for the north-northwest—south-southeast gradient in trophic conditions; and (3) environmental heterogeneity (e.g., grain size distribution, habitat complexity, distribution of food inputs) [29]. Yet, our knowledge about deep-sea biodiversity patterns is still limited [32, 33].

Food availability in deep sea decreases with depth and depends on the supply of energy from the pelagic area. This may explain most of the variability between the observed spatial patterns of the benthic biodiversity in the deep Mediterranean Sea [29, 34].

### 3.1. Deep-sea sponge

Sponges living in deep waters are an important component of the seas' bathyal benthos and prefer to inhabit soft bottom, whereas sponges are usually dependent for attachment on hard substrate [35]. Records of deep-sea sponges in the Mediterranean Sea are hard fragments within soft bottoms and also hard substrate such as vertical walls [36, 37].

Littoral zones and bathyal zones are clearly distinguishable for their sponge fauna in the Aegean Sea. A total number of sponge species are decreasing with depth [37]. According to Witte, the reason lies in scarcity of water-borne particles in deep-sea environments [38].

Although many endemic sponges recorded from deeper water increased the number of the known sponges in the western Mediterranean Sea [39], the number of endemic sponges recorded in the Aegean Sea is limited. One possible reason for this is lack of research in deep waters.

While sponges with sponging skeletons are widely distributed in warm waters, those with siliceous skeletons ones are found at high latitudes or deeper waters [40]. Order Poecilosclerida that showed a distinct diversity center in cold and deep waters is the most diverse in species number in the Aegean Sea [41].

### 3.2. Deep-sea coral

Cold-water reef-forming corals have been known for nearly 250 years in the deep ocean. However, there were some recent discoveries of white coral communities in the Mediterranean Sea. At the present, the Mediterranean Sea is known for its richness of fossil white coral communities exposed in land outcrops, and extant coral communities [42]. The Mediterranean basin represents an excellent biological archive of the past and recent deep-coral growth and evolutionary patterns of present deep-coral bioconstructions [43].

So far, only one isolated spot containing live *Lophelia pertusa* (Linnaeus, 1758) and *Madrepora oculata* (Linnaeus, 1758) was reported from a trough off Thassos, in the northern Aegean Sea [44]. Also, fossil or subfossil white corals have been sampled from the Cretan Arc [45]. The Cretan Arc relevant to the depth intervals suitable for white corals is not far from the isolated unusual occurrence of the live *L. pertusa* and *M. oculata* in the Aegean Sea. *Desmophyllum dianthus* (Esper, 1794) is relatively common and widespread in the whole Mediterranean and it has been reported alive from the Aegean Sea [45, 46].

One of the potential regions for white coral communities in the Aegean Sea is the northern Aegean trough (especially between Gökçeada Island and Samothrace) that has steep bathymetric gradient in terms and narrow shelves.

### 3.3. Bryozoan diversity

Information on bryozoan diversity from the Aegean Sea have been reported from a variety of habitats, including soft sediments, sea-grass leaves and rhizomes, macroalgae and coralligenous [47].

The richest bryozoan diversity is found in the coralligenous and in the dark and semi-dark cave biocoenoses [48]. Bryozoan diversity is much lower in bathyal habitats [48]. This habitat is characterized by complete darkness, long-lasting hard substrata provided by exposed coral skeletons, coral rubble and occasionally by firm- and hardgrounds. Most information on bryozoan diversity in this habitat come from communities associated to cold water corals [49]. Although Mediterranean deep-water habitats are known as relatively depleted in macrofaunal species, a number of new bryozoans species have been described in these habitats including seamounts and ridges [49].

The only bryozoan species *Herentia hyndmanni* that has been recorded so far by Johnston (1847) is found in the Rhodes Channel at 270 m, in the deep Aegen Sea. Specific regions such as the deep of the Aegean Sea can be potentially suitable for bryozoan diversification.

### 3.4. Deep-sea Arthropoda

Eighty-six Arthropoda species have been reported deeper than 200 m in the Aegean Sea. Fifteen of 86 deep-water species are found below 1000 m depth (**Table 1**). Arthropoda are the dominant invertebrate taxon in deep Aegean waters. All of these species are Atlanto-Mediterranean originated. *Parapenaeus longirostris*, *Pandalid shrimps* (*Plesionika* spp.) and *Polycheles typhlops* are among dominating species. It is considered that, due to their low levels of food consumption, crustacean decapods are more important in the deep Mediterranean (an oligotrophic region) [6].

Since deep Aegean Sea waters are still not yet well known, it is quite difficult to give comparative remarks.

| Phylum | Reference | Depth |
|---|---|---|
| **Porifera** | | |
| *Thenea muricata* Bowerbank, 1858 | [59] | I |
| *Stylocordyla pellita* (Topsent, 1904) | [43] | I |
| *Discodermia polydiscus* du Bocage, 1869 | [43] | I |
| *Leiodermatium lynceus* Schmidt, 1870 | [43] | I |
| *Desmacella annexa* (Schmidt, 1870) | [43] | I |
| *Hamacantha falcula* (Bowerbank, 1866) | [43] | I |
| *Mycale syrinx* (Schmidt, 1862) | [59] | I |
| *Eurypon coronula* (Bowerbank, 1874) | [43] | I |
| *Scalarispongia scalaris* (Schmidt, 1862) | [43] | I |
| **Cnidaria** | | |
| *Desmophyllum dianthus*(Esper, 1794) | [48] | I |
| *Lophelia pertusa* (Linnaeus, 1758) | [46] | I |
| *Madrepora oculata* Linnaeus, 1758 | [46] | I |
| *Funiculina quadrangularis* (Pallas, 1766) | [57] | II |
| **Brachiopoda** | | |
| *Argyrotheca cuneata* (Risso, 1826) | [58] | I |
| *Megerlia truncata* (Linnaeus, 1767) | [58] | I |
| *Gryphus vitreus* (Born, 1778) | [57] | II |
| **Bryozao** | | |
| *Herentia hyndmanni* (Johnston, 1847) | [59] | I |
| **Polychaeta** | | |
| *Augeneria profundicola* sp. nov | [60] | I |
| *Adercodon pleijeli* Mackie, 1994 | [61– 63] | I |
| *Amage gallasi* Marion, 1875 | [65] | I |
| *Amphitritides gracilis* (Grube, 1860) | [66] | I |
| *Aponuphis bilineata* (Baird, 1870) | [67] | I |
| *Euratella salmacidis* (Claparède, 1869) | [67] | I |
| *Exogone campoyi* San Martin, Ceberio & Aguirrezabalaga, 1996 | [64] | I |
| *Exogone lopezi* San Martin, Ceberio & Aguirrezabalaga, 1996 | [64] | I |
| *Exogone sorbei* San Martin, Ceberio & Aguirrezabalaga, 1996 | [64] | I |
| *Heterospio mediterranea* Laubier, Picard & Ramos, 1973 | [68] | I |
| *Inermonephtys foretmontardoi* Ravara, Cunha & Pleijel, 2010 | [69] | I |
| *Langerhansia caeca* Katzmann, 1973 | [70] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Levinsenia demiri* Çinar, Dagli & Açik, 2011 | [71] | I |
| *Melinna palmata* Grube, 1870 | [72] | I |
| *Metavermilia multicristata* (Philippi, 1844) | [73] | I |
| *Naiades cantrainii* Delle Chiaje, 1828 | [74] | I |
| *Neomediomastus glabrus* (Hartman, 1960) | [64] | I |
| *Nephtys hombergii* Savigny, 1818 | [66] | I |
| *Nepthys pulchra* Rainer, 1991 | [70] | I |
| *Notophyllum foliosum* (M. Sars, 1835) | [75] | I |
| *Ophelina cylindricaudata* (Hansen, 1878) | [76] | I |
| *Otopsis chardyi* (Katzmann, Laubier and Ramos 1974) | [70] | I |
| *Paradoneis lyra* (Southern, 1914) | [72] | I |
| *Pherusa plumosa* (O. F. Müller, 1776) | [72] | I |
| *Pista cristata* (O. F. Müller, 1776) | [67] | I |
| *Pista lornensis* (Pearson, 1969) | [70] | I |
| *Poecilochaetus fauchaldi* Pilato and Cantone, 1976 | [70] | I |
| *Prionospio dubia* Day, 1961 | [76] | I |
| *Salmacina incrustans* Claparède, 1870 | [67] | I |
| *Scoloplos armiger* (O. F. Müller, 1776) | [67] | I |
| *Serpula vermicularis* Linnaeus, 1767 | [69] | I |
| *Sternaspis scutata* (Renier in Ranzani, 1817) | [77] | I |
| *Tachytrypane jeffreysii* McIntosh, 1879 | [65] | I |
| *Terebellides stroemi* M. Sars, 1835 | [67] | I |
| **Mollusca** | | |
| *Abra alba* (W. Wood, 1802) | [75] | II |
| *Abra longicattus* (Scacchı 1834) | [76] | II |
| *Abralia veranyi* (Rüppell, 1844) | [77] | I |
| *Acar clathrata* (Defrance, 1816) | [78] | I |
| *Acteon monterosatoi* Dautzenberg, 1889 | [79] | I |
| *Alloteuthis media* (Linnaeus, 1758) | [77] | I |
| *Alvania cimicoides* (Forbes 1844) | [80] | II |
| *Anatoma crispata* Flemmıng 1828 | [81] | II |
| *Ancistrocheirus lesueurii* (Orbigny, 1842) | [77] | I |
| *Aporrhats serresianus* (Mıchaud 1828) | [81] | I |
| *Barbatia scabra* (Poli 1795) | [80] | II |

| Phylum | Reference | Depth |
|---|---|---|
| *Bathyarca grenophia* (Rlsso 1826) | [81] | II |
| *Bathypolypus sponsalis* (Fischer, P. & Fischer, H. 1892) | [77] | I |
| *Benthomangelia macra* (Watson 1881) | [81] | II |
| *Brachioteuthis riisei* (Steenstrup, 1882) | [77] | I |
| *Cavolinia gibbosa* (d'Orbigny, 1834) | [75] | I |
| *Chiroteuthis veranii* (Férussac, 1835) | [77] | I |
| *Chrysallida doliolum* (Phılıppı 1844) | [82] | II |
| *Chrysallida interstincta* (Adams, J., 1797) | [82] | I |
| *Clio pyramidata* Linnaeus, 1767 | [82] | I |
| *Crenilabium exile* (Jeffreys 1870 Ex Forbes ms) | [83] | I |
| *Cuspidaria rostrata* (Spengler 1793) | [80] | I |
| *Cyclopecten hoskynsi* (Forbes 1844) | [80] | II |
| *Danilia otaviana* (Cantkaıne 1835) | [80] | II |
| *Delectopecten vitreus* (Gmelın 1791) | [81] | II |
| *Dentalium agile* Sars M. in Sars O.G. 1872 | [81] | II |
| *Dentalium panormum* Chenu 1842 | [84] | II |
| *Diacria trispinosa* (Blainville, 1821) | [75] | I |
| *Drilliola emendata* (Monterosato 1872) | [80] | I |
| *Eledone cirrhosa* (Lamarck, 1798) | [77] | I |
| *Ennucula aegeensis* (Forbes, 1844) | [78] | I |
| *Entalina tetragona* (Brocchi, 1814) | [85] | I |
| *Epitonium celesti* (Aradas 1854) | [86] | I |
| *Eulimella neoattenuata* Gaglini, 1992 | [87] | I |
| *Euspira fusca* (Blaınvılle 1825) | [81] | I |
| *Euspira nitida* (Donovan, 1804) | [80] | I |
| *Falcidens gutturosus* (Kowalevsky 1901) | [88] | I |
| *Fusinus rostratus* (Olivi, 1792) | [89] | I |
| *Galeodea echinophora* (Linnaeus, 1758) | [78] | I |
| *Heteroteuthis dispar* (Rüppell, 1844) | [77] | I |
| *Histioteuthis bonnellii* (Férrussac, 1835) | [77] | I |
| *Illex coindetii* (Vérany, 1839) | [77] | I |
| *Japonactaeon pusillus* (MacGilivray, 1843) | [90, 91] | I |
| *Kelliella abyssicola* (Forbes 1844) | [81] | II |
| *Kurtiella bidentata* (Montagu, 1803) | [82] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Limatula subauriculata* (Montagu 1808) | [80] | I |
| *Lissopecten hyalinus* (Polı-i 1795) | [80] | I |
| *Loligo forbesi* Steenstrup, 1856 | [77] | I |
| *Mangelia nuperrima* (Tıberı 1855) | [81] | II |
| *Neorossia caroli* (Joubin, 1902) | [77] | I |
| *Notolimea crassa* (Forbes 1844) | [80] | II |
| *Nuculoma aegeensis* Forbes 1844 | [80] | I |
| *Octopus salutii* Vérany, 1837 | [77] | I |
| *Octopus vulgaris* Cuvıer 1798 | [80] | I |
| *Odostomella bicincta* (Tiberi, 1868) | [79] | I |
| *Odostomia silesui* Nofroni, 1988 | [92] | I |
| *Parthenina flexuosa* (Monterosato, 1874) | [85] | I |
| *Parvicardium scabrum* (Phılıppı 1844) | [80] | I |
| *Phdine catena* (Montagu 1803) | [80] | I |
| *Philine scabra* (Müller, O.F., 1784) | [78] | I |
| *Pleurotomella eurybrocha* (Dautzenberg & Fıscher 1896) | [93] | II |
| *Prochaetoderma raduliferum* (Owalevsky 1901) | [89] | II |
| *Propeamussium fenectratum* (Fobes I844) | [80] | I |
| *Propilidium pertenue* Jeffreys 1883 | [76] | II |
| *Pulsellum lofotense* (Sars M. 1865) | [76] | I |
| *Punctiscala cerigottana* (Sturany, 1896) | [94] | I |
| *Putzeysia wiseri* (Calcara 1842) | [95] | II |
| *Pyramidella octavtana* (Dı Geronımo 1973) | [96] | II |
| *Pyroteuthis margaritifera* (Rüppell, 1844) | [77] | I |
| *Ranella olearium* (Linnaeus, 1758) | [97] | I |
| *Rondeletiola minor* (Naef 1912) | [98] | I |
| *Rossia macrosoma* (Delle Ch1aje 1830) | [99] | I |
| *Scaeurgus unicirrhus* (Delle Chiaje in de Férussac & d'Orbigny, 1841) | [77] | I |
| *Scaphander lignarius* (Linnaeus, 1758) | [79] | I |
| *Scaphander punctostriatus* (Mighels & Adams, 1842) | [75] | II |
| *Sepia elegans* Blainville 1827 | [100] | I |
| *Sepia orbignyana* Férrussac, 1826 | [101] | I |
| *Sepietta neglecta* Naef, 1916 | [77] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Sepietta oweniana* Naef, 1916 | [77] | I |
| *Sepiola rondeletii* Leach, 1817 | [77] | I |
| *Syrnola minuta* Adams, H., 1869 | [87] | I |
| *Tellina pulchella* Lamarck, 1818 | [81] | I |
| *Teretia teres* (Reeve 1844) | [80] | I |
| *Thracia convexa* (Wood W. 1815) | [101] | II |
| *Thysanoteuthis rhombus* Troschel, 1857 | [77] | I |
| *Todarodes sagittatus* (Lamarck, 1798) | [77] | I |
| *Todaropsis eblanae* (Ball, 1841) | [77] | I |
| *Tonna galea* (Linnaeus, 1758) | [57] | I |
| *Trophon echinatus* (Kiener 1840) | [80] | I |
| *Turbonilla gradata* Bdd 1883 | [96] | I |
| *Turbonilla micans* (Monterosato, 1875) | [87] | I |
| *Turbonilla paucistriata* (Jeffreys, 1844) | [87] | I |
| **Arthropoda** | | |
| *Acanthephyra eximia* Smith, 1884 | [102] | I |
| *Acanthephyra pelagica* (Risso, 1816) | [103] | I |
| *Aegaeon lacazei* (Gourret, 1887) | [29] | I |
| *Argissa hamatipes* (Norman, 1869) | [104] | I |
| *Aristaeomorpha foliacea* (Risso, 1827) | [104] | I |
| *Aristeus antennatus* (Risso, 1816) | [104] | I |
| *Bathynectes maravigna* (Prestandrea, 1839) | [104] | I |
| *Calappa granulata* (Linnaeus, 1758) | [105] | I |
| *Calocaris macandreae* Bell, 1853 | [106] | I |
| *Chaceon mediterraneus* Manning & Holthuis, 1989 | [107] | I |
| *Chlorotocus crassicornis* (A. Costa, 1871) | [103] | I |
| *Deflexilodes subnudus* (Norman, 1889) | [103] | I |
| *Diastylis cornuta* (Boeck, 1864) | [108] | I |
| *Dorhynchus thomsoni* Thomson, 1873 | [103] | I |
| *Ebalia nux* A. Milne Edwards, 1883 | [109] | I |
| *Ekleptostylis walkeri* (Calman, 1907) | [108] | I |
| *Epimeria cornigera* (Fabricius, 1779) | [78] | II |
| *Eryoneicus puritanii* Lo Bianco, 1903 | [110] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Euphausia krohnii* (Brandt, 1851) | [111] | II |
| *Eurydice spinigera* Hansen, 1890 | [78] | II |
| *Eusergestes arcticus* (Krøyer, 1855) | [103] | I |
| *Galathea dispersa* Bate, 1859 | [112] | I |
| *Gennadas elegans* (Smith, 1882) | [106] | II |
| *Geryon longipes* A. Milne-Edwards, 1882 | [107] | I |
| *Goneplax rhomboides* (Linnaeus, 1758) | [113] | I |
| *Macropipus tuberculatus* (Roux, 1830) | [114] | I |
| *Macropodia longipes* (A. Milne-Edwards and Bouvier, 1899) | [114] | I |
| *Macropodia rostrata* (Linnaeus, 1761) | [115] | I |
| *Maja goltziana* d'Oliveira, 1888 | [116] | I |
| *Medorippe lanata* (Linnaeus, 1767) | [114] | I |
| *Meganyctiphanes norvegica* (M. Sars, 1857) | [111] | II |
| *Monodaeus couchii* (Couch, 1851) | [113] | I |
| *Monodaeus guinotae* Forest, 1976 | [110] | I |
| *Munida curvimana* A. Milne-Edwards & Bouvier, 1894 | [117] | I |
| *Munida intermedia* A. Milne Edwards and Bouvier, 1899 | [112] | I |
| *Munida rugosa* (Fabricius, 1775) | [118] | I |
| *Munida rutllanti* Zariquiey Alvarez, 1952 | [112] | I |
| *Munida tenuimana* G.O. Sars, 1872 | [110] | II |
| *Nebalia abyssicola* Fage, 1929 | [119] | II |
| *Nematoscelis atlantica* Hansen, 1910 | [115] | II |
| *Nematoscelis megalops* G. O. Sars, 1883 | [115] | II |
| *Nephrops norvegicus* (Linnaeus, 1758) | [113] | I |
| *Odontozona minoica* Dounas and Koukouras, 1989 | [110] | II |
| *Pagurus alatus* Fabricius, 1775 | [116] | I |
| *Pagurus prideaux* Leach, 1815 | [116] | I |
| *Pandalina profunda* Holthuis, 1949 | [110] | II |
| *Parapandalus narval* (Fabricius, 1787) | [118] | I |
| *Parapenaeus longirostris* (Lucas, 1846) | [120] | I |
| *Parthenopoides massena* (Roux, 1830) | [118] | I |
| *Pasiphaea multidentata* Esmark, 1866 | [107] | I |
| *Pasiphaea sivado* (Risso, 1816) | [107] | I |
| *Pilumnus hirtellus* (Linnaeus, 1761) | [118] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Platyscelus serratulus* Stebbing, 1888 | [78] | I |
| *Plesionika acanthonotus* (Smith, 1882) | [113] | I |
| *Plesionika antigai* Zariquiey Alvarez, 1995 | [121] | I |
| *Plesionika edwardsii* (Brandt, 1851) | [107] | I |
| *Plesionika gigliolii* (Senna, 1902) | [121] | I |
| *Plesionika heterocarpus* (A. Costa, 1871) | [121] | I |
| *Plesionika martia* (A. Milne-Edwards, 1883) | [121] | I |
| *Plesionika narval* (Fabricius, 1787) | [121] | I |
| *Polycheles typhlops* Heller, 1862 | [121] | I |
| *Polycheles typhlops typhlops* Heller, 1862 | [110] | II |
| *Processa canaliculata* Leach, 1815 | [121] | I |
| *Processa macrophthalma* Nouvel & Holthuis, 1957 | [114] | I |
| *Processa nouveli* Al-Adhub & Williamson, 1975 | [114] | I |
| *Richardina fredericii* Lo Bianco, 1903 | [121] | I |
| *Rissoides pallidus* (Giesbrecht, 1910) | [121] | I |
| *Scalpellum scalpellum* (Linnaeus 1767) | [120] | I |
| *Scopelocheirus hopei* (A. Costa, 1851) | [78] | I |
| *Sergestes arachnipodus* (Cocco, 1832) | [106] | I |
| *Sergestes arcticus* Krøyer, 1855 | [122] | I |
| *Sergestes atlanticus* H. Milne Edwards, 1830 | [122] | I |
| *Sergestes sargassi* Ortmann, 1893 | [122] | I |
| *Sergestes vigilax* Stimpson, 1860 | [106] | I |
| *Sergia robusta* (Smith, 1882) | [122] | I |
| *Sergia tenuiremis* (Krøyer, 1855) | [122] | I |
| *Solenocera membranacea* (Risso, 1816) | [118] | I |
| *Spinolambrus macrochelos* (Herbst, 1790) | [118] | I |
| *Squilla mantis* (Linnaeus, 1758) | [122] | I |
| *Stylocheiron abbreviatum* G. O. Sars, 1883 | [115] | II |
| *Stylocheiron longicorne* G. O. Sars, 1883 | [115] | II |
| *Stylocheiron maximum* Hansen, 1908 | [115] | II |
| *Stylocheiron suhmi* G. O. Sars, 1883 | [115] | I |
| *Urothoe corsica* Bellan-Santini, 1965 | [108] | I |
| *Westwoodilla caecula* (Bate, 1857) | [108] | I |
| *Xantho pilipes* A. Milne-Edwards, 1867 | [118] | I |

| Phylum | Reference | Depth |
|---|---|---|
| **Echinodermata** | | |
| *Amphilepis norvegica* (Ljungman, 1865) | [123] | II |
| *Amphipholis squamata* (Delle Chiaje, 1828) | [123] | I |
| *Amphiura chiajei* Forbes, 1843 | [83] | I |
| *Anseropoda placenta* (Pennant, 1777) | [123] | I |
| *Antedon mediterranea* (Lamarck, 1816) | [123] | I |
| *Brissopsis lyrifera* (Forbes, 1841) | [124] | I |
| *Ceramaster grenadensis* (Perrier, 1881) | [123] | II |
| *Cidaris cidaris* (Linnaeus, 1758) | [83] | I |
| *Echinus acutus* Lamarck, 1816 | [123] | I |
| *Echinus melo* Olivi, 1792 | [123] | I |
| *Hemiaster expergitus* Lovén, 1874 | [123] | II |
| *Hymenodiscus coronata* (Sars G.O., 1872) | [60] | I |
| *Leptometra phalangium* (Müller, 1841) | [124] | I |
| *Luidia ciliaris* (Philippi, 1837) | [123] | I |
| *Luidia sarsi sarsi* Düben & Koren, in Düben, 1845 | [123] | II |
| *Marginaster capreensis* (Gasco, 1876) | [123] | II |
| *Ocnus koellikeri* (Semper, 1868) | [123] | I |
| *Oestergrenia digitata* (Montagu, 1815) | [123] | I |
| *Ophiacantha setosa* (Retzius, 1805) | [123] | I |
| *Ophiomyxa pentagona* (Lamarck, 1816) | [123] | I |
| *Ophiothrix fragilis* (Abildgaard, in O. F. Müller, 1789) | [123] | I |
| *Ophiura ophiura* (Linnaeus, 1758) | [123] | I |
| *Parastichopus regalis* (Cuvier, 1817) | [123] | I |
| *Peltaster placenta* (Müller & Troschel, 1842) | [123] | I |
| *Psammechinus microtuberculatus* (Blainville, 1825) | [123] | I |
| *Pseudostichopus occultatus* Marenzeller, 1893 | [123] | I |
| *Sclerasterias neglecta* (Perrier, 1891) | [123] | I |
| *Sclerasterias richardi* (Perrier, 1882) | [123] | I |
| *Stylocidaris affinis* (Philippi, 1845) | [123] | I |
| *Tethyaster subinermis* (Philippi, 1837) | [123] | II |
| **Pisces** | | |
| *Acantholabrus palloni* (Risso, 1810) | [54, 55] | I |
| *Arctozenus risso* (Bonaparte, 1840) | [54, 55] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Argentina sphyraena* Linnaeus, 1758 | [54, 55] | I |
| *Argyropelecus hemigymnus* Cocco, 1829 | [54, 55] | I |
| *Ariosoma balearicum* (Delaroche, 1809) | [54, 55] | I |
| *Arnoglossus rueppelii* (Cocco, 1844) | [54, 55] | I |
| *Aulopus filamentosus* (Bloch, 1792) | [54, 55] | I |
| *Bathophilus nigerrimus* Giglioli, 1882 | [54] | I |
| *Bathypterois dubius* Vaillant, 1888 | [54] | I |
| *Bellottia apoda* Giglioli, 1883 | [54, 55] | I |
| *Benthocometes robustus* | [54, 55] | I |
| *Benthosema glaciale* (Reinhardt, 1837) | [54, 55] | I |
| *Brama brama* (Bonnaterre, 1788) | [54, 55] | I |
| *Capros aper* (Linnaeus, 1758) | [54, 55] | I |
| *Centracanthus cirrus* Rafinesque, 1810 | [54, 55] | I |
| *Centrolophus niger* (Gmelin, 1789) | [54, 55] | I |
| *Centrophorus granulosus* (Bloch & Schneider, 1801) | [54, 55] | I |
| *Centroscymnus coelolepis* Barbosa du Bocage & de Brito Capello, 1864 | [55] | I |
| *Ceratoscopelus maderensis* (Lowe, 1839) | [54, 55] | I |
| *Chalinura mediterranea* Giglioli, 1893 | [107] | II |
| *Champsodon capensis* Regan, 1908 | [56] | I |
| *Chauliodus sloani* Bloch & Schneider, 1801 | [54, 55] | I |
| *Chimaera monstrosa* Linnaeus, 1758 | [54, 55] | I |
| *Chlopsis bicolor* Rafinesque, 1810 | [55] | I |
| *Chlorophthalmus agassizi* Bonaparte, 1840 | [54, 55] | I |
| *Coelorinchus caelorhincus* (Risso, 1810) | [54, 55] | I |
| *Conger conger* (Linnaeus, 1758) | [54, 55] | I |
| *Cubiceps gracilis* (Lowe, 1843) | [54] | I |
| *Cyclothone braueri* Jespersen & Tåning, 1926 | [54, 55] | I |
| *Dalatias licha* (Bonnaterre, 1788) | [54, 55] | I |
| *Diaphus holti* Tåning, 1918 | [54, 55] | I |
| *Diaphus metopoclampus* (Cocco, 1829) | [54, 55] | I |
| *Diaphus rafinesquii* (Cocco, 1838) | [54, 55] | I |
| *Dipturus batis* (Linnaeus, 1758) | [54, 55] | I |
| *Dipturus oxyrinchus* (Linnaeus, 1758) | [54, 55] | I |
| *Dysomma brevirostre* (Facciolà, 1887) | [54] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Echinorhinus brucus* (Bonnaterre, 1788) | [54] | I |
| *Echiodon dentatus* (Cuvier, 1829) | [54, 55] | I |
| *Electrona risso* (Cocco, 1829) | [54] | I |
| *Epigonus constanciae* (Giglioli, 1880) | [54] | I |
| *Epigonus denticulatus* Dieuzeide, 1950 | [54, 55] | I |
| *Epigonus telescopus* (Risso, 1810) | [54, 55] | I |
| *Etmopterus spinax* (Linnaeus, 1758) | [107] | II |
| *Evermannella balbo* (Risso, 1820) 38 | [54, 55] | I |
| *Facciolella oxyrhyncha* (Bellotti, 1883) | [54, 55] | I |
| *Gadella maraldi* (Risso, 1810) | [54, 55] | I |
| *Gadiculus argenteus* Guichenot, 1850 | [54, 55] | I |
| *Gaidropsarus biscayensis* (Collett, 1890) | [54, 55] | I |
| *Galeus melastomus* Rafinesque, 1810 | [107] | II |
| *Glossanodon leioglossus* (Valenciennes, 1848) | [54, 55] | I |
| *Gnathophis mystax* (Delaroche, 1809) | [54] | I |
| *Gonichthys cocco* (Cocco, 1829) | [54, 55] | I |
| *Gonostoma denudatum* Rafinesque, 1810 | [54, 55] | I |
| *Helicolenus dactylopterus* (Delaroche, 1809) | [54, 55] | I |
| *Heptranchias perlo* (Bonnaterre, 1788) | [54, 55] | I |
| *Hexanchus griseus* (Bonnaterre, 1788) | [54, 55] | I |
| *Hoplostethus mediterraneus* Cuvier, 1829 | [54, 55] | I |
| *Hygophum benoiti* (Cocco, 1838) | [54, 55] | I |
| *Hygophum hygomii* (Lütken, 1892) | [55] | I |
| *Hymenocephalus italicus* Giglioli, 1884 | [54, 55] | I |
| *Ichthyococcus ovatus* (Cocco, 1838) | [55] | I |
| *Lampanyctus crocodilus* (Risso, 1810) | [54, 55] | I |
| *Lampanyctus pusillus* (Johnson, 1890) | [55] | I |
| *Lampris guttatus* (Brünnich, 1788) | [55] | I |
| *Lepidion lepidion* Risso, 1810 | [107] | II |
| *Lepidopus caudatus* (Euphrasen, 1788) | [54, 55] | I |
| *Lepidorhombus boscii* (Risso, 1810) | [54, 55] | I |
| *Lepidorhombus whiffiagonis* (Walbaum, 1792) | [54, 55] | I |
| *Lestidiops jayakari* (Boulenger, 1889) | [54, 55] | I |
| *Lestidiops sphyrenoides* (Risso, 1820) | [54, 55] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Leucoraja circularis* (Couch, 1838) | [54, 55] | I |
| *Leucoraja fullonica* (Linnaeus, 1758) | [54, 55] | I |
| *Leucoraja melitensis* (Clark, 1926) | [55] | I |
| *Lobianchia dofleini* (Zugmayer, 1911) | [54, 55] | I |
| *Lobianchia gemellarii* (Cocco, 1838) | [54, 55] | I |
| *Lophius budegassa* Spinola, 1807 | [54, 55] | I |
| *Lophius piscatorius* Linnaeus, 1758 | [54, 55] | I |
| *Macroramphosus scolopax* (Linnaeus, 1758) | [54, 55] | I |
| *Maurolicus muelleri* (Gmelin, 1789) | [54, 55] | I |
| *Merluccius merluccius* (Linnaeus, 1758) | [54, 55] | I |
| *Microichthys coccoi* Rüppell, 1852 | [54] | I |
| *Micromesistius poutassou* (Risso, 1827) | [54, 55] | I |
| *Microstoma microstoma* (Risso, 1810) | [54, 55] | I |
| *Molva macrophthalma* (Rafinesque, 1810) | [54, 55] | I |
| *Mora moro* (Risso, 1810) | [107] | II |
| *Myctophum punctatum* Rafinesque, 1810 | [54, 55] | I |
| *Nansenia oblita* (Facciolà, 1887) | [54, 55] | I |
| *Nemichthys scolopaceus* Richardson, 1848 | [54, 55] | I |
| *Nettastoma melanurum* Rafinesque, 1810 | [54, 55] | I |
| *Nezumia aequalis* (Günther, 1878) | [54] | I |
| *Nezumia sclerorhynchus* Valenciennes, 1838 | [54, 55] | I |
| *Notacanthus bonaparte* Risso, 1840 | [54, 55] | I |
| *Notoscopelus elongatus* (Costa, 1844) | [54, 55] | I |
| *Notoscopelus kroyeri* (Malm, 1861) | [54] | I |
| *Odontaspis ferox* (Risso, 1810) | [54, 55] | I |
| *Ophidion barbatum* Linnaeus, 1758 | [54, 55] | I |
| *Oxynotus centrina* (Linnaeus, 1758) | [54, 55] | I |
| *Pagellus bogaraveo* (Brünnich, 1768) | [54, 55] | I |
| *Peristedion cataphractum* (Linnaeus, 1758) | [54, 55] | I |
| *Petromyzon marinus* Linnaeus, 1758 | [54, 55] | I |
| *Phycis blennoides* (Brünnich, 1768) | [54, 55] | I |
| *Physiculus dalwigki* Kaup, 1858 | [55] | I |
| *Polyprion americanus* (Bloch & Schneider, 1801) | [54, 55] | I |
| *Rachycentron canadum* (Linnaeus, 1766) 109 | [54, 55] | I |

| Phylum | Reference | Depth |
|---|---|---|
| *Regalecus glesne* Ascanius, 1772 | [54, 55] | I |
| *Rostroraja alba* (Lacepède, 1803) | [54, 55] | I |
| *Ruvettus pretiosus* Cocco, 1833 20,168 | [54, 55] | I |
| *Saurenchelys cancrivora* Peters, 1864 | [55] | I |
| *Schedophilus ovalis* (Cuvier, 1833) | [54, 55] | I |
| *Scorpaena elongata* Cadenat, 1943 | [54, 55] | I |
| *Scyliorhinus canicula* (Linnaeus, 1758) | [54, 55] | I |
| *Scyliorhinus stellaris* (Linnaeus, 1758) | [54, 55] | I |
| *Somniosus rostratus* (Risso, 1827) | [55] | I |
| *Squalus acanthias* Linnaeus, 1758 | [54, 55] | I |
| *Squalus blainville* (Risso, 1827) | [54, 55] | I |
| *Stomias boa* (Risso, 1810) | [54, 55] | I |
| *Sudis hyalina* Rafinesque, 1810 | [54, 55] | I |
| *Symbolophorus veranyi* (Moreau, 1888) | [55] | I |
| *Symphurus ligulatus* (Cocco, 1844) | [55] | I |
| *Symphurus nigrescens* Rafinesque, 1810 | [54, 55] | I |
| *Synchiropus phaeton* (Günther, 1861) | [54, 55] | I |
| *Trachipterus trachypterus* (Gmelin, 1789) | [54, 55] | I |
| *Trachyrincus scabrus* (Rafinesque, 1810) | [54, 55] | I |
| *Trigla lyra* Linnaeus, 1758 | [54, 55] | I |
| *Vinciguerria attenuata* (Cocco, 1838) | [54, 55] | I |
| *Vinciguerria poweriae* (Cocco, 1838) | [55, 56] | I |
| *Zu cristatus* (Bonelli, 1819) | [55, 56] | I |

**Table 1.** Aegean deep-sea fauna that is recorded at a greater depth than 200 m.

### 3.5. Deep-sea mollusca

The mollusca species list is based on a review of published findings and 92 species found in deep-sea waters of depth over 200 m. But, there are no Indo-Pacific origin molluscan species in the deep of the Aegean Sea. In general, mollusca species showed a decline with depth. This has also been reported for other macrofauna species in the Mediterranean Sea [14].

### 3.6. Other benthic invertebrates

Suspension feeders (such as; hexactinellid sponges, pennatulids) are dominant in terms of invertebrate biomass on the upper and middle slope (to 1400 m) in the Atlantic, while echinoderms are important at all depths and dominant on the middle and lower slope [50]. Suspension feeders are of relatively little importance in the Mediterranean, due to its oligotrophic waters, and they are important only locally. Probably due to their low levels of food consumption, crustacean decapods are more important in the deep Mediterranean (an oligotrophic region) than in the deep Atlantic, where echinoderms dominate [50].

There are 4 Cnidaria species and 3 Brachiopoda species found in the depth of the Aegean Sea. Brachiopoda species are distributed in shallow water and since cnidarian species are in a symbiotic relationship with endosymbiotic algae for food and calcification, they prefer shallow waters too [51].

Nevertheless, given the low number of studies focusing on deep water, further research is needed to increase our knowledge on the brachiopod and cnidaria fauna of the Aegean Sea.

### 3.7. Deep-sea fishes

The depth ranges of the Aegean deep-sea fishes were specified by Froose and Pauly [52]. B Turkish and Greek waters have almost the same number of marine fish species (512 and 510, respectively) [53, 54]. Also, there are little differences between the lists of deep-sea fishes. This checklist is composed of fishes that are usually observed at depths deeper than 200 m in the Aegean Sea. Although the lower limit of their depth range is below 200 m, some of the fish species are not included to the list due to their rareness at those depths. Fishes represented by 126 fish species included: Agnatha by 1 species, Elasmobranchii by 21 species, Holocephali by 1 species and Osteichthyes by 103 species.

The deep-sea fish fauna of the Aegean Sea has three main origins: Atlanto-Mediterranean, Cosmopolite and Mediterranean Endemic species. *C. capensis* is the only Red Sea immigrant species [55].

Their ecological characters are mostly restricted and are generalized as mesopelagic, bathypelagic, benthopelagic and bathydemersal species. The order Gadiformes formed 16% of the total number of species with 20 species. Furthermore, most of the deep-sea fishes that have economic value belong to this order. Myctophidae is the largest family represented by 17 small mesopelagic fish species in the deep waters of the Aegean Sea. It is expected that further studies will reveal a number of new Myctophid species.

*L. lepidion* and *M. moro* are the only species living in waters deeper than 500 m, while *A. palloni*, *C. cirrus*, *C. capensis*, *C. bicolor*, *C. caelorhincus*, *L. guttatus*, *L. fullonica*, *N. oblita* and *S. stellaris* are found at depths shallower than 500 m.

## 4. Conclusion

There is a lack of detailed studies on the fauna in the deep Aegean Sea. This chapter is the first attempt to describe composition of macro faunal assemblages occurring in the deep waters of the deep Aegean Sea including Turkey and Greek coast.

We present an updated checklist including the most recent status of the relevant deep biodiversity. The aims of the present chapter were to give recent taxonomic and biogeographic knowledge of deep-sea species reported from Aegean Sea (deeper than 200 m) to date.

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