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Inventory and the biogeographical affinities of Annelida Polychaeta in the Algerian coastline (Western Mediterranean)

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Abstract

From collected data analyzed to produce an inventory of all polychaetes in Algerian waters, the diversity of this group was estimated as 534 species. The largest families are Syllidae (66 species), Spionidae (37 species) and Terebellidae (27 species). The presence of those listed species along the Algerian coast was compared with their occurrence in nine other areas of the Mediterranean Sea, in the Black Sea and in four other more distant seas around the world. Comparisons are also made with respect to the biogeographical origin for each species. The polychaete fauna of the Algerian coast is among the richest of the Mediterranean Sea and comparable to the diversity reported for the French Mediterranean continental shelf and that in the Aegean Sea, but higher than that found in the nearby coastlines of Morocco and Tunisia. Most of the species found have an Atlantic origin and are present in the western Mediterranean Sea. This current inventory includes eight non-indigenous polychaete species found in the Algerian waters.

Keywords: Biogeography; inventory; non-native species; benthos.

Introduction

Establishing an inventory of marine species remains a challenging task despite the availability of numerous records (especially via the Internet), and the existing data already provided by taxonomists and ecologists. Coll *et al.* (2010) carried out the first complete inventory of marine species in the Mediterranean Sea at the end of the 2010s.

The entire Mediterranean region, with its smaller distinct areas, has long been recognized as rich in terms of marine biodiversity (Coll *et al.*, 2010, 2012; Altobelli *et al.*, 2017). In their review for the Mediterranean Sea, Coll *et al.* (2010) reported 16,848 different marine species, including 10,902 invertebrates. Moreover, these authors stressed that these numbers were probably still an underestimate and needed to be supplemented to include additional species found in some southern areas of the sea as well as those living in the deeper regions of the eastern basin. This gap in their records mostly concerns the coasts of North Africa, mainly relating to Libya and Algeria. Such an apparent lack of available information is probably due to the numerous data included in early

publications written in French and the large amount of grey literature including PhD theses that are often not accessible via the web.

The annelid polychaetes are amongst the most diversified of invertebrates and several publications report inventories for this group at the local, national and regional scale, including the coastlines along Morocco and Tunisia in the southern part of the western basin of the Mediterranean Sea.

Some inventories for polychaetes cover the entire Mediterranean Sea (Arvanitidis *et al.*, 2002; Castelli *et al.*, 2008; Coll *et al.*, 2010), while others are limited to certain areas: Moroccan waters (both the Atlantic and Mediterranean coasts) (Gillet, 2017), the Mediterranean coast of France (Laubier & Paris, 1962; Dauvin *et al.*, 2006), Italian waters (Castelli *et al.*, 1995, 2008), the Adriatic Sea (Musco, 2012; Mikac, 2015), the Tunisian coasts (Ayari *et al.*, 2009; Zaâbi *et al.*, 2012, Mosbahi *et al.*, 2017), the Aegean Sea (Ergen, 1976; Simbora & Nicolaidou, 1994, 2001; Arvanitidis, 2000; Ergen *et al.*, 2002, 2006; Faulwetter *et al.*, 2017), the Levantine Sea (Laubier, 1966; Ben-Eliahu, 1995; Çinar & Ergen, 2003; Çinar, 2005, 2007, 2009; Çinar *et al.*, 2003, 2014;

Mutlu *et al.*, 2010; Faulwetter *et al.*, 2017; Dorgham *et al.*, 2013, 2014), the Turkish coastline (Çinar *et al.*, 2014) and the Black Sea (Arvaniditis *et al.*, 2002; Şahin & Çinar, 2012). However, no complete inventory is available for the 1200km of Algerian coastline. The first studies of polychaetes in Algerian waters took place at the turn of the 20th century. Viguier (1886 to 1920) and Gravier & Dantan (1928) described several new species of polychaetes in the Bay of Algiers, including the genus *Alciope* Viguier, 1886, the genus *Frennia* Viguier, 1912 (*F. dubia* Viguier, 1912, *F. propinqua* Viguier, 1920), the genus *Iospilus* Viguier, 1886 (*I. phalacroides* Viguier, 1886), the genus *Maupasias* Viguier, 1886 (*M. coeca* Viguier, 1886), the genus *Paraiospilus* Viguier, 1911 (*P. affinis* Viguier, 1911), and the species *Nereis icosiensis* Gravier & Dantan, 1928. Most of the polychaetes found during this period were reported by Fauvel (1923, 1927a, 1927b) in the French publication 'Faune de France, polychètes errantes et sédentaires'. Fauvel (1927b) wrote:

'A l'exception des Mémoires de Viguier sur le plancton de la Baie d'Alger et de quelques mentions par Marenzeller (1888) on ne trouve que de bien rares indications disséminées dans d'autres travaux. Jamais à notre connaissance la Faune des Polychètes des Côtes d'Algérie n'a encore été l'objet de recherches suivies et cela est regrettable car cette étude fournirait sûrement bien des observations intéressantes' translated as 'Other than the memoirs of Viguier on the plankton in the Bay of Algiers and some references by Marenzeller (1888), it is very rare to find anything disseminated in other studies. To the best of our knowledge, polychaete fauna off the coast of Algeria has never been the subject of research, which is regrettable, as such a study would surely provide some interesting observations'.

Marcel (1962) studied the annual cycle of *Perinereis cultrifera*. In studies on the phanerogam meadows on the Algerian coastline near Bou Ismail, Le Gall (1969) identified 72 polychaetes species, whereas Falconetti (1970) listed 64 polychaete species from the maërl beds in the same bay. Separately, some data was acquired for the waters in the harbour of Algiers (Bakalem & Romano, 1983, 1988; Rebzani-Zahaf *et al.*, 1988; Rebzani-Zahaf, 1990, 1992). Populations of some nereids in shallow hard substrates from the eastern part of the Algerian coast were investigated by Rouabah & Scaps (2003) and also by Daas *et al.* (2010). In other work, Younsi *et al.* (2010) recorded the polychaetes of economic interest and Meghlaoui *et al.* (2015a,b) investigated the effects of local pollution on polychaetes. More recently Bakalem (2008) and Grimes (2010) studied the communities of soft bottom of all Algerian gulfs, bays and harbours, in reported work that includes inventories of polychaetes.

Despite this level of scientific interest, there has still been no complete inventory of all polychaetes found in Algerian waters. A total of 26 polychaete species were initially listed in the two monographs entitled 'Faune de France' (Fauvel, 1923, 1927a), whilst a further 69 species were later added by Gravier & Dantan (1928). Many further species have since been identified during the PhD research of Bakalem (2008) (444 species) and then by Grimes (2010) (506 species). All these previous documents from an essential basis for the current listing of polychaetes of the Algerian coast; other even more recent publications, (including as yet unpublished data and personal communications), have been used to supplement the complete inventory reported here.

The main objectives of this current study were:

- to present a current list of all polychaetes species

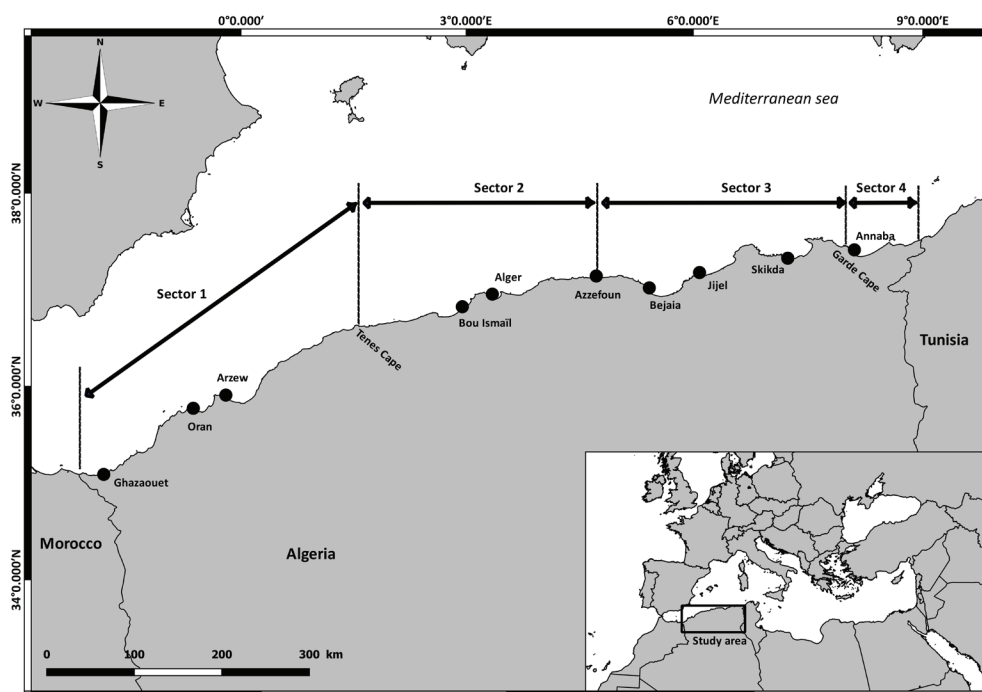


Fig. 1: Map of the Algerian coast with identification of the four study sectors with cited locations.

- recorded along the whole Algerian coastline;
- to attribute geographical affinities for each of the Algerian polychaete species;
- to compare the inventory of polychaete in the coastal waters off Algeria with similar studies compiled for other areas of the Mediterranean Sea.

Materials and Methods

General characteristics of the Algerian coastal zone

The Algerian coastline (Fig. 1) covers a variety of different habitats, ranging from rocky shorelines (sometimes with high cliffs), to sandy beaches and dunes found in many of the bays. The Algerian continental shelf is narrow, in contrast with those found in the north-western basin of the Mediterranean Sea, and especially the Gulf of Lion and the northern part of the Adriatic Sea. The distribution of soft sediments shows an increasing gradient (in terms of silt content) with sea depth; the seabed composition was characterized by a succession of fine sand, muddy sand, sandy mud and pure mud such as observed in the coastal seabed in the bay of Algiers and the bay of Bou Ismail (Bakalem, 2008; Bakalem *et al.*, 2020). Coarse sand and gravel make up the seabed near rocky shores, especially in the vicinity of the headlands bordering the bays (Grimes *et al.*, 2016). The shallow waters are also characterized by some specific habitats such as “seagrass zones” including *Posidonia oceanica* meadows and coralligenous formations both types having a high natural heritage value. The composition of the fauna in these habitats is characterized by a high diversity, and such areas are protected in many countries bordering the Mediterranean Sea against a range of environmental threats (Coll *et al.*, 2010, 2012; Altobelli *et al.*, 2017).

The circulation of the sea currents along the Algerian coast is mainly influenced by North Atlantic surface waters, which penetrate into the Mediterranean Sea through the Strait of Gibraltar. As they continue to progress eastward, the Atlantic waters gradually mix into the Mediterranean waters with its higher salinity. This movement is highlighted by the progressive impoverishment of Atlantic species travelling from the western to the eastern part of the Algerian coast (Dauvin *et al.*, 2013).

Data sources

The current study covers all the polychaetes that have been recorded along the Algerian coast, which runs 1200km from the Morocco to Tunisia. The study has been largely restricted to the continental shelf since there was little opportunity to access the continental slope or the offshore bathyal zones (Fig. 1). Zooplankton sampling in Algiers Bay (sector 2 in Fig. 1) enabled the collection of pelagic polychaetes and the subsequent description of several new species (Viguier, 1886, 1911, 1912, 1920; Gravier & Dantan, 1928). More recent studies have fo-

cused mainly on the soft-bottom communities found in the bays and gulfs of the Algerian continental shelf (Vaisière & Fredj, 1963; Le Gall, 1969; Falconetti, 1970; Bakalem, 2008; Grimes, 2010).

These results show a progressive change in the physico-chemical marine water characteristics along the the Algerian coast from the entrance of the Atlantic current in the West and its attenuation moving to the eastern part of the coast. Since the end of the 1970, the studies of Bakalem (2008), Grimes (2010) and Dauvin *et al.* (2013) on the soft-bottom macrobenthic communities of the Algerian shallow habitats from west to east have enabled the identification of four main sectors along the coast (see Dauvin *et al.*, 2013). This classification takes into account numerous characteristics based on: 1) the hydrology and local marine currents (Furnestin & Allain, 1962a,b,c; Benzohra & Millot, 1990; Millot, 1987, 1988; Millot *et al.*, 1990), 2) the hydrology, nutrients and phytoplankton (Bernard, 1952, 1956, 1958), and 3) biological data including ichthyology and macrobenthos (Le Danois, 1925; Maurin, 1962; Vaisière & Fredj, 1963; Bakalem, 2008; Grimes, 2010).

Sector 1 is located in the West before the Almeria-Oran front with hydrological characteristics similar than those of the Atlantic waters (Fig. 1). Sectors 3 and 4 correspond to Mediterranean hydrological water characteristics while the sector 2 corresponds to an intermediate situation between the western sector 1 and the eastern sectors.

Data reported here follows the model set out by Dauvin *et al.* (2013), where the presence of polychaetes is reported for the four sectors, which enables the identification of changes in diversity along the Algerian coast from west to east. Sector 1 comprises the western part of the Algerian coast from the Moroccan border to Cap Tenes, including the bays of Ghazaouet, Oran and Arzew. Sector 2 is the central part of the coastline from Cap Tenes to Azeffoun, including the bays of Bou Ismail and Algiers. Sector 3 is defined as the eastern part of Algerian coast from Azeffoun to the Cap de Garde including the Bejaia, Jijel and Skikda bays. Finally, Sector 4 corresponds to the most eastern Algerian coast from Cap de Garde to the Tunisian border, including the bays of Annaba and El Kala (Fig. 1). The coastlines of Sectors 1 and 2 are similar in length (300-350 km), whilst the coastline of Sector 3 is longer (400 km) and that of Sector 4 shorter (150 km).

Nomenclature and polychaete classification

The nomenclature and classification of polychaetes have been the subject of several successive studies (Fauchald & Rouse, 1997; Rouse & Fauchald, 1997; Hansson, 1998; Rouse & Gonzalo, 2016; Weigert & Bleidorn, 2016). The present work adopts the most recent form of the classification system for families based on polychaete phylogeny (Weigert & Bleidorn, 2016).

The individual species were classified by family, and these are listed alphabetically in Table 1. The species are validated following the nomenclature and classification given by the World Register of Marine Species (WoRMS)

Table 1. List of the Polychaetes recorded along the Algerian coast. The species are classified following the alphabetical order of the families. Year of collection: 1886, 1911, 1912, 1920: Viguiier; 1923, 1927: Fauvel; 1928, Gravier & Dantan; 1963: Vaisière & Fredj; 1969: Le Gall; 1970: Falconetti; 2008: Bakalem; 2010: Grimes. S1: Sector 1... Status: Qs: Questionable species; Se: species complex; NIS: Non-Indigenous Species. G: geographical origin, for legend see Figure 5; 1, 2, ... geographical areas, for legend see Figure 6.

| Species | Authority | Of re- cord | Status | G | S1 | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | Year |
|------------------------------------|---------------------------------|----------------|--------|--------|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|------|
| | | | | | | | | | | | | | | | | | | | | | | Year |
| Acetidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Eupanthalis kimbergi</i> | McIntosh, 1876 | | | eamr | + | | | | | | | | | | | | | | | | | 1970 |
| <i>Panthalis oerstedii</i> | Kimberg, 1856 | 2008 | | em | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Polydora maxillosus</i> | (Ranzani, 1817) | 2008 | | eamrip | + | | | | | | | | | | | | | | | | | 2008 |
| Acroiridae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Acrocirrus frontifilis</i> | (Grube, 1860) | 2008 | | eamrip | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Macrochaeta clavicornis</i> | (M. Sars, 1835) | 2008 | | eam | + | | | | | | | | | | | | | | | | | 2008 |
| Alciopidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Naiades cantraii</i> | Delle Chiaje, 1828 | 1886 | | enrip | + | | | | | | | | | | | | | | | | | 1886 |
| <i>Rhynchonereella capitata</i> | (Greeff, 1876) | 1886 | | amip | + | | | | | | | | | | | | | | | | | 1886 |
| <i>Rhynchonereella petersii</i> | (Langerhans, 1880) | 1886 | | eam | + | | | | | | | | | | | | | | | | | 1886 |
| <i>Torrea candida</i> | (Delle Chiaje, 1841) | 1886 | | enrip | + | | | | | | | | | | | | | | | | | 1886 |
| <i>Yanadis longissima</i> | (Levinsen, 1885) | 2008 | | enrip | + | | | | | | | | | | | | | | | | | 2008 |
| Ampharetidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Alkmaria romijni</i> | Horst, 1919 | 2010 | Qs | eam | + | | | | | | | | | | | | | | | | | 2010 |
| <i>Amage adpersa</i> | (Grube, 1863) | 2008 | | eam | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Amage gallasi</i> | Marion, 1875 | 2008 | | am | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Ampharete grubei</i> | Malmgren, 1865 | 2008 | | c | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Ampharete octocirrata</i> | (Sars, 1835) | 2008 | | c | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Amphiteteis gunneri</i> | (M. Sars, 1835) | 2008 | | eam | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Anobothrus gracilis</i> | (Malmgren, 1866) | 2008 | | c | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Melinna palmata</i> | Grube, 1870 | 1970 | | c | + | | | | | | | | | | | | | | | | | 1970 |
| Amphinomidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Arenicola marina</i> | Quatrefages, 1866 | 2008 | Qs | c | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Chloeta venusta</i> | (McIntosh, 1885) | 1923 | | eam | + | | | | | | | | | | | | | | | | | 1923 |
| <i>Hermodice carunculata</i> | Audouin & Milne Edwards, 1830 | 2008 | | eamr | + | | | | | | | | | | | | | | | | | 2008 |
| Aphroditidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hipponeo gaudichaudi</i> | McIntosh, 1885 | 2008 | | enrip | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Notopygos megalops</i> | Linnaeus, 1758 | 2008 | Qs | eamr | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Aphroditia aculeata</i> | (Savigny in Lamarek, 1818) | 2008 | | mip | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Laetmonice hystrix</i> | (Baird, 1865) | 1963 | | c | + | | | | | | | | | | | | | | | | | 1963 |
| <i>Pontogenia chrysocoma</i> | (Linnaeus, 1758) | 1970 | | eam | + | | | | | | | | | | | | | | | | | 1970 |
| Arenicolidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Arenicolides branchialis</i> | (Audouin & Milne Edwards, 1833) | 2008 | | eam | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Arenicolides grubii</i> | Claparède, 1868 | 2008 | | e | + | | | | | | | | | | | | | | | | | 2008 |
| Bonelliidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Branchiomalidane vineenti</i> | Langerhans, 1881 [as vincentii] | 2008 | | eam | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Maxmuelleria gigas</i> | (Müller M., 1852) | 2008 | | em | + | | | | | | | | | | | | | | | | | 2008 |
| Capitellidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Capitella capitata</i> | (Fabricius, 1780) | 2008 | Qs&Sc | c | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Capitella gardii</i> | (Mesnil, 1897) | 2010 | | em | + | | | | | | | | | | | | | | | | | 2010 |
| <i>Capitella minima</i> | Langerhans, 1880 | 2008 | | eamrip | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Dasybranchus caducus</i> | (Grube, 1846) | 2008 | | c | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Dasybranchus gajolae</i> | Eisig, 1887 | 1969 | | em | + | | | | | | | | | | | | | | | | | 1969 |
| <i>Heteromastus filiformis</i> | (Claparède, 1864) | 2008 | | c | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Mastobranchnus trichesi</i> | Eisig, 1887 | 2008 | | c | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Notomastus aberans</i> | Day, 1957 | 2010 | NIS | mrip | + | | | | | | | | | | | | | | | | | 2010 |
| <i>Notomastus latericus</i> | Sars, 1851 | 1969 | | c | + | | | | | | | | | | | | | | | | | 1969 |
| <i>Notomastus lineatus</i> | Claparède, 1869 | 2008 | | em | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Notomastus profundus</i> | (Eisig, 1887) | 2008 | | eam | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Peresiella clymenoides</i> | Harmelin, 1968 | 2008 | | eam | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Pseudocapitella incerta</i> | Fauvel, 1913 | 2008 | | em | + | | | | | | | | | | | | | | | | | 2008 |
| <i>Pseudoleiocapitella fauveli</i> | Harmelin, 1964 | 2008 | | e | + | | | | | | | | | | | | | | | | | 2008 |

Continued

Table 1 continued

| Species | Authority | Year Of re- cord | Status | G | SI | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-------------------------------------|---------------------------------|------------------------|--------|-------|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|
| | | | | | | | | | | | | | | | | | | | | | |
| <i>Chaetopterus varipedatus</i> | (Renier, 1804) | 1970 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Mesochaetopterus sagittarius</i> | (Claparède, 1870) | 2008 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Phyllochaetopterus gracilis</i> | Grube, 1863 | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Phyllochaetopterus socialis</i> | (Claparède, 1869) | 2008 | | emip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Spiochaetopterus costarum</i> | (Claparède, 1869) | 2008 | Sc | emr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Spiochaetopterus solitarius</i> | (Rioja, 1917) | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Spiochaetopterus typicus</i> | M Sars, 1856 | 2008 | | emip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Chrysopetalum debile</i> | (Grube, 1855) | 2008 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aphelocheata filiformis</i> | (Kieferstein, 1862) | 1927 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aphelocheata marioni</i> | (Saint-Joseph, 1894) | 1969 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aphelocheata multibranchis</i> | (Grube, 1863) | 1970 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Caulerella alata</i> | (Southern, 1914) | 1969 | | eamip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Caulerella bioculata</i> | (Kieferstein, 1862) | 2008 | | eamip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Chaetozone caputesocis</i> | (Saint-Joseph, 1894) | 1928 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Chaetozone setosa</i> | Malmgren, 1867 | 1927 | Qs&Sc | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Chaetozone zelandica</i> | McIntosh, 1911 | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Cirratulus cirratus</i> | (O. F. Müller, 1776) | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Cirratulus tentaculata</i> | (Montagu, 1808) | 1969 | Sc | eamip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Dodecaceria concharum</i> | Orsted, 1843 | 1969 | Qs | eamip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Kirkegaardia heterochaeta</i> | (Laubier, 1961) | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Protocirrinis chrysoerma</i> | (Claparède, 1868) | 1928 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Raphidrilus nemasoma</i> | Monticelli, 1910 | 2008 | | emrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Tharyx killaricensis</i> | (Southern, 1914) | 2008 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Timarete filigera</i> | (Delle Chiaje, 1828) | 2010 | Sc | e | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Dorvillea atlantica</i> | (McIntosh, 1885) | 2010 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Dorvillea rubrovittata</i> | (Grube, 1855) | 1928 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ophryotrocha puerilis</i> | Claparède & Meeznikow, 1869 | 1886 | Sc | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Parophryotrocha isochaeta</i> | (Eliason, 1962) | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Protodurvillea atlantica</i> | (McIntosh, 1885) | 1928 | Qs | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Protodurvillea kefersteini</i> | (McIntosh, 1869) | 2008 | | eamr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Schistomeringos neglecta</i> | (Fauvel, 1923) | 1969 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Schistomeringos rudolphi</i> | (Delle Chiaje, 1828) | 2008 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Eunice floridana</i> | (Pourtales, 1867) | 2010 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Eunice norvegica</i> | (Linnaeus, 1767) | 2008 | Qs | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Eunice oerstedii</i> | Stimpson, 1853 | 2008 | | e | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Eunice pennata</i> | (Müller, 1776) | 1928 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Eunice roussaei</i> | Quatrefages, 1866 | 2008 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Eunice schizobranchia</i> | Claparède, 1870 | 2010 | Qs | e | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Eunice vittata</i> | (Delle Chiaje, 1828) | 1970 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Leodice harassii</i> | (Audouin & Milne Edwards, 1833) | 1969 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Leodice torquata</i> | (Quatrefages, 1866) | 2008 | | emrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Lysidice ninetta</i> | Audouin & H Milne Edwards, 1833 | 1928 | Sc | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Lysidice unicornis</i> | (Grube, 1840) | 1928 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Marphysa sanguinea</i> | (Montagu, 1813) | 1969 | Sc | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Palola sicilensis</i> | (Grube, 1840) | 1928 | | emrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paucibranchia bellii</i> | (Audouin & Milne Edwards, 1833) | 2008 | | emip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paucibranchia fallax</i> | (Marion & Bobretzky, 1875) | 1928 | | eamip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

Continued

Table 1 continued

| Species | Authority | Year Of re- cord | Status | G | S1 | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
|--------------------------------------|------------------------------------|------------------------|--------|---|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|---|
| | | | | | | | | | | | | | | | | | | | | | | |
| Euphrosini- dae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Euphrosine armadillo</i> | Sars, 1851 | 2008 | eamr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Euphrosine foliosa</i> | Audouin & H Milne Edwards, 1833 | 1928 | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Euphrosine myrtosa</i> | Savigny in Lamarek, 1818 | 2010 | Qs | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Fabriciidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Fabricia stellaris</i> | (Müller, 1774) | 2008 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Manayunkia aestuarina</i> | (Bourne, 1883) | 1969 | Qs | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Pseudofabriciella filamentosa</i> | (Day, 1963) | 2008 | mrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Diplocirrus glaucus</i> | (Malmgren, 1867) | 2008 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Flabelligera affinis</i> | M. Sars, 1829 | 1928 | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Flabelligera diplochaitus</i> | (Otto, 1820) | 2010 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Pherusa monilifera</i> | (Delle Chiaje, 1841) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Pherusa plumosa</i> | (Müller, 1776) | 1970 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Piromis eruca</i> | (Claparède, 1869) | 1970 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Therochaeta flabellata</i> | (Sars in Sars, 1872) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Glycera alba</i> | (O.F. Müller, 1776) | 1969 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Glycera capitata</i> | Orsted, 1843 | 2008 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Glycera fallax</i> | Quatrefages, 1850 | 1970 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Glycera lapidum</i> | Quatrefages, 1866 | 1928 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Glycera tessellata</i> | Grube, 1863 | 1928 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Glycera tridactyla</i> | Schmarda, 1861 | 1928 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Glycera unicornis</i> | Lamarek, 1818 | 2008 | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Glycinde nordmanni</i> | (Malmgren, 1866) | 2008 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Goniadiidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Goniada emerita</i> | Audouin & H Milne Edwards, 1833 | 1969 | enrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Goniada maculata</i> | Örsted, 1843 | 2008 | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Goniada norvegica</i> | Örsted, 1845 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Gyptis propinqua</i> | Marion & Bobretzky, 1875 | 2008 | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Hesionia splendida</i> | Lamarek, 1818 | 2008 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Leocrates claparedii</i> | (Costa in Claparède, 1868) | 2008 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Nereimyra punctata</i> | (Müller, 1788) | 2010 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Oxydromus agilis</i> | (Ehlers, 1864) | 1928 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Oxydromus flexuosus</i> | (Delle Chiaje, 1827) | 1928 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Oxydromus pallidus</i> | Claparède, 1864 | 2010 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Psamathe fusca</i> | Johnston, 1836 | 2008 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Syllidia armata</i> | Quatrefages, 1866 | 1928 | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Iospilus phalacroides</i> | Viguier, 1886 | 1886 | am | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paraiospilus affinis</i> | Viguier, 1911 | 1920 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Phalacrophorus pictus</i> | Greenf. 1879 | 1886 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Lacydoniidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Lacydonia miranda</i> | Marion & Bobretzky, 1875 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Lopadorhynchus krohnii</i> | (Claparède, 1870) | 1886 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Lopador- rhynchidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Maupasia coeca</i> | Viguier, 1886 | 1923 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Pedinosoma curium</i> | Reibisch, 1895 | 2010 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Pelagobia longicirrata</i> | Greenf. 1879 | 1886 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

Continued

Table 1 continued

| Species | Authority | Year Of re- cord | Status | G | SI | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
|--------------------------------------|----------------------------------|------------------------|--------|-------|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|---|
| | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hilbigneris gracilis</i> | (Ehlers, 1868) | 1969 | | em | + | + | + | + | | | | | | | + | | | | | | | |
| <i>Lumbrinerides acuta</i> | (Verrill, 1875) | 2008 | Qs | em | + | + | + | + | | | | | | | + | | | | | | | |
| <i>Lumbrineriopsis paradoxa</i> | (Saint-Joseph, 1888) | 1970 | | em | + | + | + | + | | | | | | | + | | | | | | | |
| <i>Lumbrineris coccinea</i> | (Renier, 1804) | 1970 | | c | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Lumbrineris inflata</i> | Moore, 1911 | 2008 | | eamip | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Lumbrineris labrofrimbriata</i> | Saint-Joseph, 1888 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Lumbrineris latreilli</i> | Audouin & Milne Edwards, 1834 | 2008 | | c | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Lumbrineris nonatoi</i> | Ramos, 1976 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Lumbrineris perkinsi</i> | Carrera-Parra, 2001 | 2008 | NIS | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Scoletoma emandibulata mabiti</i> | (Ramos, 1976) | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Scoletoma fragilis</i> | (O.F. Müller, 1776) | 1923 | Sc | eam | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Scoletoma funchalensis</i> | (Kinberg, 1865) | 2008 | | eam | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Scoletoma inopatiens</i> | (Claparède, 1868) | 1969 | | emr | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Magelona alleni</i> | Wilson, 1958 | 2008 | | eam | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Magelona filiformis</i> | Wilson, 1959 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Magelona minuta</i> | Eliason, 1962 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Magelona mirabilis</i> | (Johnston, 1865) | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Magelona wilsoni</i> | Glémarec, 1966 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Axiiothella constricta</i> | (Claparède, 1868) | 2008 | | c | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Axiiothella rubrocincta</i> | (Johnson, 1901) | 2008 | Qs&Sc | c | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Chirimia biceps</i> | (M. Sars, 1861) | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Euclymene collaris</i> | (Claparède, 1869) | 2008 | | emr | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Euclymene lombricooides</i> | (Quatrefages, 1866) | 1970 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Euclymene oerstedii</i> | (Claparède, 1863) | 2008 | | eamip | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Euclymene palermitana</i> | (Grube, 1840) | 1970 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Euclymene robusta</i> | Arwidsson, 1906 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Johnstonia chymenoides</i> | Quatrefages, 1866 | 2008 | | eam | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Leiochone leiopygos</i> | (Grube, 1860) | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Leiochone tricirrata</i> | Bellan & Reys, 1967 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Macroclymene santanderensis</i> | (Rioja, 1917) | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Maldane glebifex</i> | Grube, 1860 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Maldane sarsi</i> | Malmgren, 1865 | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Metasychis gotoi</i> | (Izuka, 1902) | 2008 | NIS | eamip | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Micromaldane ornithochaeta</i> | Mesnil, 1897 | 2008 | | emip | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Nicomache lumbricalis</i> | (Fabricius, 1780) | 2008 | Qs | eamip | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Petaloproctus terricolus</i> | Quatrefages, 1866 | 1969 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Praxillella affinis</i> | (M. Sars in G.O. Sars, 1872) | 2008 | | eamip | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Praxillella gracilis</i> | (M. Sars, 1861) | 2008 | | emrip | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Praxillella lophoseta</i> | (Orlandi, 1898) | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Praxillella praetermissa</i> | (Malmgren, 1865) | 2008 | Sc | c | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Aglaophamus agilis</i> | (Langerhans, 1880) | 2008 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Inermonephtys inermis</i> | (Ehlers, 1887) | 2008 | Qs | c | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Nephtys caeca</i> | (Fabricius, 1780) | 2008 | | c | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Nephtys ciliata</i> | (Müller, 1788) | 2010 | Qs | c | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Nephtys cirrosa</i> | Ehlers, 1868 | 2008 | | eam | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Nephtys hombergii</i> | Savigny in Lamarek, 1818 | 1969 | | eam | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Nephtys hystericis</i> | McIntosh, 1900 | 1923 | | em | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Nephtys incisa</i> | Malmgren, 1865 | 2008 | | eam | + | + | + | + | | | | | | | + | | | | | | | + |
| <i>Nephtys paradoxa</i> | Malm, 1874 | 2008 | | c | + | + | + | + | | | | | | | + | | | | | | | + |

Continued

Table 1 continued

| Species | Authority | Year Of re- cord | Status | G | S1 | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|------------------------------------|------------------------|--------|--------|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|
| <i>Alitta succinea</i> | (Leuckart, 1847) | 2008 | | eamip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ceratonereis (Composetia) costae</i> | (Grube, 1840) | 1970 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ceratonereis (Composetia) hirci- nicola</i> | (Eisig, 1870) | 2008 | | amip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Eunereis longissima</i> | (Johnston, 1840) | 1928 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Hediste diversicolor</i> | (O.F. Müller, 1776) | 2008 | Sc | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Micronereis variegata</i> | Claparède, 1863 | 2008 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Neanthes acuminata</i> | (Ehlers, 1868) | 1969 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Neanthes fucata</i> | (Savigny, 1822) | 2008 | Sc | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Neanthes nibila</i> | (Savigny, 1822) | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Nereis funchalensis</i> | (Langerhans, 1880) | 1928 | | eamr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Nereis rava</i> | Ehlers, 1868 | 1928 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Nereis splendida</i> | Grube, 1840 | 1928 | | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Nereis zonata</i> | Malmgren, 1867 | 1928 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Perinereis cultrifera</i> | (Grube, 1840) | 1928 | | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Perinereis macropus</i> | (Claparède, 1870) | 1928 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Perinereis oliveirae</i> | (Horst, 1889) | 2008 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Perinereis tenuisetis</i> | (Fauvel, 1915) | 1928 | | e | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Platynereis coccinea</i> | (Delle Chiaje, 1822) | 2008 | | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Platynereis dumerilii</i> | (Audouin & Milne Edwards, 1833) | 1928 | | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Websterinereis glauca</i> | (Claparède, 1870) | 1928 | | eamr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Arabella geniculata</i> | (Claparède, 1868) | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Arabella tricolor</i> | (Montagu, 1804) | 1969 | Sc | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Driloneis flum</i> | (Claparède, 1868) | 1969 | | emr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Halia parthenopeia</i> | (Delle Chiaje, 1828) | 2008 | | emip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Notocirrus scoiticus</i> | McIntosh, 1869 | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aponuphis bilineata</i> | (Baird, 1870) | 1970 | Sc | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aponuphis brementii</i> | (Fauvel, 1916) | 2008 | Sc | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Diopatra neapolitana</i> | Delle Chiaje, 1841 | 1969 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Hyalinoecia tubicola</i> | (O.F. Müller, 1776) | 1963 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Nothria conchylega</i> | (Sars, 1835) | 2008 | Sc | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Onuphis eremita</i> | Audouin & Milne Edwards, 1833 | 1969 | Sc | emr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paradiopatra quadricuspis</i> | (M. Sars in G.O. Sars, 1872) | 1969 | Qs | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Rhampobrachium (Spinigerium) brevibrachiatum</i> | (Ehlers, 1875) | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Armandia cirrhosa</i> | Filippi, 1861 | 1928 | | emr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Armandia polyopthalma</i> | Kükenthal, 1887 | 1969 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ophelia amoureuxi</i> | Bellán & Costa, 1987 | 2008 | | e | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ophelia barquii</i> | Fauvel, 1927 | 2008 | | e | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ophelia bicornis</i> | Savigny, 1822 | 2010 | Sc | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ophelia neglecta</i> | Schneider, 1892 | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ophelia radata</i> | (Delle Chiaje, 1828) | 2008 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ophelia roscoffensis</i> | Augener, 1910 | 1970 | | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ophelina acuminata</i> | Ørsted, 1843 | 2008 | Sc | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Polyopthalma pictus</i> | (Dujardin, 1839) | 1928 | | eamrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

Continued

Table 1 continued

| Species | Authority | Year Of re- cord | Status | G | SI | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|-----------------------------------|------------------------|--------|---|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|
| | | | | | | | | | | | | | | | | | | | | | |
| <i>Naineris laevigata</i> | (Grube, 1855) | 1969 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Orbinia latreillii</i> | (Audouin & H Milne Edwards, 1833) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Orbinia sertulata</i> | (Savigny, 1822) | 2008 | eamip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Phylofoetida</i> | (Claparède, 1868) | 1969 | emip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Phylofoetida ligustica</i> | (Orlandi, 1896) | 1927 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Phylo grubei</i> | (McIntosh, 1910) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Phylo norvegicus</i> | (M. Sars in G.O. Sars, 1872) | 2008 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Protoaricia oerstedii</i> | (Claparède, 1864) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Scoloplos (Leodamas) chevalieri</i> | (Fauvel, 1902) | 2008 | amr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Scoloplos armiger</i> | (Müller, 1776) | 1969 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Scoloplos typicus</i> | (Eisig, 1914) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Galathowenia oculata</i> | (Zachs, 1923) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Myriochele heeri</i> | Malmgren, 1867 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Ovonia fusiformis</i> | Delle Chiaje, 1844 | 1969 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paralacydonia paradoxa</i> | Fauvel, 1913 | 2008 | eamip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Acmira) assimilis</i> | Tebble, 1959 | 2008 | amip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Acmira) catherinae</i> | Laubier, 1967 | 2008 | emip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Acmira) cerrutii</i> | Laubier, 1966 | 2008 | emr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Acmira) lopezi</i> | Berkeley & Berkeley, 1956 | 2008 | am | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Acmira) simonae</i> | Laubier & Ramos, 1974 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Aricidea) capensis barsei</i> | Laubier & Ramos, 1974 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Aricidea) fragilis</i> | Webster, 1879 | 2008 | amip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Aricidea) pseudoarticulata</i> | Hobson, 1972 | 2008 | emip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Strelzovia) claudiae</i> | Laubier, 1967 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Strelzovia) mediterranea</i> | (Laubier & Ramos, 1974) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Strelzovia) pseudannae</i> | Katzmann & Laubier, 1975 | 2008 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea (Strelzovia) suecica meridionalis</i> | Laubier & Ramos, 1974 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea amnae</i> | Laubier, 1967 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Aricidea neosuecica</i> | Hartman, 1965 | 2010 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Cirrophorus branchiatus</i> | Ehlers, 1908 | 2008 | emrip | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Levinsenia gracilis</i> | (Tauber, 1879) | 2008 | c | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paradoneis armata</i> | Glémarec, 1966 | 2008 | emr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paradoneis harpagonea</i> | (Storch, 1967) | 2008 | emr | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paradoneis lyra</i> | (Southern, 1914) | 1969 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paraonides neapolitana</i> | (Cerruti, 1909) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paraonius fulgens</i> | (Levinsen, 1884) | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paraonius paucibranchiata</i> | Cerruti, 1909 | 2008 | e | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Paraonius tenera</i> | Grube, 1873 | 2008 | e | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Amphitene auricoma</i> | (O.F. Müller, 1776) | 1969 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Lagis koreni</i> | Malmgren, 1866 | 2008 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Pectinaria belgica</i> | (Pallas, 1766) | 2008 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Petta pusilla</i> | Malmgren, 1866 | 1970 | eam | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| <i>Pholoe inornata</i> | Johnston, 1839 | 2008 | em | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |

Continued

Table 1 continued

| Species | Authority | Year Of re- cord | Status | G | SI | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
|-------------------------------------|---|------------------------|--------|-------|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|------|
| | | | | | | | | | | | | | | | | | | | | | | Year |
| Pontodoridae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pontodora pelagica</i> | Greiff, 1879 | 1886 | | em | | | | | | | | | | | | | | | | | | |
| Protodrilidae | | | | | | | | | | | | | | | | | | | | | | |
| <i>Megadrilus purpureus</i> | (Schneider, 1868) | 2010 | | em | | | | | | | | | | | | | | | | | | |
| <i>Lygdamis muratus</i> | (Allen, 1904) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Phalacrostemma cidariophilum</i> | Marenzeller, 1895 | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Sabellaria abveolata</i> | (Linnaeus, 1767) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Sabellaria spinulosa</i> | (Leuckart, 1849) | 1969 | | eam | | | | | | | | | | | | | | | | | | |
| <i>Acromegulomma vesiculosum</i> | (Montagu, 1813) | 2010 | Qs | em | | | | | | | | | | | | | | | | | | |
| <i>Amphiglena mediterranea</i> | (Leydig, 1851) | 2008 | | e | | | | | | | | | | | | | | | | | | |
| <i>Bispira volutacornis</i> | (Montagu, 1804) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Branchioma bombyx</i> | (Dalyell, 1853) | 2008 | | c | | | | | | | | | | | | | | | | | | |
| <i>Dialyhone dumerficta</i> | (Tovar-Hernandez, Lucciano, Giangrande, 2007) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Dialyhone acustica</i> | (Claparède, 1869) | 1969 | | e | | | | | | | | | | | | | | | | | | |
| <i>Dialyhone collaris</i> | (Langerhans, 1881) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Euchone rosea</i> | Langerhans, 1884 | 1970 | | em | | | | | | | | | | | | | | | | | | |
| <i>Euchone rubrocincta</i> | (Sars, 1862) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Euratella salmacidis</i> | (Claparède, 1869) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Hypsicomus stichophthalmos</i> | (Grube, 1863) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Jasmineira caudata</i> | (Grube, 1863) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Jasmineira candela</i> | Langerhans, 1880 | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Jasmineira elegans</i> | Saint-Joseph, 1894 | 2008 | | eam | | | | | | | | | | | | | | | | | | |
| <i>Laonome kroeyeri</i> | Malmgren, 1866 | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Myxicola aesthetica</i> | (Claparède, 1870) | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Myxicola infundibulum</i> | (Montagu, 1808) | 2008 | Sc | eam | | | | | | | | | | | | | | | | | | |
| <i>Notaulax phaeotaenia</i> | (Schmarda, 1861) | 2008 | | enrip | | | | | | | | | | | | | | | | | | |
| <i>Amphicorinaarmandi</i> | (Claparède, 1864) | 2008 | Qs | emr | | | | | | | | | | | | | | | | | | |
| <i>Pseudopotamilla reniformis</i> | (Bruguière, 1789) | 2008 | | eamip | | | | | | | | | | | | | | | | | | |
| <i>Sabella discifera</i> | Grube, 1874 | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Sabella pavonina</i> | Savigny, 1822 | 2008 | | em | | | | | | | | | | | | | | | | | | |
| <i>Sabella spallanzanii</i> | (Gmelin, 1791) | 2008 | | eamip | | | | | | | | | | | | | | | | | | |
| Scalibregma- | | | | | | | | | | | | | | | | | | | | | | |
| <i>Asclerocheilus intermedius</i> | (Saint-Joseph, 1894) | 2010 | | em | | | | | | | | | | | | | | | | | | |
| <i>Scalibregma inflatum</i> | Rathke, 1843 | 2008 | Sc | emr | | | | | | | | | | | | | | | | | | |
| <i>Sclerocheilus minutus</i> | Grube, 1863 | 1928 | | em | | | | | | | | | | | | | | | | | | |

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Table 1 continued

| Species | Authority | Year Of re- cord | Status | G | S1 | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
|-----------------------------------|---|------------------------|--------|---|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|---|
| <i>Apomatus similis</i> | Marion & Bobretzky, 1875 | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | |
| <i>Ditropa arietina</i> | (O. F. Müller, 1776) | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | |
| <i>Ficopomatus enigmaticus</i> | (Fauvel, 1923) | 2010 | eamip | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Hydroides dianthus</i> | (Verrill, 1873) | 2008 | eamip | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Hydroides dirampha</i> | Mörch, 1863 | 2008 | c | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Hydroides elegans</i> | (Haswell, 1883) | 2008 | c | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Hydroides norvegica</i> | Gunnerus, 1768 | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Hydroides pseudouncinata</i> | Zibrowius, 1968 [original] | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Metavermilia multicristata</i> | (Philippi, 1844) | 1927 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Placostegus tridentatus</i> | (Fabricius, 1779) | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Protula intestinum</i> | (Lamarck, 1818) | 2010 | emip | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Protula tubularia</i> | (Montagu, 1803) | 2010 | c | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Salmacina dysteri</i> | (Huxley, 1855) | 2008 | emr | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Salmacina incrustans</i> | Claparède, 1870 | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Semivermilia agglutinata</i> | (Marenzeller, 1893) | 1927 | emr | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Semivermilia crenata</i> | (O. G. Costa, 1861) | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Serpula concharum</i> | Langerhans, 1880 | 2010 | eamr | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Serpula lobiancoi</i> | Rioja, 1917 | 2008 | emr | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Serpula vermicularis</i> | Linnaeus, 1767 | 1928 | c | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Spiraserpula massiliensis</i> | (Zibrowius, 1968) | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Spirobranchus lamarecki</i> | (Quatrefages, 1866) | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Spirobranchus triquetter</i> | (Linnaeus, 1758) | 2008 | eamr | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Vermiliopsis infundibulum</i> | (Philippi, 1844) | 2008 | c | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Vermiliopsis labiata</i> | (O. G. Costa, 1861) | 2008 | eamr | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Vermiliopsis striaticeps</i> | (Grube, 1862) | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Claparedepelogenia inclusa</i> | (Claparède, 1868) | 1923 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Euthalenessa oculata</i> | (Peters, 1854) | 1970 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Fimbriosthenelais minor</i> | (Pruvot & Racovitza, 1895) | 1970 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Labioleanira yhleni</i> | (Malmgren, 1867) | 2008 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Leanira hystrix</i> | Ehlers, 1874 | 2008 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Neoleanira tetragona</i> | (Ørsted, 1845) | 2008 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Pelogenia arenosa</i> | (Delle Chiaje, 1830) | 1969 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Pholoides dorsipapillatus</i> | (Marenzeller, 1893) | 2008 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Pisione remota</i> | (Southern, 1914) | 1970 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Sigalion mathildae</i> | Audouin & Milne Edwards in Cuvier, 1830 | 2008 | emr | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Sigalion squamosus</i> | Delle Chiaje, 1830 | 1970 | eam | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Sithenelais boa</i> | (Johnston, 1833) | 1969 | emr | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Sithenelais limicola</i> | (Ehlers, 1864) | 1970 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Ephesiella abyssorum</i> | (Hansen, 1878) | 2008 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Sphaerodoridium claparedii</i> | (Greeff, 1866) | 2010 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Sphaerodoridium minutum</i> | (Webster & Benedict, 1887) | 2008 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Sphaerodorium gracilis</i> | (Rathke, 1843) | 2008 | em | | | | | | + | + | | | | + | | | | | | | | + |
| <i>Spintheridae</i> | <i>Spinther arcticus</i> | 2008 | em | | | | | | + | + | | | | + | | | | | | | | + |

Continued

Table 1 continued

| | | Year | Year | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|---|--------------------------------|--------------------|--------|--------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|---|--|
| | Species | Authority | Of re- cord | Status | G | SI | S2 | S3 | S4 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | | |
| Syllidae | <i>Syllis vivipara</i> | Krohn, 1869 | 2008 | | em | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Symmerosyllis lamelligera</i> | (Saint-Joseph, 1886) | 2010 | | eam | | | | | | | | | | | | | | | | | | | |
| | <i>Trypanosyllis (Trypanosyllis) coeliaca</i> | Claparède, 1868 | 1928 | | eam | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Trypanosyllis zebra</i> | (Grube, 1860) | 1928 | Sc | c | | | | | | | | | | | | | | | | | | | |
| | <i>Virchowia clavata</i> | Langerhans, 1879 | 1886 | | em | | | | | | | | | | | | | | | | | | | |
| | <i>Amphitrite cirrata</i> | Müller, 1776 | 2008 | | eam | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Amphitrite rubra</i> | (Risso, 1826) | 2008 | | em | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Amphitrite variabilis</i> | (Risso, 1826) | 1970 | | c | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Amphitritides gracilis</i> | (Grube, 1860) | 2008 | | em | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Eupolymnia nebulosa</i> | (Montagu, 1819) | 2008 | | eamrip | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Eupolymnia nesidensis</i> | (Delle Chiaje, 1828) | 2008 | | eam | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Lanice conchilega</i> | (Pallas, 1766) | 1969 | | c | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Lysilla loveni</i> | Malmgren, 1866 | 2008 | | em | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Neoamphitrite affinis</i> | (Malmgren, 1866) | 2010 | | em | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Neoamphitrite edwardsi</i> | (Quatrefages, 1865) | 2008 | | em | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Neoamphitrite figulus</i> | (Dalyell, 1853) | 2008 | | eam | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Nicolea venustula</i> | (Montagu, 1819) | 1970 | | em | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Nicolea zostericola</i> | (Ørsted, 1844) | 2008 | | em | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | Terebellidae | | | | | | | | | | | | | | | | | | | | | | | |
| | | <i>Pista cretacea</i> | (Grube, 1860) | 2008 | | em | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | | <i>Pista cristata</i> | (Müller, 1776) | 1969 | | c | | | | | | | | | | | | | | | | | | |
| | | <i>Pista maculata</i> | (Dalyell, 1853) | 2008 | | eam | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | | <i>Pista unibranchia</i> | Day, 1963 | 2008 | NIS | enrip | | | | | | | | | | | | | | | | | | |
| | | <i>Polycirrus aurantiacus</i> | Grube, 1860 | 2008 | | eam | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | | <i>Polycirrus denticulatus</i> | Saint-Joseph, 1894 | 2008 | | em | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | | <i>Polycirrus haematodes</i> | (Claparède, 1864) | 2008 | | em | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | |
| | <i>Polycirrus medusa</i> | Grube, 1850 | 2008 | | em | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Proclea graffi</i> | (Langerhans, 1884) | 2008 | | em | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Sireblosoma bairdi</i> | (Malmgren, 1866) | 2008 | | eam | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Terebella lapidaria</i> | Linnaeus, 1767 | 2008 | | emr | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Thelepus cinctatus</i> | (Fabricius, 1780) | 2008 | | eam | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Thelepus setosus</i> | (Quatrefages, 1866) | 2008 | | enrip | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Thelepus triseriatis</i> | (Grube, 1855) | 1927 | | enrip | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| Tomopteridae | | | | | | | | | | | | | | | | | | | | | | | | |
| | <i>Tomopteris (Johnstonella) levipes</i> | (Greeff, 1879) | 1886 | | eam | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Tomopteris (Johnstonella) pacifica</i> | (Izuka, 1914) | 1886 | | eam | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| Travisiidae | | | | | | | | | | | | | | | | | | | | | | | | |
| | <i>Travisia forbesii</i> | Johnston, 1840 | 2010 | | em | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| Trichobranchiidae | | | | | | | | | | | | | | | | | | | | | | | | |
| | <i>Octobranchus lingulatus</i> | (Grube, 1863) | 2008 | | em | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Terebellides stroemii</i> | Sars, 1835 | 1927 | Qs&Sc | eamrip | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | <i>Trichobranchus glacialis</i> | Malmgren, 1866 | 2008 | | eam | | | | | + | + | + | + | + | + | + | + | + | + | + | + | + | | |
| | Total number of species | | | | | 371 | 430 | 300 | 195 | 216 | 492 | 180 | 507 | 534 | 406 | 305 | 462 | 488 | 189 | 348 | 110 | 151 | | |

(www.marinespecies.org; accessed on 25 January 2019). Comments are added for any questionable species present in either Algerian and Mediterranean waters. Uncertainty arose mainly for species complexes belonging to the Cirratulidae and Spionidae families.

In the current study, an abundant literature was consulted before attributing a status to each Algerian polychaete species (Çinar, 2003, 2005, 2009, 2013; Çinar & Ergen, 2003; Çinar *et al.*, 2003, 2014; Zenetos *et al.*, 2005, 2010, 2011, 2012, 2017; Gravili *et al.*, 2010; Gil, 2011; Occhipinti-Ambrogi *et al.*, 2011; Evagelopoulos *et al.*, 2015; Corriero *et al.*, 2016; Galil *et al.*, 2016; Ounifi-Ben Amor *et al.*, 2016; Faulwetter *et al.*, 2017; López & Richter, 2017).

To specify the status of a species found in Algerian waters, it was classified into one of three groups as proposed by Zenetos *et al.* (2011) and used by Faulwetter *et al.* (2017): Non-Indigenous Species (NIS), Questionable Species (Qs) and Species Complexes.

“Questionable species” are defined as either those reported as found in Algerian waters but whose presence still needs to be confirmed, or those, which have an unresolved taxonomic status. In this study, if records of any species are in doubt, they are not automatically classified as NIS if they have never been previously reported as NIS anywhere else in the Mediterranean. On the other hand, species already reported as NIS from other studies in the Mediterranean Sea but which still retain a questionable status, are listed as “NIS Questionable” to highlight this unresolved matter in the case of further assessments.

Species complexes correspond to those species known to form a complex of cryptic (morphologically indistinguishable but genetically different) or pseudo-cryptic (morphologically very similar) species (Nygren & Pleijel, 2011). The term ‘Species complex’ indicates that the name has been applied to a species as defined above.

Geographical patterns of polychaetes from the Algerian coasts

The distribution of the 534 polychaete species found in Algerian waters is categorised taking into account the distinct geographical areas of the Mediterranean and related maritime regions as proposed by Coll *et al.* (2010) and modified by Bakalem *et al.* (2020). These are, 1: African Atlantic Coast (from Cap Spartel to Cap Blanc); 2: North-Eastern Atlantic European waters; 3: Alboran Sea; 4: North-Western Mediterranean; 5: Algeria South-Western Mediterranean; 6: Ionian Sea; 7: Tunisian shelf and Libya; 8: Adriatic Sea; 9: Aegean Sea; 10: Black Sea; 11: Levantine Sea; 12: Red Sea and 13: Indo-Pacific oceans.

Each polychaete species found on the Algerian coast, is classified as one of fifteen groups reflecting their geographical origin (Bakalem *et al.*, 2020): eam (Mediterranean, European and African Atlantic species); em (Mediterranean and European Atlantic species); am (Mediterranean and African Atlantic coast species); e (endemic species); c (cosmopolitan species); emr (Mediterranean, European Atlantic and Red Sea species); emip (Mediterranean, European Atlantic and Indo-Pacific species); amr (African Atlantic, Mediterranean and Red Sea species); amip (African Atlantic, Mediterranean and Indo-Pacific species); mip (Mediterranean and Indo-Pacific species); emrip (European Atlantic, Mediterranean, Red Sea and Indo-Pacific species); eamrip (European and African Atlantic, Mediterranean, Red Sea and Indo-Pacific species); eamip (European and African Atlantic, Mediterranean and Indo-Pacific species); eamr (European and African Atlantic, Mediterranean and Red Sea species) and mrip (Mediterranean, Red Sea and Indo-Pacific species).

Hierarchical Cluster Analysis (HCA) based on Sorensen’s coefficient for the presence/absence of the species found in each of the four sectors of the Algerian coast and in the 13 geographical areas was carried out along with the construction of a dendrogram using the group average algorithm generated from the PRIMER V6 software (Clarke & Gorley, 2006).

Results

List of species

Studies on the presence of polychaetes along the Algerian coasts have been sporadic. Viguiet (1886, 1911, 1912, 1920) and later, Gravier & Dantan (1928), all collected pelagic species from the Bay of Algiers, whilst Fauvel (1923, 1927a,b) focused on benthic species in the waters surrounding Algiers and Annaba. These focused studies only found a small number of polychaete families and species: between 8 and 18 families covering 25 to 69 species. More recently, Le Gall (1969) and Falconetti (1970) studied the Phanerogam meadows and maërl community respectively, (located in the Bay of Bou Ismail), and reported between them a total of 27 families and 72 species.

The present inventory of polychaete species is mainly compiled from data collected in three successive periods: the first was from 1886 to 1928, (leading to 28 families and 96 species), the second from 1963 to 1970, (leading to 44 families and 196 species), and finally from 1975 to 2010, (leading to the final list with 58 families and 534 species). During these three periods, the number of recorded species increased from 96 to 534. The PhD theses of Bakalem (2008) and Grimes (2010), which together, covered most of the soft-bottom habitats in the gulfs, bays and harbours along the Algerian coasts, listed the greatest numbers of polychaetes with 54 and 51 families and 444 and 506 species, respectively. It is noteworthy that there were no studies reporting new polychaetes between 1928 and 1963, and none have taken place since 2011.

The Syllidae (66 species representing 12% of the total diversity) is the most diversified family, followed by the Spionidae (37 species, 7%), the Terebellidae (27 species, 5%), the Serpulidae (25 species, 4.5%), the Polynoidae (24 species, 4.5%), the Sabellidae (23 species, 4%) and the Paraonidae (23 species, 4%).

Ten families (each with more than 20 species) account

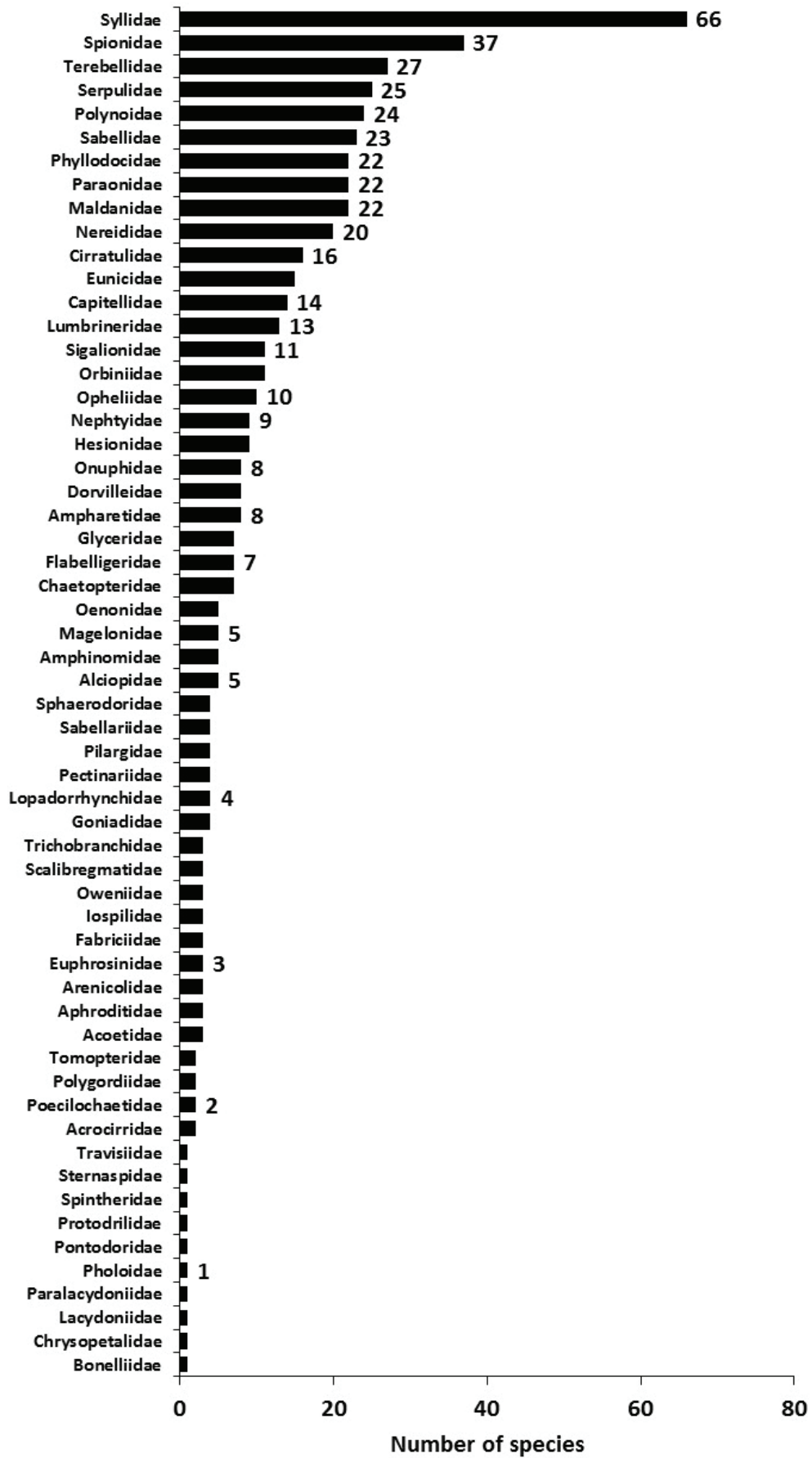


Fig. 2: Number of polychaete species per family classified by decreasing number of species.

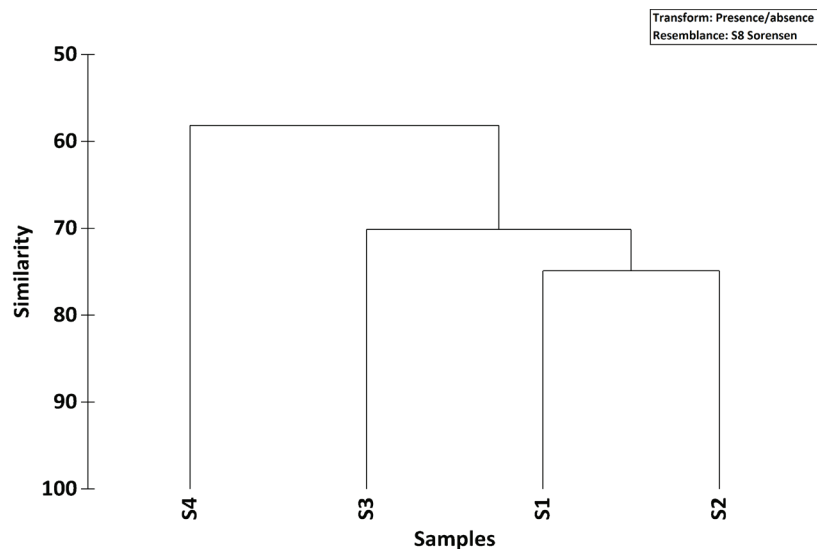


Fig. 3: Results of cluster analysis (Sørensen similarity) on the presence and absence of species, in the four defined sectors (S1 to S4 see Fig. 1) along the Algerian coast.

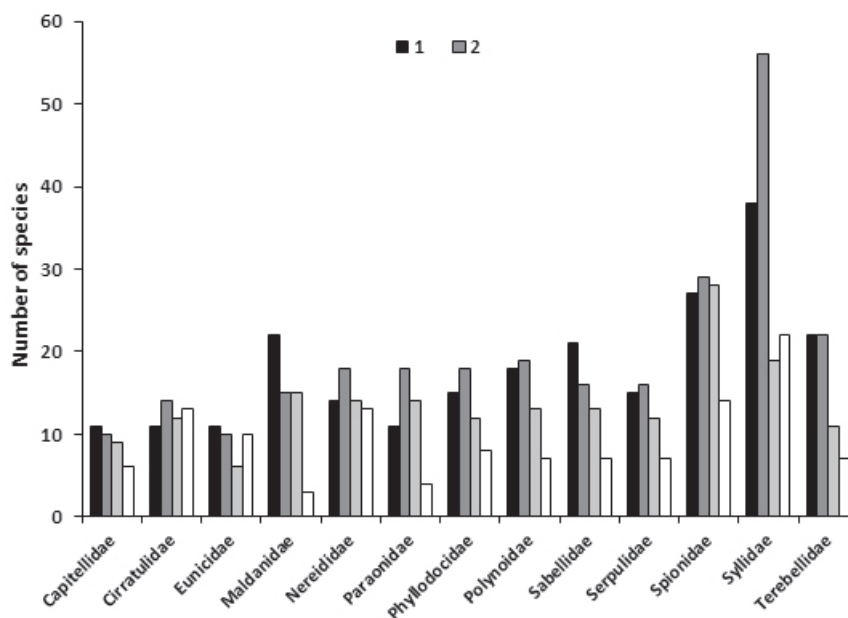


Fig. 4: Number of species present of the ten most diversified families in the four defined sectors (see Fig. 1) along the Algerian coast.

for 55% of polychaetes diversity (Fig. 2); seven families are contain between 10 and 20 species, whilst most of the remaining families (41) have fewer than 10 species; moreover, ten families are only represented by a single species (Fig. 2).

Out of the 534 species reported, 22 are planktonic, including five families with a strictly pelagic life style: Alciopidae (5 species), Lopadorhynchidae (4), Iosipilidae (3), Tomopteridae (2) and Pontodoridae (1). Five species, two of *Ancistrosyllis* (Pilargidae), two of Polynoidae and one Nereididae belonging to families of benthic polychaetes are all pelagic.

The previously defined geographical sector 2 was found to be the richest in terms of polychaete diversity with 56 families and 430 species (representing 81% of the total recorded species). Sector 1 with 48 families (371

species, 69%) supported the second largest diversity. The eastern sectors were relatively poorer in terms of diversity with 49 families (300 species, 56%) in sector 3 and 40 families (195 species, 37%) in sector 4. Figure 3 compares the similarities between the four sectors; sector 4 is very different from the three other sectors, whilst sectors 1 and 2 (in the western and central parts, which display the richest diversity), also show the greatest similarity. Families are represented by a similar number of species in all except sector 3 where the family of Syllidae is more diversified (Fig. 4).

Questionable species (Qs) and species complexes

Among the 534 species recorded along the Algerian coast, 45 correspond to the status “questionable species” and 38 are considered nowadays to be species complexes, these numbers respectively 8 and 6.5% of the total richness amongst the polychaete (Table 1). Further data will be required to confirm their presence in Algerian waters. It should be noted that most of these species have already been previously reported in other polychaete inventories (e.g., Faulwetter *et al.*, 2017).

The following taxa are classified as both questionable species and species complex: *Axiothella rubrocincta* (Johnson, 1901), *Capitella capitata* (Fabricius, 1780), *Chaetozone setosa* Malmgren, 1867, *Laonice cirrata* (M. Sars, 1851), *Lepidonotus squamatus* (Linnaeus, 1758), *Phyllodoce groenlandica* Örsted, 1842, *Protocirrinieris chrysoderma*, (Claparède, 1868), and *Terebellides stroemii* Sars, 1835.

Ampharete acutifrons (Grube, 1860) may have been confused with *Ampharete lindstroemi* Hessle, 1917 in the Mediterranean Sea (Mikac, 2015) and in samples found in Algerian waters. It forms a species complex in its North Atlantic and Pacific distributions (Faulwetter *et al.*, 2017). *Ampharete grubei* Malmgren, 1865 is often reported as *A. acutifrons*, which is also present in Greek waters (Faulwetter *et al.*, 2017).

The specimens reported as *Chaetozone setosa* Malmgren, 1867 in the Mediterranean Sea and along the Algerian coast, corresponds to several possible species such as *Chaetozone gibber* Woodham & Chambers,

1994, *Chaetozone corona* Berkeley & Berkeley, 1941 or *Chaetozone carpenteri* McIntosh, 1911: it probably does not exist in the Mediterranean Sea (Çinar & Ergen, 2007; Faulwetter *et al.*, 2017).

Specimens of polychaetes from the Mediterranean previously named as *Terebellides stroemii* almost certainly belong to different species including *Terebellides gracilis* (Malm, 1874) and *Terebellides mediterranea* Parapar, Mikac and Fiege, 2013 (Faulwetter *et al.*, 2017).

Non-Indigenous Species (NIS)

Out of the 534 species reported along the Algerian coast, eight have the status NIS in the Mediterranean Sea: *Aricidea (Aricidea) fragilis* (Webster, 1879), *Ficopomatus enigmaticus* (Fauvel, 1923), *Hydroides dirampha* Mörch, 1863 and *H. elegans* (Haswell, 1883), *Lumbrineris perkinsi* Carrera-Parra, 2001, *Metasychis gotoi* (Izuka, 1902), *Notomastus aberans* Day, 1957 and *Pista unibranchia* Day, 1963.

Seven species found along the Algerian coast were reported in the list compiled by Zenetos *et al.* (2017). They were *Ficopomatus enigmaticus* (Fauvel, 1923), *Hydroides dirampha* Mörch, 1863 and *H. elegans* (Haswell, 1883), *Lumbrineris perkinsi* Carrera-Parra, 2001, *Metasychis gotoi* (Izuka, 1902), *Pista unibranchia* Day, 1963, and *Notomastus aberans* Day, 1957. *Aricidea (Aricidea) fragilis* (Webster, 1879) was a typically west-Atlantic species. It was present in the Adriatic and Tyrrhenian seas and in the Strait of Sicily (Langeneck *et al.*, 2018). The

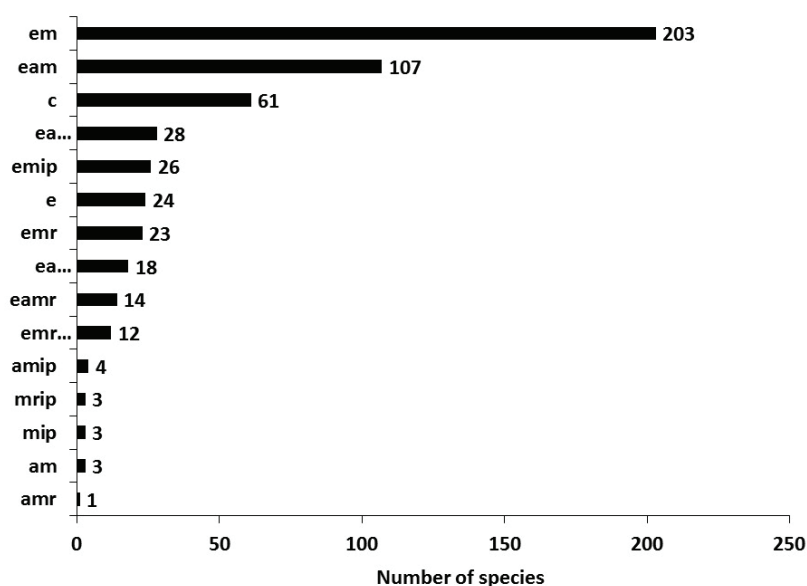


Fig. 5: Number of species present in the different geographical groups. Legend: amr: African Atlantic, Mediterranean and Red Sea species, amip: African Atlantic, Mediterranean and Indo-Pacific species, mip: Mediterranean and Indo-Pacific species, mrip: Mediterranean, Red Sea and Indo-Pacific species, am: Mediterranean and African Atlantic species, emrip: European Atlantic, Mediterranean, Red Sea and Indo-Pacific species, eamr: European Atlantic, African Atlantic, Mediterranean and Red Sea species, eamrip: European Atlantic, African Atlantic, Mediterranean, Red Sea and Indo-Pacific species, emr: European Atlantic, Mediterranean and Red Sea species, eamip: European Atlantic, African Atlantic, Mediterranean and Indo-Pacific species, emip: European Atlantic, Mediterranean and Indo-Pacific species, e: endemic species, c: cosmopolitan species, eam: European Atlantic, Mediterranean and African Atlantic species, em: European Atlantic and Mediterranean species.

status of NIS is also given for this species present along the Algerian coast.

Geographical patterns of Polychaetes of the Algerian coasts

Most of the Polychaetes found in Algerian waters have an Atlantic-Mediterranean origin (315 species, 50% of the total number recorded). 203 species (38%) are common to the Mediterranean Sea and the North-Eastern Atlantic coast, whereas 107 species (20%) are common to the Mediterranean Sea, the North-Eastern Atlantic and African Atlantic coast and only three species share a Mediterranean and African Atlantic distribution (Fig. 5). The cosmopolitan species (61) and endemic species (24) make up 11.5 and 5% of all species respectively. 122 species (23% of the total) show a wide distribution across the North-Eastern Atlantic Ocean, the Mediterranean and Red Seas as well as being found in the Indo-Pacific region. Only six species (1%) share a Mediterranean, Red Sea and Indo-Pacific distribution.

A total of 492 species from the European Atlantic Ocean and 507 from the North-Western Mediterranean Sea were reported as found along the Algerian coast; these species make up 92 and 95% respectively of the total inventory. The Aegean and Adriatic Seas have a high number of polychaete species in common with the Algerian coasts, respectively 488 (91%) and 462 (86%) species, whereas a significant number are in common with the Ionian Sea (406 species and 76%), the Levantine Sea (348 species, 66%) and with the Tunisian shelf extending to Libya (305 species, 57%). By contrast, the Alboran Sea (180 species, 34%) and the Black Sea (189 species, 35%) both share a relatively low number common of species with the Algerian coast. The number of species shared between the Algerian coast and the Red Sea (110 species, 21%) and the Indo-Pacific (151 species, 28%) was low.

The geographical distributions of the 534 species recorded from the Algerian coast (Table 1) are compared with their presence in 12 other geographical areas. Differences were analysed using the Sorensen coefficient (Fig. 6). The dendrogram showing the Sorensen similarity between the 13 geographical areas suggests the division of these areas into two main groups. The first group comprises only two areas, the Red Sea (labelled 12 in Fig. 6) and the Indo-Pacific region (13) whereas the second group encompasses all the 11 other areas. Within this second group, the Alboran Sea (3), the Black Sea (10) and the African Atlantic coast (1) show the lowest level of similarities with the other areas in the same group. However, the remaining eight areas display a high level of similarity and form an distinct pattern with the Tunisian shelf and Libya (7), Levantine Sea (11), Ionian Sea (6), Adriatic Sea (8), North-Eastern Atlantic European (2), Algeria (South-Western Mediterranean) (5), North-Western Mediterranean (4) and Aegean Sea (9). The highest similarities (>90%) are found between the North-Eastern Atlantic European waters (2) and the Algerian south-western Mediterranean (5) and also between the North-Western Mediterranean (4) and the Aegean Sea (9) (Fig. 6).

Discussion

The estimated total number of polychaete species varies depending on the author (Arvanitidis *et al.*, 2002; Coll *et al.*, 2010); the most recent census of polychaete species for the Mediterranean Sea is that of Faulwetter *et al.* (2017) who recorded 1,105 species. With 534 species, the polychaetes of the Algerian coasts represent 48% of the polychaete fauna found in the Mediterranean Sea and this diversity is appreciable in comparison with those noted in other areas of the Mediterranean Sea (Table 2).

However, the inventory of Faulwetter *et al.* (2017) do

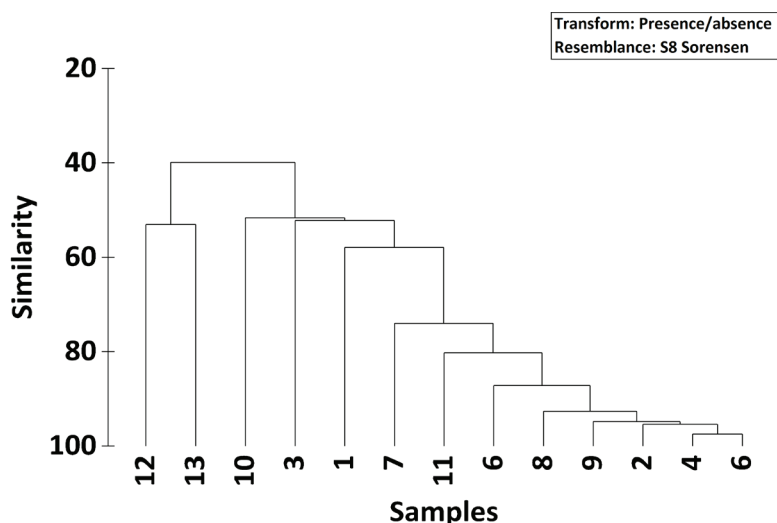


Fig. 6: Results of cluster analysis (Sørensen similarity) on the species presence and absence in 13 geographical regions. 1: African Atlantic Coast (from Cap Spartel to Cap Blanc); 2: North-Eastern Atlantic European waters; 3: Alboran Sea; 4: North-Western Mediterranean; 5: Algerian South-Western Mediterranean; 6: Ionian Sea; 7: Tunisian Shelf and Libya coastline; 8: Adriatic Sea; 9: Aegean Sea; 10: Black Sea; 11: Levantine Sea; 12: Red Sea and 13: Indo-Pacific Oceans.

Table 2. Comparison of inventories of polychaetes species found in different areas of the Mediterranean Sea.

| Author (s) | Areas | Species | Comments |
|--------------------------------------|--|------------|---|
| Arvanitidis <i>et al.</i> , 2002 | Mediterranean and Black seas | 1,036 | All species recorded including questionable species |
| Coll <i>et al.</i> , 2010 | Mediterranean Sea | 1,122 | Few data in the southern part of the Mediterranean Sea |
| Faulwetter <i>et al.</i> , 2017 | Mediterranean Sea | 1,105 | Number standardised to currently accepted names in 2017 |
| Gillet, 2017 | Morocco (Atlantic and Mediterranean) | 321 | Continental shelf species |
| Dauvin <i>et al.</i> , 2006 | Mediterranean French continental shelf | 623 | Continental shelf species |
| | Gulf of Lions | 641 | Continental and bathyal species |
| | Gulf of Lions | 487 | Continental shelf species |
| | Provence-Alpes-Côte d'Azur coast | 516 | Continental shelf species |
| | Corsica | 256 | Continental shelf species, few data around Corsica |
| Castelli <i>et al.</i> , 2008 | Italian waters | 876 | Including questionable species |
| Mikac, 2015 | Adriatic Sea | 764 | Including questionable species |
| Ayari <i>et al.</i> , 2009 | Tunisia | 289 | Few data for the southern part of the Tunisia |
| Zaâbi <i>et al.</i> , 2012 | Cap Bon Peninsula, Tunisia | 212 | North-east coast of Tunisia |
| Zaâbi <i>et al.</i> , 2012 | Tunisia | 375 | New cumulative number |
| Fersi <i>et al.</i> , in preparation | Tunisia | 443 | Indicative total number |
| Arvanitidis, 2000 | Aegean Sea | 592 | 0-1000 m, except Turkish coast |
| Simboura & Nicolaidou, 2001 | Greek waters | 753 | Census from 1891 to 2000 |
| Arvanitidis <i>et al.</i> , 2002 | Western Basin of the Mediterranean | 884 | All species recorded including questionable species |
| | Central Basin of the Mediterranean | 528 | All species recorded including questionable species |
| | Levantine Basin of the Mediterranean | 451 | All species recorded including questionable species |
| | Aegean Sea | 493 | All species recorded including questionable species |
| Faulwetter <i>et al.</i> , 2017 | Greek waters | 836 | Including 142 questionable species |
| Çinar <i>et al.</i> , 2014 | Mediterranean coasts of Turkey | 705 | Including questionable species |
| Çinar, 2005 | Cyprus waters | 456 | All species recorded including questionable species |
| Şahin & Çinar, 2012 | Black Sea | 238 | New cumulative number |
| Dorgham <i>et al.</i> , 2013 | Egyptian Mediterranean waters | 283 | Including questionable species |
| This study | Algerian waters | 534 | Species mainly found on the continental shelf |

not include 45 of the 534 Algerian species. Moreover, this value of 534 species may also be under-estimated due to: 1) the low level of study and sampling in the eastern part of the Algerian coast (sectors 3 and 4); 2) the few studies of exceptional habitats (including the phanerogams, shallow and deep hard substratum as well as coralligenous formations and the bathyal benthic zone), and 3) the absence of molecular analyses applied to those questionable species and species complexes, those Non-Native species and those species classified as “cosmopolitan”.

The richness of polychaete species along the coast of Algeria is comparable to that reported for the continental shelf of the French Mediterranean coast (Dauvin *et al.*, 2006) and also to that for the Greek part of the Aegean Sea (Arvanitidis, 2000) (Table 2). This richness is higher

than that found in bordering countries such as Morocco, with 321 species listed including the Atlantic coast of Morocco (Gillet, 2017), and Tunisia with 443 species (Ayari *et al.*, 2009; Zaâbi *et al.*, 2012). It is also higher than that observed for the Black Sea (Şahin & Çinar, 2012). Nevertheless, an even greater diversity of polychaetes have been found for Greek waters (Faulwetter *et al.*, 2017), along the Italian coast (Castelli *et al.*, 2008), in Turkish waters (Çinar *et al.*, 2014), and in the Adriatic Sea (Mikac, 2015).

In the coasts of Algeria, the families of Syllidae, Spionidae, Polynoidae, Phyllodoceidae, Terebellidae, Serpulidae and Sabellidae, account for most of the diversity, as is the case in along the French Continental shelf (Dauvin *et al.*, 2006), the Greek coasts (Faulwetter *et al.*, 2017), the

Turkish coasts (Çinar *et al.*, 2014), and Adriatic coastline (Mikac, 2015); however, in these areas, there is also the significant presence of the family Maldanidae.

The percentage of questionable species and species complexes remains high in the case of studies along the Algerian coastline (15%), but this number is lower than that given by Faulwetter *et al.* (2017) for such types of species present in Greek waters (23%).

Arvanitidis *et al.* (2002) reviewed 1,036 species of polychaetes for the Mediterranean Sea, including 41% that are considered as cosmopolitan, 29% as Atlantic-Mediterranean and 19% as endemic polychaetes. By comparison, the Mediterranean, European and African Atlantic species are dominant along the Algerian coastal waters accounting for 60%. The European Atlantic-Mediterranean species (38%) and the cosmopolitan species (12%) are the dominant groups on the Algerian coasts. The number of endemic species for Algeria is low (24 species, making up just 5% of the recorded species and indeed, lower than the values reported for other areas of the Mediterranean Sea such as the French Mediterranean coast (Dauvin *et al.*, 2006), the Greek coasts (Simboura & Nicolaidou, 2001) and the Aegean Sea (Arvanitidis *et al.*, 2002).

The close similarity between the Algerian polychaetes and those found in both the European and African coasts of the Atlantic Ocean reflects the influence of the Atlantic waters along the Moroccan coasts extending towards Tunisia in the south of the Mediterranean Sea, which is inevitably related to the connexion via the Strait of Gibraltar (Fig. 6). This same observation has previously been highlighted for all the macrobenthic species of the Algerian coasts (Dauvin *et al.*, 2013). Moreover, the polychaete fauna in Algerian waters is similar to those of the North-Western basin of the Mediterranean Sea off Spain, France and Italy (Fig. 6). Furthermore, Algerian polychaete fauna displays a great similarity to that of the Aegean Sea (both Greek and Turkish coasts), suggesting a high level of similarity of Polychaete fauna at the scale of the Mediterranean Sea. The Black Sea, due its particular physico-chemical characteristics shows little similarity in terms of polychaete fauna with the different areas of the Mediterranean Sea.

Faulwetter *et al.* (2017) pointed out that the regional lists of species inevitably reflect the research and sampling effort. He added that their reliability depends on the presence of zoological experts who are competent in the identification of polychaetes, noting that some groups or species of polychaetes can be very difficult to identify (Dauvin, 2005). The richness and geographic origin of a species in a given area can be estimated by making comparisons. Faulwetter *et al.* (2017) stressed that each inventory carried out on Polychaetes has given rise to a relatively large number of species reported in the same region. Faulwetter *et al.* (2017) go on to explain that this may be partly due by the actual geographic distribution of species and partly due to the incorrect identification of some species.

Comprehensive revisions and updated identification keys are lacking for many of the taxa studied in the Medi-

terranean yet protocols established a century ago, such as those of Fauvel (1923, 1927a), are still commonly used in many laboratories as the main tools for species identification. It is unfortunate that the level of research on Mediterranean Polychaete Fauna performed in the 1990s was not maintained to the present day. The taxonomic effort remains to be implemented and will be a challenge for polychaete experts around the world. On the other hand, British Synopses, Fauna Iberica and other publications on the taxonomy and phylogeny of polychaetes remain very useful tools for the identification of the Mediterranean polychaetes. Furthermore, molecular analysis needs to be developed to resolve the problems of cryptic and sibling polychaete species, not only for the Mediterranean Sea but also for the wider area of the North-Eastern Atlantic Ocean. The World Register of Marine Species (WoRMS) has become an indispensable tool, not only for naming existing species and problems of synonymy, but also for describing their actual geographical distribution.

The Mediterranean Sea is recognised as a rich area for biodiversity. It is also impacted on by a range of damaging factors such as habitat loss and degradation, climate change, pollution and the invasion of NIS (Coll *et al.*, 2010, 2012; Altobelli *et al.*, 2017). A regular evaluation of the marine biodiversity of target groups (such as the polychaetes) in certain target areas (such as the wide range of soft-bottom habitats in the Bay of Bou Ismail) is strongly recommended. Such monitoring activity can reveal the long-term changes in biodiversity under the increased influence of climatic and human pressures in Algerian coastal environments.

The analyses by Arvanitidis *et al.* (2002) show differences in the Mediterranean Sea between the western basin, where the polychaete studies are satisfactory, and the eastern basin where the knowledge of polychaetes remains insufficient. Furthermore, Spanish, French and Italian inventories cover the northern coasts of the western basin, whereas there is relatively sparse data for the southern coast (North Africa) of this same basin. For the central part of the Mediterranean Sea, these inventories take into account the Ionian Sea (Italy and Greece). Finally, for the eastern basin, the inventories carried out concern mostly the Aegean Sea (Ergen, 1976; Simboura, 1987; Arvanitidis, 1994, 2000), the Levantine Sea, mainly the coasts of Cyprus and Israel (Ben-Eliahu, 1972, 1991, 1995; Ben-Eliahu & Fiege, 1995, 1996; Russo, 1997), the Egyptian coasts (Abd-Elnaby, 1999; Selim, 1978, 1996) and Turkish waters (Ergen & Çinar, 1997). The data relating to these areas remain sporadic.

Since the beginning of new millennium there has been a considerable research effort on polychaetes with a great deal of effort targeted at those areas with a low level of data: Algeria (Bakalem, 2008; Grimes, 2010), Tunisia (Ayari *et al.*, 2009; Zaâbi *et al.*, 2012; Ayari *et al.*, in preparation), Greece (see Faulwetter, 2017), Turkey (see Çinar *et al.*, 2014), Cyprus (Çinar, 2005), and Egypt (Abd-Elnaby, 2008, 2009; Dorgham *et al.*, 2013, 2014). These very recent results have shown that the diversity of polychaete fauna is relatively homogenous at the scale of the whole Mediterranean Sea and that the differences between the

West and East (as noted by Arvanitidis *et al.*, 2002) may only be due to the lack of information and thus not correctly reflect the real situation. Future research using molecular analysis will be crucial to assess the representability of questionable species and species complex, which are numerous amongst the polychaete species reported.

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