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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; Simboursa & 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 20<sup>th</sup> 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

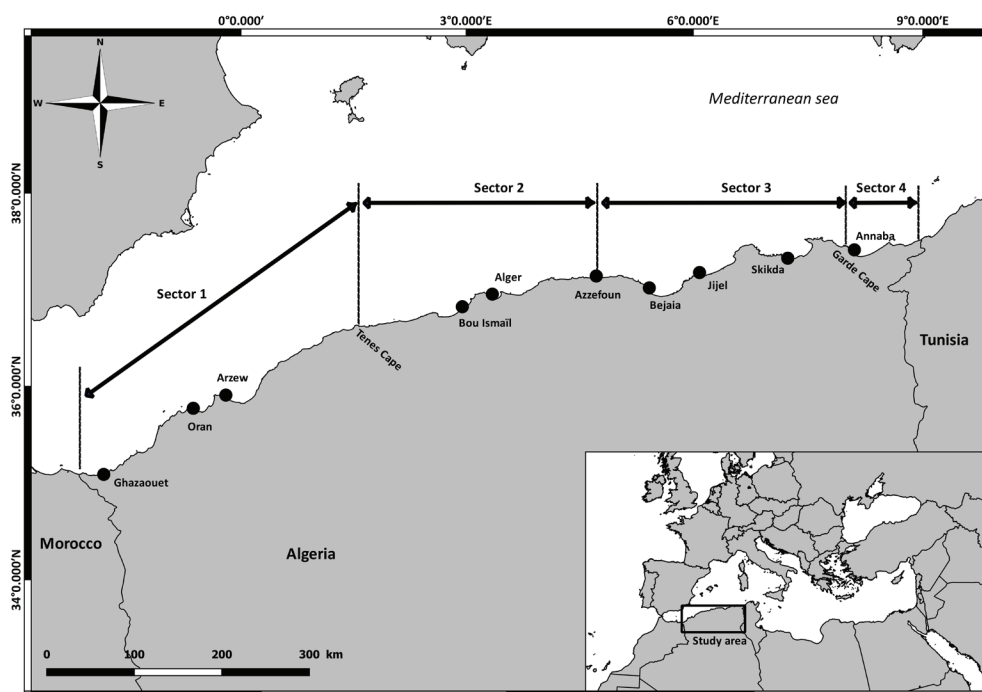


Fig. 1: Map of the Algerian coast with identification of the four study sectors with cited locations.

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

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 variopedatus</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	Sc	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Cirratulma tentaculata</i>	(Montagu, 1808)	1969		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	Qs&Sc	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	
<b>Euphrosini- dae</b>																						
<i>Euphrosine armadillo</i>	Sars, 1851	2008	eamr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euphrosine foliosa</i>	Audouin & H Milne Edwards, 1833	1928	eamrip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euphrosine myrtilis</i>	Savigny in Lamarek, 1818	2010	Qs	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Fabriciidae</b>																						
<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	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Goniadiidae</b>																						
<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>Paraisopius affinis</i>	Viguier, 1911	1920	c	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Phalacrophorus pictus</i>	Greiff, 1879	1886	eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Lacydoniidae</b>																						
<i>Lacydonia miranda</i>	Marion & Bobretzky, 1875	2008	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lopadorhynchus krohnii</i>	(Claparède, 1870)	1886	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Lopador- rhynchidae</b>																						
<i>Maupasia coeca</i>	Viguier, 1886	1923	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pedinosoma curium</i>	Reibisch, 1895	2010	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pelagobia longicirrata</i>	Greiff, 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)	1928		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>Halla 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 polyophtalma</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>Polyophtalmus 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>Orbina latreillii</i>	(Audouin & H Milne Edwards, 1833)	2008	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Orbina 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	S1	S2	S3	S4	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Eulalia bilineata</i>	(Johnston, 1840)	2008	Qs	eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Eulalia pusilla</i>	Ørstedt, 1843	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Eulalia viridis</i>	(Linnaeus, 1767)	2008	Sc	emr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Eumida punctifera</i>	(Grube, 1860)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Eumida sanguinea</i>	(Ørsted, 1843)	1928	Sc	enip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Hypereteone foliosa</i>	(Quatrefages, 1865)	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lugia pierophora</i>	(Ehlers, 1864)	1970		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Mysta picta</i>	(Quatrefages, 1866)	1969		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Mysta siphodonta</i>	(Delle Chiaje, 1830)	1969		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Mysidides borealis</i>	Théel, 1879	2008	Qs	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Nereiphylla paretii</i>	Blainville, 1828	2010		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Nereiphylla pusilla</i>	(Claparède, 1870)	1970		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Phyllocladidae</b>	(Sars, 1835)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Paranaitis kosteriensis</i>	(Malmgren, 1867)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Phyllodoce groenlandica</i>	(Orsted, 1842)	2008	Qs&Sc	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Phyllodoce lineata</i>	(Claparède, 1870)	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Phyllodoce maculata</i>	(Linnaeus, 1767)	1928		emip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Phyllodoce madeirensis</i>	Langerhans, 1880	1969	Sc	c	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Phyllodoce mucosa</i>	Ørsted, 1843	1970		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudomysidides limbata</i>	(Saint-Joseph, 1888)	1970		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pterocirrus limbatus</i>	(Claparède, 1868)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pterocirrus macroceros</i>	(Grube, 1860)	1928		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Ancistrosyllis groenlandica</i>	McIntosh, 1878	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Ancistrosyllis hamata</i>	(Hartman, 1960)	2008		mip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pitangis verrucosa</i>	Saint-Joseph, 1899	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sigambra tentaculata</i>	(Treadwell, 1941)	2008		c	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Poecilochaetidae</b>	Claparède in Ehlers, 1875	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Poecilochaetus fulgoris</i>	Allen, 1904	1928		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Poecilochaetus serpens</i>	Fraipont, 1887	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Polygordiiidae</b>	Schneider, 1868	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Polygordius appendiculatus</i>	(Delle Chiaje, 1827)	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Polygordius taceus</i>	Michaelson, 1892	2010		mip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Acholoe squamosa</i>	(M. Sars, 1861)	2008		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Drieschia pelagica</i>	Viguier, 1912	1912		e	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Eunoe nodosa</i>	Viguier, 1920	1920		e	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Frennia dubia</i>	(Pallas, 1766)	2008		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Frennia propinqua</i>	(McIntosh, 1876)	2008	Qs	eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Gaityana cirrhosa</i>	(Grube, 1876)	1970		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Harmothoe antilopes</i>	(Grube, 1860)	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Harmothoe areolata</i>	(Grube, 1840)	1970		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Harmothoe extenuata</i>	(McIntosh, 1897)	1970		emip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Harmothoe fraserthomsoni</i>	(Johnston, 1839)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Harmothoe impar</i>	(McIntosh, 1876)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Harmothoe johnstoni</i>	(Grube, 1863)	1928		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Harmothoe longisetis</i>	(Ehlers, 1864)	1969		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Harmothoe spinifera</i>	(Grube, 1840)	2008		enip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lepidasthenia elegans</i>	(Grube, 1840)	2008	Qs	enip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lepidasthenia maculata</i>	Potts, 1910	2008		enip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lepidonotus clava</i>	(Montagu, 1808)	1970		enip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Lepidonotus squamatus</i>	(Linnaeus, 1758)	1969	Qs&Sc	enip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Malmgrenia castanea</i>	McIntosh, 1876	2008		emr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Malmgrenia ljungmani</i>	(Malmgren, 1867)	1970		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Malmgrenia tumulata</i>	(Delle Chiaje, 1830)	1969		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Polyoe scolopendrina</i>	Savigny, 1822	1970		eamr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Subadyte pellucida</i>	(Ehlers, 1864)	1970		enip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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	
<b>Pontodoridae</b>																						
<i>Pontodora pelagica</i>	Greiff, 1879	1886		em																		
<b>Protodrilidae</b>																						
<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 kroyeri</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		emr																		
<i>Pseudopotamilla reniformis</i>	(Bruguière, 1789)	2008	Qs	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																		
<b>Scalibregma-</b>																						
<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																		

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>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 ditanthus</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	eamip						+	+												
<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	emip						+	+												
<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						+	+												
	(M. Sars, 1851)	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
<i>Aonides oxycephala</i>	(Sars, 1862)	1969		emip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Aonides paucibranchiata</i>	Southern, 1914	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Aurospio banyulensis</i>	(Laubier, 1966)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Bocardia polybranchia</i>	(Haswell, 1885)	2008		c	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Boccardiella ligerica</i>	(Feronnière, 1898)	2010		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Dipolydora armata</i>	(Langerhans, 1880)	2008		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Dipolydora coeca</i>	(Orsted, 1843)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Dipolydora flava</i>	(Claparède, 1870)	2008		c	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Dipolydora giardi</i>	(Mesnil, 1893)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Dipolydora quadrilobata</i>	(Jacobi, 1883)	2010		emip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Laonice cirrata</i>	(M. Sars, 1851)	1927	Qs&Sc	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Malacoceeros fuliginosus</i>	(Claparède, 1868)	1969	Sc	eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Malacoceeros girardi</i>	Quatreffages, 1843	1969		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Malacoceeros tetracerus</i>	(Schmarda, 1861)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Microspio mecznikowianus</i>	(Claparède, 1869)	1969		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Paraprionospio pinnata</i>	(Ehlers, 1901)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Polydora ciliata</i>	(Johnston, 1838)	2008	Sc	c	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Polydora hoplura</i>	(Claparède, 1868)	2008		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Prionospio caspersi</i>	(Laubier, 1962)	2008		e	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Prionospio cirrifera</i>	Wirén, 1883	1928	Qs	emr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Prionospio decipiens</i>	Söderström, 1920	2010	Qs	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Prionospio ehlersi</i>	Fauvel, 1928	2008		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Prionospio fallax</i>	(Claparède, 1869)	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Prionospio steenstrupi</i>	Malmgren, 1867	2008	Qs	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudopolydora antennata</i>	(Claparède, 1869)	1969		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pygospio elegans</i>	(Claparède, 1863)	2008	Sc	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Scolecopsis (Parascolecopsis) tridentata</i>	(Southern, 1914)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Scolecopsis (Scolecopsis) cantabra</i>	(Rioja, 1918)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Scolecopsis (Scolecopsis) foliosa</i>	(Audouin & Milne Edwards, 1833)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Scolecopsis (Scolecopsis) squamata</i>	(O.F. Muller, 1806)	1969		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Scolecopsis bomieri</i>	(Mesnil, 1896)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Spio decorata</i>	Bobretzky, 1870	1969		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Spio multioculata</i>	(Rioja, 1918)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Spiophanes bombyx</i>	(Claparède, 1870)	2008	Sc	c	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Spiophanes kroyeri</i>	Grube, 1860	2008	Qs	emr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Spiophanes reyssi</i>	Laubier, 1964	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Streblospio shrubsolii</i>	(Buchanan, 1890)	2010		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Sternaspidae</b>																					
<i>Sternaspis scutata</i>	(Ranzani, 1817)	2008		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Amblyosyllis formosa</i>	(Claparède, 1863)	1886		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Anoplosyllis edentula</i>	(Claparède, 1868)	2010	Qs	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Branchiosyllis exilis</i>	(Gravier, 1900)	2008	Sc	mip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Brania pusilla</i>	(Dujardin, 1851)	2008		eamip	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Epigamita alexandri</i>	(Malmgren, 1867)	2008	Qs	em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euryyllis tuberculata</i>	(Ehlers, 1864)	1928		emr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euryyllis assimilis</i>	Marenzeller, 1875	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euryyllis blomstrandii</i>	(Malmgren, 1867)	1928		eamr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euryyllis lamelligera</i>	Marion & Bobretzky, 1875	2008		eam	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Exogone (Parexogone) cognettii</i>	Castelli, Badalamenti & Lardici, 1987	2010		em	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Exogone (Sylline) brevipes</i>	(Claparède, 1864)	2010		emrmp	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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>Exogone naidina</i>	Ørsted, 1845	1886		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Exogone verugera</i>	(Claparède, 1868)	2008		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Haplosyllis spongicola</i>	(Grube, 1855)	1928	Sc	enip	+			+														
<i>Myrionida brachycephala</i>	(Marenzeller, 1874)	2008		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Myrionida inermis</i>	(Saint-Joseph, 1887)	2010	Qs	em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Myrionida pinnigera</i>	(Montagu, 1808)	1886		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Myrionida prolifera</i>	(O.F. Müller, 1788)	1886		emr	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Nudisyllis divaricata</i>	(Kieferstein, 1862)	1928		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Nudisyllis pulligera</i>	(Krohn, 1852)	1928		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Odontosyllis ctenostoma</i>	Claparède, 1868	1928		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Odontosyllis dugesiana</i>	Claparède, 1864	1928		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Odontosyllis fulgurans</i>	(Audouin & Milne Edwards, 1833)	2010	c	c	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Odontosyllis gibba</i>	Claparède, 1863	1928		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Palposyllis prosotoma</i>	Hartmann-Schröder, 1977	2010		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Parahalteria ferrugina</i>	(Langerhans, 1881)	2010		c	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Parapionosyllis brevicirra</i>	Day, 1954	2008		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Parapionosyllis elegans</i>	(Pierantoni, 1903)	2010	Qs	em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Paraxogone hebes</i>	(Webster & Benedict, 1884)	2008		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Proceræa aurantiaca</i>	Claparède, 1868	2008		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Proceræa picta</i>	Ehlers, 1864	1928		enip	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Proceræa halleziana</i>	Malaquin, 1893	2008		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Prophaerosyllis tetralix</i>	(Eliason, 1920)	2008		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Salvatoria clavata</i>	(Claparède, 1863)	1928	Qs	eamrip	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Salvatoria eurtimica</i>	(Sardá, 1984)	2008		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Salvatoria limbata</i>	(Claparède, 1868)	1886		emr	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Salvatoria tenuicirrata</i>	(Claparède, 1864)	1886	Qs	emr	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sphaerosyllis bulbosa</i>	Southern, 1914	2008		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sphaerosyllis hysrix</i>	Claparède, 1863	1886		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sphaerosyllis ovigera</i>	Langerhans, 1879	2008	Qs	eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sphaerosyllis papillifera</i>	Naville, 1933	2008		c	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sphaerosyllis pirifera</i>	Claparède, 1868	1886		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Streptosyllis bidentata</i>	Southern, 1914	2010	Qs	eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Streptosyllis varians</i>	Webster & Benedict, 1887	2010		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Streptosyllis websteri</i>	Southern, 1914	2008		eamip	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis alternata</i>	Moore, 1908	2008	Sc	em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis amica</i>	Quatrefages, 1866	1928		c	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis armillaris</i>	(O.F. Müller, 1776)	1970		c	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis columbretensis</i>	(Campoy, 1982)	2008		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis cornuta</i>	Rathke, 1843	1928	Qs	enip	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis garciai</i>	(Campoy, 1982)	2008		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis gerlachi</i>	(Hartmann-Schröder, 1960)	2008		eamr	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis gracilis</i>	Grube, 1840	1928	Sc	c	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis hyalina</i>	Grube, 1863	2008		c	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis krohnii</i>	Ehlers, 1864	1928		eamrip	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis prolifera</i>	Krohn, 1852	1928		eamrip	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis pubinata</i>	(Langerhans, 1881)	2008		eamr	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis rosea</i>	(Langerhans, 1879)	2008		eamr	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis torquata</i>	Marion & Bobretzky, 1875	2008		em	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis variegata</i>	Grube, 1860	2008		c	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Syllis vittata</i>	Grube, 1840	1928		eam	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+

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																					
																						Syllidae																				
<i>Syllis vivipara</i>	Krohn, 1869	2008		em																																						
<i>Symmerosyllis lamelligera</i>	(Saint-Joseph, 1886)	2010		exam																																						
<i>Trypanosyllis (Trypanosyllis) coeliaca</i>	Claparède, 1868	1928		exam																																						
<i>Trypanosyllis zebra</i>	(Grube, 1860)	1928	Sc	c																																						
<i>Virchowia clavata</i>	Langerhans, 1879	1886		em																																						
<i>Amphitrite cirrata</i>	Müller, 1776	2008		exam																																						
<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>Eupolyinnia nebulosa</i>	(Montagu, 1819)	2008	Sc	exam																																						
<i>Eupolyinnia nesidensis</i>	(Delle Chiaje, 1828)	2008		exam																																						
<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		exam																																						
<i>Nicolea venustula</i>	(Montagu, 1819)	1970		em																																						
<i>Nicolea zostericola</i>	(Ørsted, 1844)	2008		em																																						
<i>Pista cretacea</i>	(Grube, 1860)	2008		em																																						
<i>Pista cristata</i>	(Müller, 1776)	1969		c																																						
<i>Pista maculata</i>	(Dalyell, 1853)	2008		exam																																						
<i>Pista unibranchia</i>	Day, 1963	2008	NIS	exam																																						
<i>Polycirrus aurantiacus</i>	Grube, 1860	2008		exam																																						
<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		exam																																						
<i>Terebella lapidaria</i>	Linnaeus, 1767	2008		emr																																						
<i>Thelepus cincinnatus</i>	(Fabricius, 1780)	2008		exam																																						
<i>Thelepus setosus</i>	(Quatrefages, 1866)	2008		emr																																						
<i>Thelepus triseriatus</i>	(Grube, 1855)	1927		emr																																						
<b>Tomopteridae</b>																																										
<i>Tomopteris (Johnstonella) levipes</i>	(Greeff, 1879)	1886		exam																																						
<i>Tomopteris (Johnstonella) pacifica</i>	(Izuka, 1914)	1886		exam																																						
<b>Travisiidae</b>																																										
<i>Travisia forbesii</i>	Johnston, 1840	2010		em																																						
<i>Octobranchus linguatus</i>	(Grube, 1863)	2008		em																																						
<i>Terebellides stroemii</i>	Sars, 1835	1927	Qs&Sc	exam																																						
<i>Trichobranchus glacialis</i>	Malmgren, 1866	2008		exam																																						
<b>Total number of species</b>																						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**

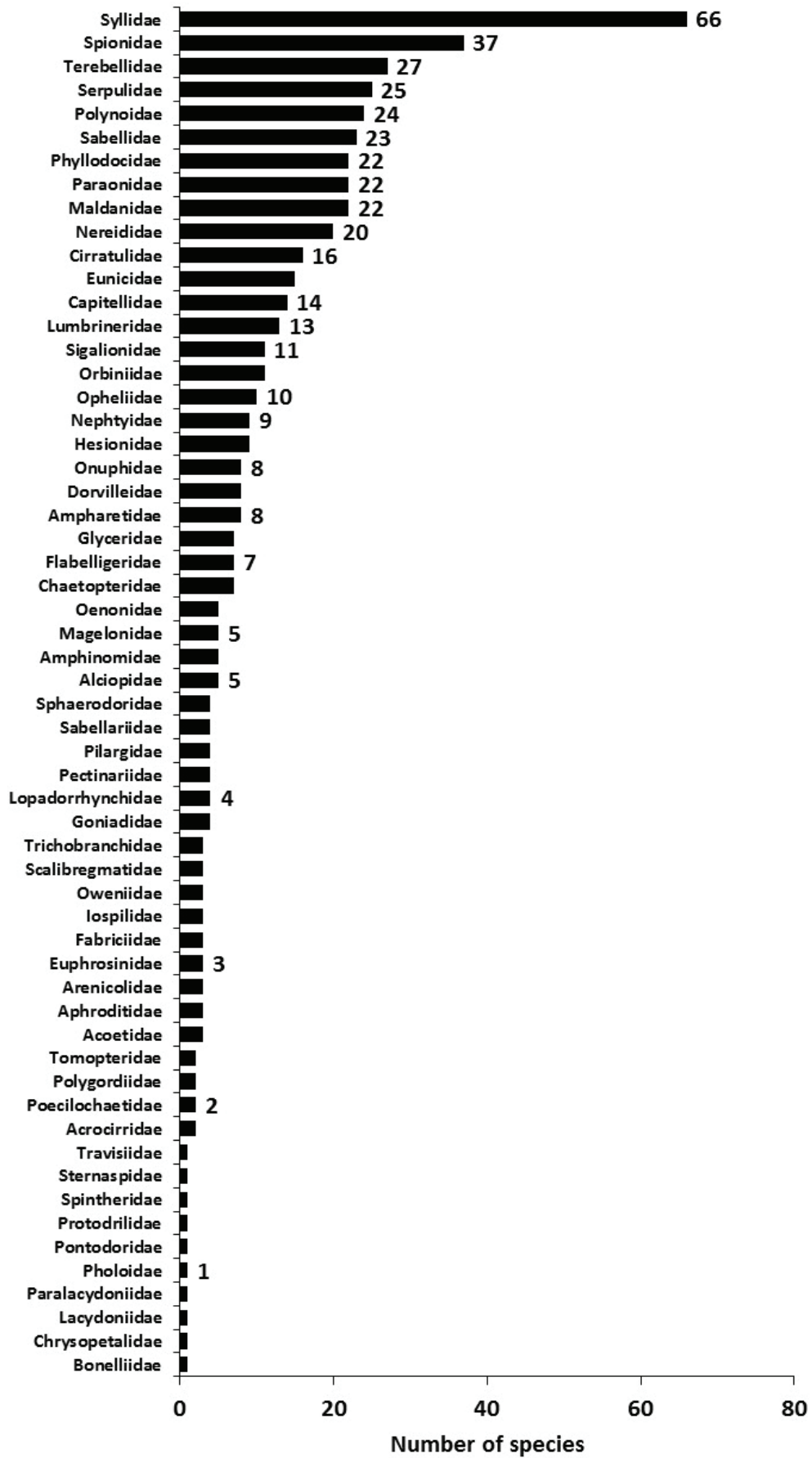
### **List of species**

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.

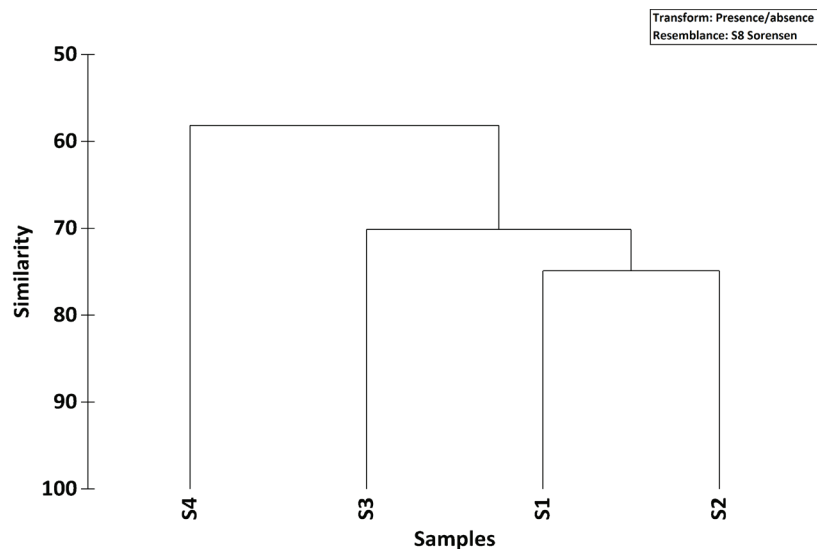
The present inventory of polychaete species is mainly compiled from data collected in three successive periods: the first was from 1886 to 1928, (leading to 28 families and 96 species), the second from 1963 to 1970, (leading to 44 families and 196 species), and finally from 1975 to 2010, (leading to 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%).

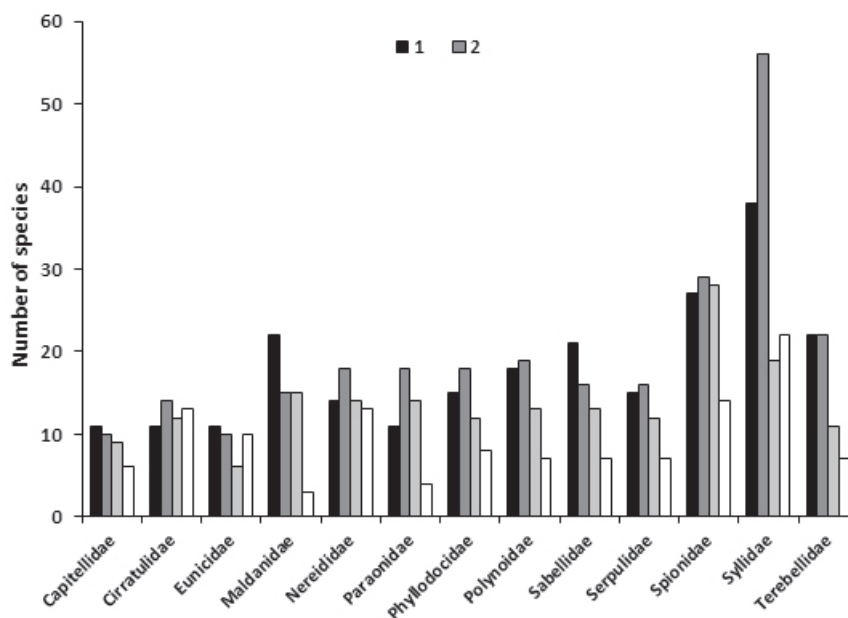
Ten families (each with more than 20 species) account



**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, *Protocirrineris 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,

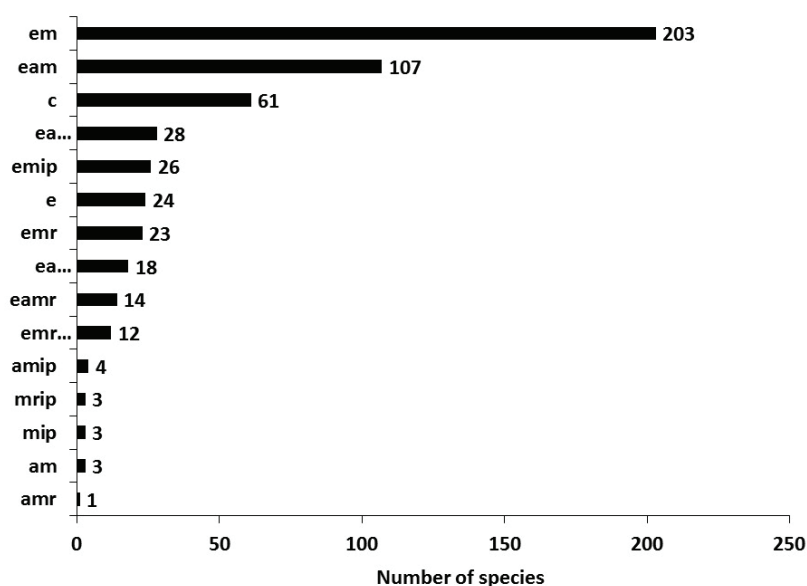
1994, *Chaetozone corona* Berkeley & Berkeley, 1941 or *Chaetozone carpenteri* McIntosh, 1911: it probably does not exist in the Mediterranean Sea (Çinar & Ergen, 2007; Faulwetter *et al.*, 2017).

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.

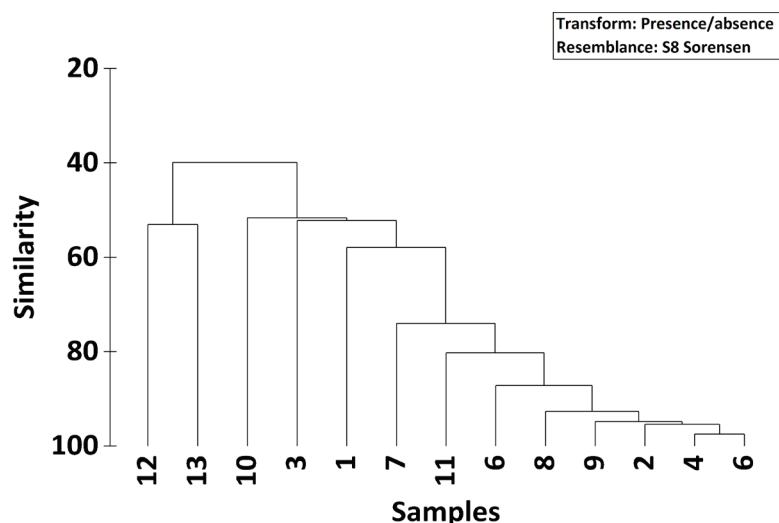
A total of 492 species from the European Atlantic Ocean and 507 from the North-Western Mediterranean Sea were reported as found along the Algerian coast; these species make up 92 and 95% respectively of the total inventory. The Aegean and Adriatic Seas have a high number of polychaete species in common 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
<b>This study</b>	<b>Algerian waters</b>	<b>534</b>	<b>Species mainly found on the continental shelf</b>

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, Spiro-nidae, Polynoidae, Phyllodocidae, Terebellidae, Serpuli-dae 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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