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RESEARCH ARTICLE

Marine Mollusca of the Libyan waters, the southern Mediterranean Sea

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Abstract

This study presents an inventory of the marine Mollusca species in Libya and aims at identifying the diversity of them along the Libyan coast, as well as collecting the information about the distribution by using unpublished data of scientific surveys and technical reports as well as samples which were collected along the Libyan coast during two periods (January 2005 to March 2006 and January 2013 to January 2017). The results of this work show that a total of 344 marine Mollusca species belonging to 114 families were distributed mostly along the western coast. Gastropoda had the most numerous species, represented with 188 species (54.39% of total species), and followed by Bivalvia (30.70%). The majority of native species (94.9%) were distributed along the Libyan coasts, whereas most of the non-indigenous species (5.1%) were distributed in the Gulf of Sirt (15.79%). This combined approach allowed to gather a more complete representation of non-indigenous species along the Libyan coast, which should be considered in future monitoring programs. This paper is the first attempt to fill the gap of knowledge about these species in the southeastern Mediterranean coast.

Keywords: Marine Mollusca, Libyan coast, southern Mediterranean Sea, biodiversity

Received: 09.07.2020, **Accepted:** 15.11.2020

Introduction

Mollusca are one of the major animal phyla present in marine environment worldwide, making up as much as 25% of the species in marine benthos (Appeltans *et al.* 2012), and usually form a large part of diversity and biomass in any marine assemblage (Gofas *et al.* 2017). These species are mainly benthic;

however, some Gastropods are holoplanktic, whereas Cephalopods are mostly nektonic organisms (Sabelli and Taviani 2014). They play important roles in the ecosystem structure and the maintenance of biodiversity (Zenetos 1997). Mollusca is a well-studied group of the animal kingdom, with about 50,000 known marine-living species (Bouchet and Duarte 2006). Among Mollusca, Gastropoda dominates and makes up about 80% of the extant species (Ponder and Lindberg 2008). This taxon is the most noteworthy group of marine organisms in this regard and they account for 7% of all the animals (Benkendorff 2010). It is divided into eight classes, namely Bivalvia, Caudofoveata, Cephalopoda, Gastropoda, Monoplacophora, Polyplacophora, Scaphopoda and Solenogastres (Ponder and Lindberg 2008; Benkendorff 2010). There is an increasing interest from policy makers in having readily accessible datasets regarding biodiversity, among which the basic list of species is most essential (Gofas *et al.* 2017). Many species of Mollusca have commercial or medical importance to humans, and some of them have been used as biological indicators for the quality of aquatic environments (Nakhlé *et al.* 2006).

The Libyan coast is about 2000 km long with a wide continental shelf that encompasses various habitats and topography (Shakman *et al.* 2017). The geographic location of Libya in the southern and warm part of the Mediterranean Sea is interesting as it can host thermophilic organisms arriving from the east (Indo-Pacific origin) or expanding from the west (Tropical Atlantic origin). Mollusca species have been recorded in Libyan coast in many technical reports (e.g: Contransimex 1977; Sogreah 1977). This checklist will help to provide an inventory of the marine Libyan Mollusca. The information about Libyan benthic macrofauna especially Mollusca is rare in Libya, due to the lack of comprehensive studies; in fact, only a few studies have been carried out on Mollusca along the Libyan coast since the 1970s. A total of 139 species were recorded in the eastern coast of Libya (Contransimex 1977), and in the 1980's Huni and Aravindan (1984) recorded a total of 16 intertidal Mollusca species in the western coast. Naas (1989) recorded 20 species from the littoral zone in the western coast of Libya. Besides, a survey was carried out along the western coast of Libya in the 1970s (Sogreah 1977). As for the alien Mollusca, there are few reports with focus on these species along the Libyan coast (Röckel 1986; Giannuzzi-Savelli *et al.* 2001; Zgozi *et al.* 2002; Ben Souissi *et al.* 2007; Zaouali *et al.* 2007a; Shakman *et al.* 2017; 2019). The aim of this work is to contribute to the knowledge of Mollusca biodiversity, their distribution and characteristics along the Libyan coast.

Materials and Methods

The study area is the Libyan coast, which is 2000 km long located in the south Mediterranean Sea. Based on the topography and the type of habitats, the area was divided into three main regions: Eastern region, Sirt Gulf and Western region (Shakman 2008) (Figure 1) Records of marine Mollusca species were collected

from published articles, technical reports, grey literature and unpublished data collected during surveys and awareness campaigns in the last five decades. Furthermore, samples were collected along the entire Libyan coast during two periods, January 2005 to March 2006, and January 2013 to January 2017. Some additional samples were also collected from two non-published MSc studies, one of these studies was carried out in literal area along the western coast of Libya, and the second was conducted on the shipwrecks in the western coast of Libya (Bek-Benghazi 2020; Al-Mgoushi 2020).

The scientific names in this paper follow the convention of the World Register of Marine Species (WoRMS 2020) (<http://www.marinespecies.org>). Some specimens were preserved and registered at the Natural History Museum of Zoology Department, University of Tripoli. The distribution for these species were recorded according to their presence in the aforementioned references and our observation during the conducted fieldwork.

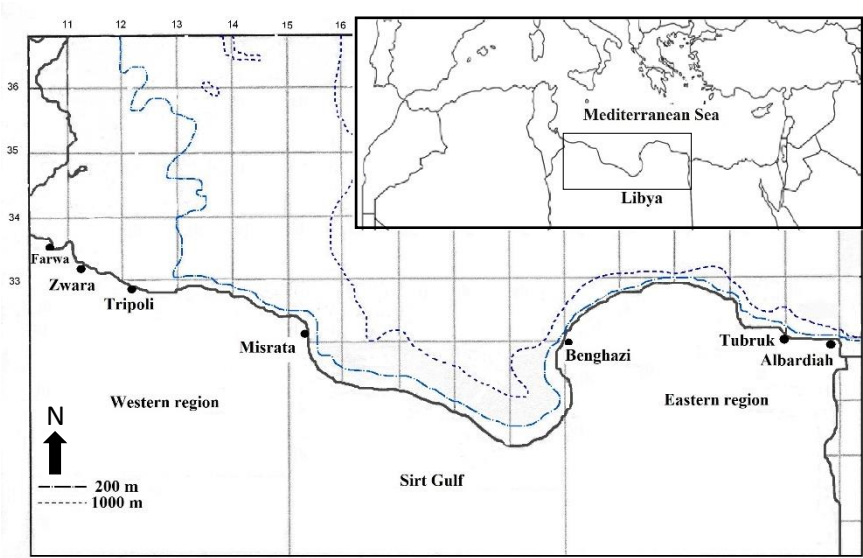


Figure 1. Sampling sites on the Libyan coast

Results

In this study, 344 marine Mollusca species were recorded along the Libyan coast (Table 1), belonging to 5 classes. Gastropoda represented the highest number of species, 188 comprising 54.39% of all the species, followed by Bivalvia, 118, 30.70% and the least class was Scaphopoda with 2.63% (Figure 2).

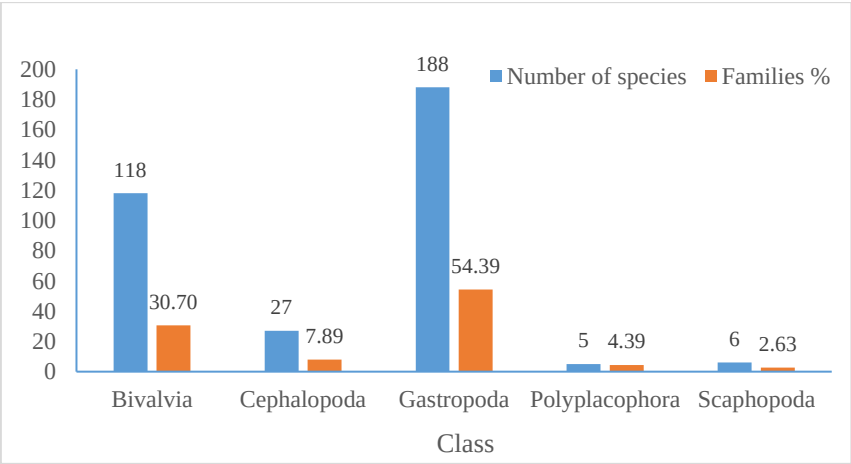


Figure 2. The number of marine Mollusca species in classes and its proportion rI found on the Libyan coast

The trend of marine Mollusca species reported from the Libyan coast increased over the last decades and reached 344 species (Figure 3), most of these species were distributed in the west region (32.56%) and the lowest percentage was found in west and Sirt region 1.74% (Figure 4).

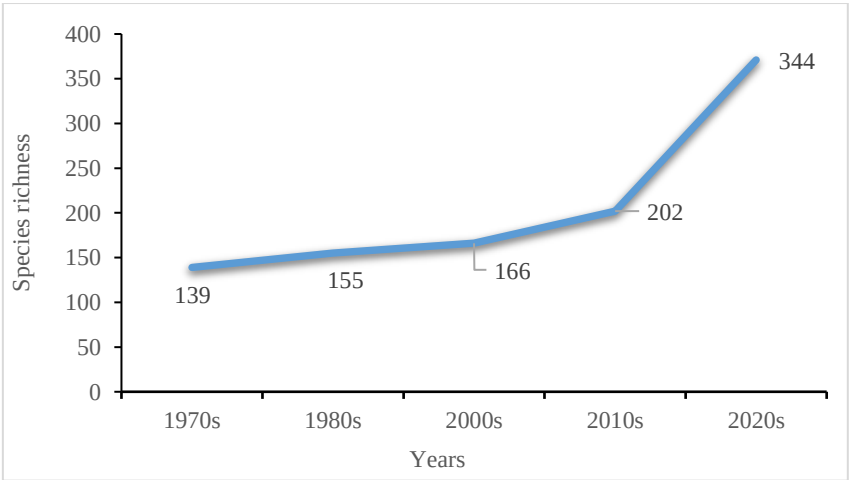


Figure 3. The trend of marine Mollusca species reported from the Libyan coast

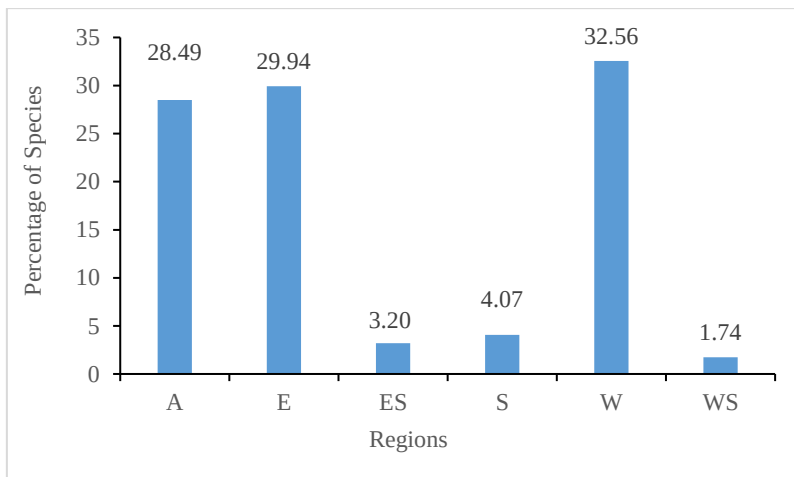


Figure 4. Distribution of marine Molluscas species in main regions on the Libyan coast (A: a long the coast, W: west region, S: Sirt Gulf, E: east region, ES: east and Sirt, WS: west and Sirt)

There are differences in the distribution of non-indigenous (NIS) versus native species in different regions. Most of the native species were found the total along the coast with 94.9%. The lowest percentage was found in the Sirt Gulf as 84.21%. As for the non-indigenous species, in total 18 species of 344 marine Mollusca were recorded representing 5.1%. In contrast to the native species, most of the non-indigenous species were distributed in the Sirt Gulf (15.79%) and the lowest percentage was along the Libyan coast (5%) (Figure 5).

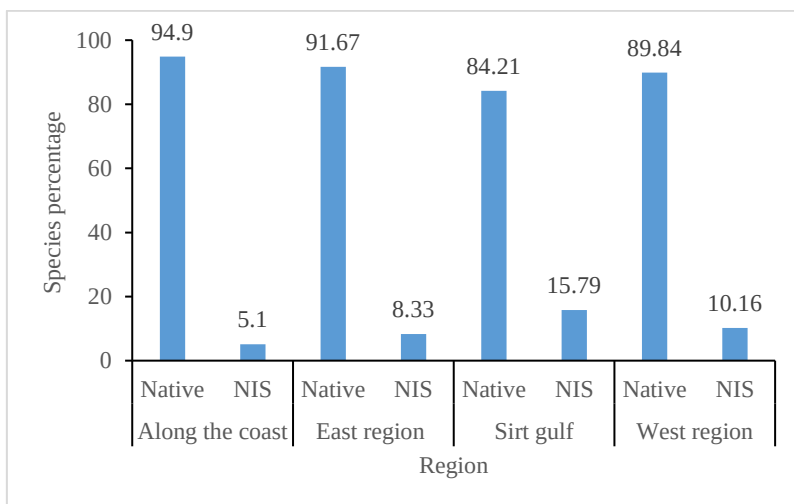


Figure 5. Distribution of native and non-indigenous species of Mollusca species along the Libyan coast

Table 1. Marine mollusc species recorded along the Libyan coast up to March 2020
(S: Sirt Gulf, W: western region, E: eastern region, A: along the coast; N: native; NIS: non-indigenous species)

No.	Class	Family	Scientific name	Origin	Distribution	Reference
1	Bivalvia	Anomiidae	<i>Anomia ephippium</i> Linnaeus, 1758	N	E	Contransimex 1977
2	Bivalvia	Arcidae	<i>Anadara corbuloides</i> Monterosato, 1881	N	E	Hadoud 1999
3	Bivalvia	Arcidae	<i>Arca noae</i> Linnaeus, 1758	N	S	Héra and Haris 2015
4	Bivalvia	Arcidae	<i>Arca tetragona</i> Poli, 1795	N	A	Contransimex 1977
5	Bivalvia	Arcidae	<i>Arca</i> sp. Linnaeus, 1758	N	E	Contransimex 1977
6	Bivalvia	Arcidae	<i>Barbatia barbata</i> (Linnaeus, 1758)	N	W-S	Sogreah 1977
7	Bivalvia	Arcidae	<i>Arca barbata</i> (Linnaeus, 1758)	N	S	Héra and Haris 2015
8	Bivalvia	Astartiidae	<i>Astarte fusca</i> (Poli, 1791)	N	w	Huni 1984
9	Bivalvia	Cardiidae	<i>Acanthocardia echinata</i> (Linnaeus, 1758)	N	W-S	Héra and Haris 2015
10	Bivalvia	Cardiidae	<i>Cardium costatum</i> Linnaeus, 1758	N	S	Héra and Haris 2015
11	Bivalvia	Cardiidae	<i>Cerastoderma edule</i> Linnaeus, 1758	N	S	Huni 1984
12	Bivalvia	Cardiidae	<i>Acanthocardia paucicostata</i> (G.B. Sowerby II, 1834)	N	E	Contransimex 1977
13	Bivalvia	Cardiidae	<i>Acanthocardia tuberculata</i> (Linnaeus, 1758)	N	A	Huni 1984
14	Bivalvia	Cardiidae	<i>Acanthocardia</i> sp. Gray, 1851	N	W	Huni 1984
15	Bivalvia	Cardiidae	<i>Cardium (Acanthocardium) echinatum</i> Linnaeus, 1758	N	A	Contransimex 1977
16	Bivalvia	Cardiidae	<i>Laevicardium oblongum</i> (Gmelin, 1791)	N	W	Huni 1984
17	Bivalvia	Cardiidae	<i>Papillicardium papillosum</i> (Poli, 1791)	N	A	Contransimex 1977
18	Bivalvia	Cardiidae	<i>Parvicardium exiguum</i> (Gmelin, 1791)	N	A	Contransimex 1977
19	Bivalvia	Cardiidae	<i>Vepricardium multispinosum</i> (G. B. Sowerby II, 1839)	N	W	Huni 1984
20	Bivalvia	Cardiidae	<i>Acanthocardia aculeata</i> (Linnaeus, 1758)	N	E	Huni 1984
21	Bivalvia	Cardiidae	<i>Cardium (Cerastoderma) aghelensis</i> Kaltenbach, 1949	N	E	Howege 1998
22	Bivalvia	Cardiidae	<i>Cerastoderma glaucum</i> (Bruguère, 1789)	N	E-S	Howege 1998
23	Bivalvia	Cardiidae	<i>Cerastoderma</i> sp. Poli, 1795	N	W	Huni 1984
24	Bivalvia	Cardiidae	<i>Fulvia fragilis</i> (Forsskål in Niebuhr, 1775)	NIS	A	Zgozi <i>et al.</i> 2002
25	Bivalvia	Cardiidae	<i>Parvicardium</i> Monterosato, 1884	N	W	Abushaala <i>et al.</i> 2014
26	Bivalvia	Carditidae	<i>Centrocardita aculeata</i> (Poli, 1795)	N	A	Huni 1984
27	Bivalvia	Carditidae	<i>Cardites antiquatus</i> (Linnaeus, 1758)	N	E	Hadoud 1999
28	Bivalvia	Carditidae	<i>Glans trapezia</i> (Linnaeus, 1767)	N	W	Huni 1984

Table 1. Continued

29	Bivalvia	Chamidae	<i>Arcinella arcinella</i> (Linnaeus, 1767)	N	W	Sogreah 1977
30	Bivalvia	Chamidae	<i>Arcinella cornuta</i> Conrad, 1866	N	W	Sogreah 1977
31	Bivalvia	Corbulidae	<i>Varicorbula gibba</i> (Olivi, 1792)	N	E	Contransimex 1977
32	Bivalvia	Cuspidariidae	<i>Cuspidaria cuspidata</i> (Olivi, 1792)	N	E	Contransimex 1977
33	Bivalvia	Donacidae	<i>Donax trunculus</i> Linnaeus, 1758	N	A	Contransimex 1977
34	Bivalvia	Donacidae	<i>Donax venustus</i> Poli, 1795	N	A	Huni 1984
35	Bivalvia	Glossidae	<i>Glossus humanus</i> (Linnaeus, 1758)	N	W	Sogreah 1977
36	Bivalvia	Glycymerididae	<i>Glycymeris glycymeris</i> (Linnaeus, 1758)	N	A	Sogreah 1977
37	Bivalvia	Glycymerididae	<i>Glycymeris nummaria</i> (Linnaeus, 1758)	N	W-S	Huni 1984
38	Bivalvia	Glycymerididae	<i>Glycymeris pilosa</i> (Linnaeus, 1767)	N	A	Contransimex 1977
39	Bivalvia	Glycymerididae	<i>Glycymeris violaceus</i> (Lamarck, 1819)	N	E-S	Contransimex 1977
40	Bivalvia	Glycymerididae	<i>Glycymeris bimaculata</i> (Poli, 1795)	N	W	Huni 1984
41	Bivalvia	Lasaeidae	<i>Kellia suborbicularis</i> (Montagu, 1803)	N	W	Huni 1984
42	Bivalvia	Lasaeidae	<i>Bornia sebetia</i> (O.G. Costa, 1830)	N	W	Huni 1984
43	Bivalvia	Laternulidae	<i>Exolaternula spengleri</i> (Gmelin, 1791)	N	W	Huni 1984
44	Bivalvia	Limidae	<i>Lima lima</i> (Linnaeus, 1758)	N	A	Sogreah 1977
45	Bivalvia	Limidae	<i>Lima</i> sp. Bruguière, 1797	N	S	Héra and Haris 2015
46	Bivalvia	Limidae	<i>Limaria tuberculata</i> (Olivi, 1792)	N	A	Sogreah 1977
47	Bivalvia	Lucinidae	<i>Ctena decussata</i> (O.G. Costa, 1829)	N	W	Huni 1984
48	Bivalvia	Lucinidae	<i>Loripes orbiculatus</i> Poli, 1795	N	A	Contransimex 1977
49	Bivalvia	Lucinidae	<i>Lucinella divaricata</i> (Linnaeus, 1758)	N	E	Contransimex 1977
50	Bivalvia	Lucinidae	<i>Myrtea spinifera</i> (Montagu, 1803)	N	E	Huni 1984
51	Bivalvia	Mactridae	<i>Mactra</i> sp. Linnaeus, 1767	N	W	Huni 1984
52	Bivalvia	Mactridae	<i>Mactra stultorum</i> (Linnaeus, 1758)	N	A	Contransimex 1977
53	Bivalvia	Malleidae	<i>Malleus regula</i> (Forsskal in Niebuhr, 1775)	NIS	A	Giannuzzi-Savelli <i>et al.</i> 2001
54	Bivalvia	Margaritidae	<i>Pinctada imbricata radiata</i> (Leach, 1814)	NIS	A	Monterosato <i>et al.</i> 1917
55	Bivalvia	Mytilidae	<i>Modiolus capax</i> (Conrad, 1837)	N	W	Huni 1984
56	Bivalvia	Mytilidae	<i>Modiolus phaseolus</i> Philippi, 1844	N	E	Contransimex 1977
57	Bivalvia	Mytilidae	<i>Musculus costulatus</i> (Risso, 1826)	N	A	Contransimex 1977
58	Bivalvia	Mytilidae	<i>Mytilaster lineatus</i> (Gmelin, 1791)	N	E	Contransimex 1977
59	Bivalvia	Mytilidae	<i>Mytilus galloprovincialis</i> Lamarck, 1819	N	W	Huni 1984

Table 1. Continued

60	Bivalvia	Mytilidae	<i>Mytilus</i> sp. Linnaeus, 1758	N	E	Contransimex 1977
61	Bivalvia	Mytilidae	<i>Brachidontes variabilis</i> (Krauss, 1848)	N	A	Huni 1984
62	Bivalvia	Mytilidae	<i>Gregariella petagnae</i> Scacchi, 1832	N	W	Abushaala <i>et al.</i> 2014
63	Bivalvia	Mytilidae	<i>Lithophaga lithophaga</i> (Linnaeus, 1758)	N	E	Contransimex 1977
64	Bivalvia	Mytilidae	<i>Modiolus adriaticus</i> Lamarck, 1819	N	w	Huni 1984
65	Bivalvia	Mytilidae	<i>Modiolus barbatus</i> (Linnaeus, 1758)	N	A	Sogreah 1977
66	Bivalvia	Mytilidae	<i>Mytilaster minimus</i> (Poli, 1795)	N	E	Howege 1998
67	Bivalvia	Mytilidae	<i>Mytilus edulis</i> Linnaeus, 1758	N	E	Hadoud 1999
68	Bivalvia	Noetiidae	<i>Striarca lactea</i> (Linnaeus, 1758)	N	E	Contransimex 1977
69	Bivalvia	Nuculidae	<i>Lembulus pella</i> (Linnaeus, 1758)	N	E	Contransimex 1977
70	Bivalvia	Nuculidae	<i>Nucula sulcata</i> Bronn, 1831	N	W	Huni 1984
71	Bivalvia	Nuculidae	<i>Nucula (Nucula) nucleus</i> Linnaeus, 1758	N	A	Huni 1984
72	Bivalvia	Ostreidae	<i>Magallana gigas</i> (Thunberg, 1793)	N	E	Howege 1998
73	Bivalvia	Ostreidae	<i>Ostrea equestris</i> Say, 1834	N	W	Abushaala <i>et al.</i> 2014
74	Bivalvia	Ostreidae	<i>Magallana angulata</i> (Lamarck, 1819)	N	W	Sogreah 1977
75	Bivalvia	Ostreidae	<i>Ostrea edulis</i> Linnaeus, 1758	N	A	Sogreah 1977
76	Bivalvia	Pectinidae	<i>Aequipecten opercularis</i> (Linnaeus, 1758)	N	A	Sogreah 1977
77	Bivalvia	Pectinidae	<i>Flexopecten flexuosus</i> (Poli, 1795)	N	A	Sogreah 1977
78	Bivalvia	Pectinidae	<i>Flexopecten glaber</i> (Linnaeus, 1758)	N	E	Contransimex 1977
79	Bivalvia	Pectinidae	<i>Karnekipia sulcata</i> (Müller, 1776)	N	W	Sogreah 1977
80	Bivalvia	Pectinidae	<i>Mimachlamys varia</i> (Linnaeus, 1758)	N	A	Sogreah 1977
81	Bivalvia	Pectinidae	<i>Pecten jacobaeus</i> (Linnaeus, 1758)	N	W	Sogreah 1977
82	Bivalvia	Pectinidae	<i>Caribachlamys</i> sp. T. R. Waller, 1993	N	W	Huni 1984
83	Bivalvia	Pinnidae	<i>Pinna nobilis</i> (Linnaeus, 1758)	N	E-S	Howege 1998
84	Bivalvia	Propeamussiidae	<i>Propeamussium lucidum</i> (Jeffreys in Wyville-Thomson, 1873)	N	E	Contransimex 1977
85	Bivalvia	Pteriidae	<i>Pteria hirundo</i> (Linnaeus, 1758)	N	S	Héra and Haris 2015
86	Bivalvia	Semelidae	<i>Abra alba</i> (W. Wood, 1802)	N	W	Bek-Benghazi 2020
87	Bivalvia	Semelidae	<i>Abra tenuis</i> (Montagu, 1803)	N	A	Contransimex 1977
88	Bivalvia	Semelidae	<i>Abra alba</i> (W. Wood, 1802)	N	E	Contransimex 1977

Table 1. Continued

89	Bivalvia	Solecurtidae	<i>Solecurtus afroccidentalis</i> Cosel, 1989	N	W	Sogreah 1977
90	Bivalvia	Solemyidae	<i>Solemya</i> sp. Lamarck, 1818	N	E	Contransimex 1977
91	Bivalvia	Solenidae	<i>Solen capensis</i> P. Fischer, 1881	N	A	Contransimex 1977
92	Bivalvia	Spondylidae	<i>Spondylus gaederopus</i> Linnaeus, 1758	N	S	Héra and Haris 2015
93	Bivalvia	Tellinidae	<i>Arcopella balaustina</i> (Linnaeus, 1758)	N	A	Contransimex 1977
94	Bivalvia	Tellinidae	<i>Ardeamya spenceri</i> (Suter, 1907)	N	E	Contransimex 1977
95	Bivalvia	Tellinidae	<i>Gastrana fragilis</i> (Linnaeus, 1758)	N	A	Huni 1984
96	Bivalvia	Tellinidae	<i>Moerella distorta</i> (Poli, 1791)	N	E	Contransimex 1977
97	Bivalvia	Tellinidae	<i>Peronaea planata</i> (Linnaeus, 1758)	N	E-S	Hadoud 1999
98	Bivalvia	Tellinidae	<i>Tellinidae</i> sp. Blainville, 1814	N	E-S	Hadoud 1999
99	Bivalvia	Tellinidae	<i>Bosemprella incarnata</i> (Linnaeus, 1758)	N	W	Huni 1984
100	Bivalvia	Tellinidae	<i>Moerella pulchella</i> (Lamarck, 1818)	N	A	Contransimex 1977
101	Bivalvia	Thraciidae	<i>Thracia speciosa</i> Angas, 1869	N	E	Contransimex 1977
102	Bivalvia	Thyasiridae	<i>Thyasira flexuosa</i> Montagu, 1803	N	W	Huni 1984
103	Bivalvia	Veneridae	<i>Dosinia exoleta</i> (Linnaeus, 1758)	N	W	Huni 1984
104	Bivalvia	Veneridae	<i>Gouldia minima</i> (Montagu, 1803)	N	E	Contransimex 1977
105	Bivalvia	Veneridae	<i>Irus irus</i> (Linnaeus, 1758)	N	W	Huni 1984
106	Bivalvia	Veneridae	<i>Lajonkairia</i> sp. Deshayes, 1854	N	E	Howege 1998
107	Bivalvia	Veneridae	<i>Leukoma staminea</i> (Conrad, 1837)	N	W	Huni 1984
108	Bivalvia	Veneridae	<i>Placamen lamellatum</i> (Röding, 1798)	N	W	Huni 1984
109	Bivalvia	Veneridae	<i>Polittapes aureus</i> (Gmelin, 1791)	N	A	Contransimex 1977
110	Bivalvia	Veneridae	<i>Ruditapes decussatus</i> (Linnaeus, 1758)	N	A	Huni 1984
111	Bivalvia	Veneridae	<i>Venerupis</i> sp. Lamarck, 1818	N	A	Huni 1984
112	Bivalvia	Veneridae	<i>Callista chione</i> (Linnaeus, 1758)	N	S	Héra and Haris 2015
113	Bivalvia	Veneridae	<i>Chamelea gallina</i> (Linnaeus, 1758)	N	S	Héra and Haris 2015
114	Bivalvia	Veneridae	<i>Dosinia lupinus</i> (Linnaeus, 1758)	N	A	Contransimex 1977
115	Bivalvia	Veneridae	<i>Pitar rudis</i> (Poli, 1795)	N	E	Contransimex 1977
116	Bivalvia	Veneridae	<i>Pitar virgo</i> Gray, 1838	N	W	Huni 1984
117	Bivalvia	Veneridae	<i>Venerupis corrugata</i> (Gmelin, 1791)	N	A	Huni 1984
118	Bivalvia	Veneridae	<i>Venus verrucosa</i> Linnaeus, 1758	N	A	Sogreah 1977

Table 1. Continued

119	Cephalopoda	Argonautidae	<i>Argonauta argo</i> Linnaeus, 1758	N	W	ISTPM 1969
120	Cephalopoda	Eledonidae	<i>Eledone moschata</i> (Lamarck, 1798)	N	E	Anon 1966
121	Cephalopoda	Eledonidae	<i>Eledone cirrhosa</i> (Lamarck, 1798)	N	W	Anon 1966
122	Cephalopoda	Enoploetuthidae	<i>Abralia (Asteroteuthis) veranyi</i> Rüppell, 1844	N	A	ISTPM 1969
123	Cephalopoda	Loliginidae	<i>Alloteuthis media</i> (Linnaeus, 1758)	N	A	ISTPM 1969
124	Cephalopoda	Loliginidae	<i>Alloteuthis ntedia</i> (Linnaeus, 1758)	N	A	Ben Abdallah and El Mgawshi 2013
125	Cephalopoda	Loliginidae	<i>Alloteuthis subulata</i> Lamarck, 1798	N	W	ISTPM 1969
126	Cephalopoda	Loliginidae	<i>Loligo forbesi</i> Steenstrup, 1856	N	A	ISTPM 1969
127	Cephalopoda	Loliginidae	<i>Loligo vulgaris</i> Lamarck, 1798	N	A	Anon 1966
128	Cephalopoda	Loliginidae	<i>Sepioteuthis lessoniana</i> d'Orbigny, 1826	NIS	w	Shakman <i>et al.</i> 2017
129	Cephalopoda	Octopodidae	<i>Octopus macropus</i> Risso, 1826	N	A	Anon 1966
130	Cephalopoda	Octopodidae	<i>Octopus vulgaris</i> Cuvier, 1797	N	A	Anon 1966
131	Cephalopoda	Octopodidae	<i>Pteroctopus tetracirrhus</i> (Delle Chiaje, 1830)	N	A	ISTPM 1969
132	Cephalopoda	Octopodidae	<i>Scaevurgus unicolorrhus</i> (Delle Chiaje [in Férussac & d'Orbigny], 1841)	N	A	ISTPM 1969
133	Cephalopoda	Ommastrephidae	<i>Illex coindetii</i> (Verany, 1839)	N	A	ISTPM 1969
134	Cephalopoda	Ommastrephidae	<i>Todarodes angolensis</i> Adam, 1962	N	W	Sogreah 1977
135	Cephalopoda	Ommastrephidae	<i>Todarodes sagittatus</i> (Lamarck, 1798)	N	A	Anon 1966
136	Cephalopoda	Ommastrephidae	<i>Todaropsis eblanae</i> (Ball, 1841)	N	A	ISTPM 1969
137	Cephalopoda	Sepiidae	<i>Sepia officinalis</i> Linnaeus, 1758	N	A	Anon 1966
138	Cephalopoda	Sepiidae	<i>Sepia orbignyana</i> Férussac [in d'Orbigny], 1826	N	A	ISTPM 1969
139	Cephalopoda	Sepiolidae	<i>Heteroteuthis dispar</i> (Rüppell, 1844)	N	A	ISTPM 1969
140	Cephalopoda	Sepiolidae	<i>Rondeletiola minor</i> (Naef, 1912)	N	E -S	Anon 2003
141	Cephalopoda	Sepiolidae	<i>Rossia macrosoma</i> (Delle Chiaje, 1830)	N	A	ISTPM 1969
142	Cephalopoda	Sepiolidae	<i>Sepietta oweniana</i> (Orbigny 1840)	N	E-S	Anon 2003
143	Cephalopoda	Sepiolidae	<i>Sepiola rondeletii</i> Leach, 1817	N	A	ISTPM 1969
144	Cephalopoda	Sepiolidae	<i>Sepia elegans</i> Blainville, 1827	N	A	ISTPM 1969
145	Cephalopoda	Thysanoteuthidae	<i>Thysanoteuthis rhombus</i> Troschel, 1857	N	A	Ben-abdallha and El Mgawshi 2013
146	Gastropoda	Acteonidae	<i>Acteon tornatilis</i> (Linnaeus, 1758)	N	E	Contransimex 1977

Table 1. Continued

147	Gastropoda	Akeridae	<i>Akera bullata</i> O.F. Müller, 1776	N	E	Contransimex 1977
148	Gastropoda	Amathinidae	<i>Clathrella clathrata</i> (Philippi, 1844)	N	E	Hadoud 1999
149	Gastropoda	Aplysiidae	<i>Aplysia californica</i> J. G. Cooper, 1863	N	W	Sogreah 1977
150	Gastropoda	Aplysiidae	<i>Aplysia dactylomela</i> Rang; 1828	NIS	W	Rizgalla <i>et al.</i> 2018
151	Gastropoda	Aplysiidae	<i>Aplysia depilans</i> Gmelin, 1791	N	E	Contransimex 1977
152	Gastropoda	Aplysiidae	<i>Bursatella leachii</i> Blainville, 1817	NIS	E	Zgozi <i>et al.</i> 2002
153	Gastropoda	Aporrhaidae	<i>Aporrhais pespelecani</i> (Linnaeus, 1758)	N	A	Sogreah 1977
154	Gastropoda	Babyloniidae	<i>Zemiropsis pintado</i> (Kilburn, 1971)	N	W	Huni 1984
155	Gastropoda	Barleeiidae	<i>Barleeia unifasciata</i> (Montagu, 1803)	N	W	Abushaala <i>et al.</i> 2014
156	Gastropoda	Buccinidae	<i>Euthria cornea</i> (Linnaeus, 1758)	N	A	Contransimex 1977
157	Gastropoda	Calliostomatidae	<i>Calliostoma granulatum</i> (Born, 1778)	N	W	Huni 1984
158	Gastropoda	Calliostomatidae	<i>Maurea pellucida</i> (Valenciennes, 1846)	N	W	Huni 1984
159	Gastropoda	Calliostomatidae	<i>Calliostoma conulus</i> (Linnaeus, 1758)	N	A	Sogreah 1977
160	Gastropoda	Calliostomatidae	<i>Calliostoma</i> sp. Swainson, 1840	N	W	Huni 1984
161	Gastropoda	Calliostomatidae	<i>Calliostoma gemmulatum</i> Carpenter, 1864	N	W	Huni 1984
162	Gastropoda	Calliostomatidae	<i>Calliostoma laugierii</i> (Payraudeau, 1826)	N	A	Contransimex 1977
163	Gastropoda	Calliostomatidae	<i>Calliostoma zizyphinum</i> (Linnaeus, 1758)	N	A	Contransimex 1977
164	Gastropoda	Calyptraeidae	<i>Crepidula fornicata</i> (Linnaeus, 1758)	NIS	W	Dragicevic <i>et al.</i> 2019
165	Gastropoda	Cancellariidae	<i>Cancellaria</i> sp. Lamarck, 1799	N	W	Abushaala <i>et al.</i> 2014
166	Gastropoda	Capulidae	<i>Capulus ungaricus</i> (Linnaeus, 1758)	N	E	Contransimex 1977
167	Gastropoda	Cassidae	<i>Galeodea echinophora</i> (Linnaeus, 1758)	N	W-S	Sogreah 1977
168	Gastropoda	Cassidae	<i>Galeodea rugosa</i> (Linnaeus, 1771)	N	E	Contransimex 1977
169	Gastropoda	Cerithiidae	<i>Rhinoclavis aspera</i> (Linnaeus, 1758)	N	W	Huni 1984
170	Gastropoda	Cerithiidae	<i>Cerithium scabridum</i> Philippi, 1848	NIS	W	Rizgalla <i>et al.</i> 2019
171	Gastropoda	Cerithiidae	<i>Cerithium lutosum</i> Menke, 1828	N	W	Huni 1984
172	Gastropoda	Cerithiidae	<i>Cerithium</i> sp. Bruguière, 1789	N	W	Huni 1984
173	Gastropoda	Cerithiidae	<i>Clypeomorus bifasciata</i> (G.B. Sowerby II, 1855)	NIS	E	Giannuzzi-Savelli <i>et al.</i> 1997
174	Gastropoda	Cerithiidae	<i>Bittium reticulatum</i> (Da Costa, 1778)	N	A	Contransimex 1977
175	Gastropoda	Cerithiidae	<i>Cerithium rueppelli</i> Philippi, 1848	N	W	Huni 1984
176	Gastropoda	Cerithiidae	<i>Cerithium vulgatum</i> Bruguière, 1792	N	A	Contransimex 1977

Table 1. Continued

177	Gastropoda	Cerithiopsidae	<i>Cerithiopsis barleei</i> Jeffreys, 1867	N	E	Howege 1998
178	Gastropoda	Colloniidae	<i>Homalopoma sanguineum</i> (Linnaeus, 1758)	N	E	Contransimex 1977
179	Gastropoda	Columbellidae	<i>Columbella rustica</i> (Linnaeus, 1758)	N	A	Contransimex 1977
180	Gastropoda	Columbellidae	<i>Cumia mestayerae</i> (Iredale, 1915)	N	W	Huni 1984
181	Gastropoda	Columbellidae	<i>Mitrella gervillii</i> (Payraudeau, 1826)	N	E	Contransimex 1977
182	Gastropoda	Columbellidae	<i>Mitrella scripta</i> (Linnaeus, 1758)	N	E	Contransimex 1977
183	Gastropoda	Columbellidae	<i>Mitrella svelta</i> Kobelt, 1889	N	E	Contransimex 1977
184	Gastropoda	Columbellidae	<i>Pyrene splendidula</i> (G.B. Sowerby I, 1844)	N	E	Hadoud 1999
185	Gastropoda	Columbellidae	<i>Mitrella spelta</i> (Kobelt, 1893)	N	E	Howege 1998
186	Gastropoda	Conidae	<i>Conasprella ione</i> (Fulton, 1938)	N	w	Huni 1984
187	Gastropoda	Conidae	<i>Conus auricomus</i> Hwass in Bruguière, 1792	N	A	Contransimex 1977
188	Gastropoda	Conidae	<i>Conus mediterraneus</i> (Bruguière, 1792)	N	w	Abushaala <i>et al.</i> 2014
189	Gastropoda	Conidae	<i>Conus ventricosus</i> Gmelin, 1791	N	A	Sogreah 1977
190	Gastropoda	Conidae	<i>Conus fumigatus</i> Hwass in Bruguière, 1792	NIS	E	Röckel 1986
191	Gastropoda	Costellariidae	<i>Pusia ebenus</i> (Lamarck, 1811)	N	E	Contransimex 1977
192	Gastropoda	Costellariidae	<i>Pusia tricolor</i> (Gmelin, 1791)	N	E	Contransimex 1977
193	Gastropoda	Costellariidae	<i>Vexillum</i> sp. Röding, 1798	N	W	Huni 1984
194	Gastropoda	Cylichnidae	<i>Cylichna cylindracea</i> (Pennant, 1777)	N	E	Hadoud 1999
195	Gastropoda	Cypraeidae	<i>Erosaria turdus</i> (Lamarck, 1810)	NIS	A	Ben Souissi <i>et al.</i> 2007
196	Gastropoda	Cypraeidae	<i>Mauritia scurra</i> (Gmelin, 1791)	N	E-S	Contransimex 1977
197	Gastropoda	Cypraeidae	<i>Naria spurca</i> (Linnaeus, 1758)	N	S	Héra and Haris 2015
198	Gastropoda	Cystiscidae	<i>Gibberula miliaria</i> (Linnaeus, 1758)	N	W	Huni 1984
199	Gastropoda	Epitoniidae	<i>Epitonium clathrus</i> (Linnaeus, 1758)	N	A	Contransimex 1977
200	Gastropoda	Epitoniidae	<i>Epitonium foliaceicosta</i> (d'Orbigny, 1842)	N	W	Huni 1984
201	Gastropoda	Epitoniidae	<i>Epitonium turtonis</i> (W. Turton, 1819)	N	A	Huni 1984
202	Gastropoda	Epitoniidae	<i>Janthina janthina</i> (Linnaeus, 1758)	N	W-S	Huni 1984
203	Gastropoda	Epitoniidae	<i>Janthina</i> sp. (Röding, 1798)	N	E	Hadoud 1999
204	Gastropoda	Eulimidae	<i>Melanella spina</i> (Boettger, 1893)	N	E	Contransimex 1977
205	Gastropoda	Fascioliariidae	<i>Pisania Bivona</i> (e Bernardi, 1832)	N	W	Abushaala <i>et al.</i> 2014
206	Gastropoda	Fascioliariidae	<i>Aptyxis syracusana</i> (Linnaeus, 1758)	N	A	Contransimex 1977

Table 1. Continued

207	Gastropoda	Fascioliariidae	<i>Gracilipurpura rostrata</i> (Olivi, 1792)	N	W	Sogreah 1977
208	Gastropoda	Fascioliariidae	<i>Tarantinaea lignaria</i> (Linnaeus, 1758)	N	A	Sogreah 1977
209	Gastropoda	Fascioliariidae	<i>Fusinus pulchellus</i> Philippi, 1840	N	W	Huni 1984
210	Gastropoda	Fascioliariidae	<i>Goniofusus spectrum</i> (A. Adams & Reeve, 1848)	N	A	Huni 1984
211	Gastropoda	Fissurellidae	<i>Diodora funiculata</i> (Reeve, 1850)	NIS	W	Rizgalla and Crocetta 2020
212	Gastropoda	Fissurellidae	<i>Diodora italica</i> (Defrance, 1820)	N	A	Sogreah 1977
213	Gastropoda	Fissurellidae	<i>Emarginula octaviana</i> (Coen, 1939)	N	E	Contransimex 1977
214	Gastropoda	Fissurellidae	<i>Emarginula rosea</i> (Bell, 1824)	N	E	Contransimex 1977
215	Gastropoda	Fissurellidae	<i>Fissurella costaria</i> (Deshayes, 1824)	N	W	Sogreah 1977
216	Gastropoda	Fissurellidae	<i>Diodora gibberula</i> (Lamarck, 1822)	N	E	Contransimex 1977
217	Gastropoda	Fissurellidae	<i>Diodora graeca</i> (Linnaeus, 1758)	N	E	Contransimex 1977
218	Gastropoda	Fissurellidae	<i>Fissurella nubecula</i> (Linnaeus, 1758)	N	W	Abushaala <i>et al.</i> 2014
219	Gastropoda	Goniodorididae	<i>Okenia longiductis</i> (Licchelli & Crocetta, 2019)	NIS	W	Rizgalla <i>et al.</i> 2019
220	Gastropoda	Haliotidae	<i>Haliotis tuberculata</i> (Linnaeus, 1758)	N	S	Héra and Haris 2015
221	Gastropoda	Haminoeidae	<i>Lamprohaminoea cyanomarginata</i> (Heller & T.E. Thompson, 1983)	NIS	W	Rizgalla <i>et al.</i> 2018
222	Gastropoda	Haminoeidae	<i>Atys caribaeus</i> (d'Orbigny, 1841)	N	W	Huni 1984
223	Gastropoda	Haminoeidae	<i>Haminoea cyanomarginata</i> Heller & Thompson, 1983	NIS	W	Rizgalla <i>et al.</i> 2018
224	Gastropoda	Haminoeidae	<i>Haminoea hydatis</i> (Linnaeus, 1758)	N	A	Contransimex 1977
225	Gastropoda	Littorinidae	<i>Littorina littorea</i> (Linnaeus, 1758)	N	E	Howege 1998
226	Gastropoda	Littorinidae	<i>Littorina saxatilis</i> (Olivi, 1792)	N	A	Contransimex 1977
227	Gastropoda	Littorinidae	<i>Melarhaphe neritoides</i> (Linnaeus, 1758)	N	E	Contransimex 1977
228	Gastropoda	Littorinimorpha	<i>Dendropoma petraeum</i> (Monterosato, 1884)	N	W	Abushaala <i>et al.</i> 2014
229	Gastropoda	Mangeliidae	<i>Mangelia</i> sp. (Risso, 1826)	N	E	Howege 1998
230	Gastropoda	Marginellidae	<i>Cryptospira strigata</i> (Dillwyn, 1817)	N	A	Contransimex 1977
231	Gastropoda	Marginellidae	<i>Volvarina mitrella</i> (Risso, 1826)	N	E	Hadoud 1999
232	Gastropoda	Mitridae	<i>Neotiarra sphoni</i> (Shasky & G.B. Campbell, 1964)	N	W	Huni 1984
233	Gastropoda	Mitridae	<i>Mitra</i> sp. (Lamarck, 1798)	N	W	Abushaala <i>et al.</i> 2014
234	Gastropoda	Mitridae	<i>Episcomitra cornicula</i> (Linnaeus, 1758)	N	A	Contransimex 1977
235	Gastropoda	Mitridae	<i>Episcomitra zonata</i> (Marryat, 1818)	N	E	Howege 1998

Table 1. Continued

236	Gastropoda	Muricidae	<i>Murexsul aradasii</i> (Monterosato, 1883)	N	E	Howege 1998
237	Gastropoda	Muricidae	<i>Trophonopsis muricata</i> (Montagu, 1803)	N	A	Sogreah 1977
238	Gastropoda	Muricidae	<i>Bolinus brandaris</i> (Linnaeus, 1758)	N	E	Hadoud 1999
239	Gastropoda	Muricidae	<i>Muricopsis cristata</i> (Brocchi, 1814)	N	W	El Mgawshi 2020
240	Gastropoda	Muricidae	<i>Ocenebra</i> sp. Gray, 1847	N	W	Huni 1984
241	Gastropoda	Muricidae	<i>Coralliophila</i> sp. H. Adams & A. Adams, 1853	N	E	Howege 1998
242	Gastropoda	Muricidae	<i>Hexaplex</i> sp. (Perry, 1810)	N	A	Sogreah 1977
243	Gastropoda	Nacellidae	<i>Cellana rota</i> (Gmelin, 1791)	NIS	E	Zaouali <i>et al.</i> 2007b
244	Gastropoda	Nassariidae	<i>Nassarius</i> sp. (Duméril, 1805)	N	W	Huni 1984
245	Gastropoda	Nassariidae	<i>Tritia gibbosula</i> (Linnaeus, 1758)	N	S	Héra and Haris 2015
246	Gastropoda	Nassariidae	<i>Tritia incrassata</i> (Strøm, 1768)	N	A	Sogreah 1977
247	Gastropoda	Nassariidae	<i>Tritia mutabilis</i> (Linnaeus, 1758)	N	W	Sogreah 1977
248	Gastropoda	Nassariidae	<i>Nassarius spiratus</i> (A. Adams, 1852)	N	E	Hadoud 1999
249	Gastropoda	Nassariidae	<i>Nassarius splendidulus</i> (Dunker, 1846)	N	W	Huni 1984
250	Gastropoda	Nassariidae	<i>Tritia reticulata</i> (Linnaeus, 1758)	N	A	Huni 1984
251	Gastropoda	Nassariidae	<i>Tritia cuvierii</i> (Payraudeau, 1826)	N	A	Huni 1984
252	Gastropoda	Naticidae	<i>Natica spadicea</i> (Gmelin, 1791)	N	E	Contransimex 1977
253	Gastropoda	Naticidae	<i>Naticarius stercusmuscarum</i> (Gmelin, 1791)	N	A	Sogreah 1977
254	Gastropoda	Naticidae	<i>Neverita josephina</i> (Risso, 1826)	N	E	Hadoud 1999
255	Gastropoda	Naticidae	<i>Tanea undulata</i> (Röding, 1798)	N	E	Hadoud 1999
256	Gastropoda	Naticidae	<i>Natica hebraea</i> (Martyn, 1786)	N	W-S	Sogreah 1977
257	Gastropoda	Naticidae	<i>Euspira quilleminii</i> (Payraudeau, 1826)	N	E	Contransimex 1977
258	Gastropoda	Neritidae	<i>Nerita sanguinolenta</i> (Menke, 1829)	NIS	E-S	Giannuzzi-Savelli <i>et al.</i> 1994
259	Gastropoda	Neritidae	<i>Smargdia viridis</i> (Linnaeus, 1758)	N	A	Huni 1984
260	Gastropoda	Patellidae	<i>Patella caerulea</i> (Linnaeus, 1758)	N	E-S	Contransimex 1977
261	Gastropoda	Patellidae	<i>Patella rustica</i> (Linnaeus, 1758)	N	S	Héra and Haris 2015
262	Gastropoda	Phasianellidae	<i>Tricolia pullus</i> (Linnaeus, 1758)	N	A	Contransimex 1977
263	Gastropoda	Phasianellidae	<i>Tricolia speciosa</i> (Megerle von Mühlfeld, 1824)	N	E	Contransimex 1977
264	Gastropoda	Phasianellidae	<i>Tricolia tenuis</i> (Michaud, 1829)	N	W	Huni 1984
265	Gastropoda	Pisaniidae	<i>Aplus dorbignyi</i> (Payraudeau, 1826)	N	A	Contransimex 1977

Table 1. Continued

266	Gastropoda	Pisaniidae	<i>Pisania striata</i> (Gmelin, 1791)	N	A	Contransimex 1977
267	Gastropoda	Pisaniidae	<i>Aplus scaber</i> (Locard, 1891)	N	W	Huni 1984
268	Gastropoda	Pisaniidae	<i>Enginella leucozona</i> (Philippi, 1844)	N	W	Huni 1984
269	Gastropoda	Planaxidae	<i>Angiola lineata</i> (da Costa, 1778)	N	W	Huni 1984
270	Gastropoda	Pleurobranchidae	<i>Pleurobranchus membranaceus</i> (Montagu, 1816)	N	E	Contransimex 1977
271	Gastropoda	Pyramidellidae	<i>Odostomia</i> sp. Fleming, 1813	N	W	Abushaala <i>et al.</i> 2014
272	Gastropoda	Pyramidellidae	<i>Turbonilla lactea</i> (Linnaeus, 1758)	N	W	Huni 1984
273	Gastropoda	Raphitomidae	<i>Raphitoma echinata</i> (Brocchi, 1814)	N	W	Huni 1984
274	Gastropoda	Raphitomidae	<i>Raphitoma purpurea</i> (Montagu, 1803)	N	A	Contransimex 1977
275	Gastropoda	Retusidae	<i>Retusa spatha</i> (R.B. Watson, 1883)	N	E	Howege 1998
276	Gastropoda	Retusidae	<i>Retusa truncatula</i> (Bruguère, 1792)	N	W	Huni 1984
277	Gastropoda	Retusidae	<i>Retusa umbilicata</i> (Montagu, 1803)	N	E	Contransimex 1977
278	Gastropoda	Retusidae	<i>Retusa crossei</i> (Bucquoy, Dautzenberg & Dollfus, 1886)	N	E	Contransimex 1977
279	Gastropoda	Rissoellidae	<i>Cythnia albida</i> Carpenter, 1864	N	A	Contransimex 1977
280	Gastropoda	Rissoidae	<i>Pusillina lineolata</i> (Michaud, 1830)	N	W	Abushaala <i>et al.</i> 2014
281	Gastropoda	Rissoidae	<i>Pusillina philippi</i> (Aradas & Maggiore, 1844)	N	E	Contransimex 1977
282	Gastropoda	Rissoidae	<i>Rissoa auriformis</i> (Pallary, 1904)	N	W	Huni 1984
283	Gastropoda	Rissoidae	<i>Rissoa auriscalpium</i> (Linnaeus, 1758)	N	W	Huni 1984
284	Gastropoda	Rissoidae	<i>Rissoa guerinii</i> (Récluz, 1843)	N	E	Contransimex 1977
285	Gastropoda	Rissoidae	<i>Rissoa lia</i> (Monterosato, 1884)	N	W	Abushaala <i>et al.</i> 2014
286	Gastropoda	Rissoidae	<i>Rissoa variabilis</i> (Megerle von Mühlfeld, 1824)	N	E	Contransimex 1977
287	Gastropoda	Rissoidae	<i>Rissoa ventricosa</i> (Desmarest, 1814)	N	W	Huni 1984
288	Gastropoda	Rissoidae	<i>Rissoa violacea</i> (Desmarest, 1814)	N	W	Huni 1984
289	Gastropoda	Rissoidae	<i>Alvania aspera</i> (Philippi, 1844)	N	W	Huni 1984
290	Gastropoda	Rissoidae	<i>Alvania cimex</i> (Linnaeus, 1758)	N	A	Huni 1984
291	Gastropoda	Rissoidae	<i>Alvania discors</i> (Allan, 1818)	N	A	Contransimex 1977
292	Gastropoda	Rissoidae	<i>Alvania hirta</i> (Monterosato, 1884)	N	E	Contransimex 1977
293	Gastropoda	Rissoidae	<i>Alvania hispidula</i> (Monterosato, 1884)	N	E	Contransimex 1977
294	Gastropoda	Rissoidae	<i>Alvania lineata</i> (Risso, 1826)	N	W	Abushaala <i>et al.</i> 2014
295	Gastropoda	Rissoidae	<i>Alvania macandrewi</i> (Manzoni, 1868)	N	A	Huni 1984

Table 1. Continued

296	Gastropoda	Rissoidae	<i>Alvania strangei</i> (Brazier in Henn, 1894)	N	W	Huni 1984
297	Gastropoda	Rissoidae	<i>Rissoa monodonta</i> (Philippi, 1836)	N	E	Hadoud 1999
298	Gastropoda	Rissoidae	<i>Alvania spinosa</i> (Monterosato, 1890)	N	E	Howege 1998
299	Gastropoda	Rissoidae	<i>Manzonina crassa</i> (Kanmacher, 1798)	N	E	Contransimex 1977
300	Gastropoda	Rissoinidae	<i>Rissoina bruquieri</i> (Payraudeau, 1826)	N	W	Huni 1984
301	Gastropoda	Scaphandridae	<i>Scaphander</i> sp. (Montfort, 1810)	N	W	Huni 1984
302	Gastropoda	Siliquariidae	<i>Tenagodus obtusus</i> (Schumacher, 1817)	N	W	Abushaala <i>et al.</i> 2014
303	Gastropoda	Strombidae	<i>Conomurex persicus</i> (Swainson, 1821)	NIS	A	Ben Souissi <i>et al.</i> 2007
304	Gastropoda	Strombidae	<i>Conomurex decorus</i> (Röding, 1798)	N	W	Huni 1984
305	Gastropoda	Strombidae	<i>Macrostrombus costatus</i> (Gmelin, 1791)	N	E	Hadoud 1999
306	Gastropoda	Tonnidae	<i>Tonna galea</i> (Linnaeus, 1758)	N	E-S	Contransimex 1977
307	Gastropoda	Triphoridae	<i>Monophorus perversus</i> (Linnaeus, 1758)	N	E	Contransimex 1977
308	Gastropoda	Trochidae	<i>Phorcus mutabilis</i> (Philippi, 1851)	N	A	Contransimex 1977
309	Gastropoda	Trochidae	<i>Steromphala adansonii</i> (Payraudeau, 1826)	N	E	Contransimex 1977
310	Gastropoda	Trochidae	<i>Steromphala nebulosa</i> (Philippi, 1849)	N	W	Huni 1984
311	Gastropoda	Trochidae	<i>Trochus erithreus</i> (Brocchi, 1821)	N	E	Hadoud 1999
312	Gastropoda	Trochidae	<i>Cantharidus</i> sp. (Montfort, 1810)	N	W	Huni 1984
313	Gastropoda	Trochidae	<i>Clanculus corallinus</i> (Gmelin, 1791)	N	E	Contransimex 1977
314	Gastropoda	Trochidae	<i>Clanculus cruciatus</i> (Linnaeus, 1758)	N	E	Contransimex 1977
315	Gastropoda	Trochidae	<i>Gibbula ardens</i> (Salis Marschlin, 1793)	N	A	Huni 1984
316	Gastropoda	Trochidae	<i>Jujubinus</i> sp. (Monterosato, 1884)	N	E	Howege 1998
317	Gastropoda	Trochidae	<i>Phorcus richardi</i> (Payraudeau, 1826)	N	W	Abushaala <i>et al.</i> 2014
318	Gastropoda	Trochidae	<i>Phorcus turbinatus</i> (Born, 1778)	N	S	Héra and Haris 2015
319	Gastropoda	Trochidae	<i>Steromphala divaricata</i> (Linnaeus, 1758)	N	W	Huni 1984
320	Gastropoda	Trochidae	<i>Steromphala rarilineata</i> (Michaud, 1829)	N	W	Huni 1984
321	Gastropoda	Trochidae	<i>Gibbula fanulum</i> (Gmelin, 1791)	N	W	Huni 1984
322	Gastropoda	Trochidae	<i>Gibbula guttadauri</i> (Philippi, 1836)	N	W	Huni 1984
323	Gastropoda	Trochidae	<i>Gibbula magus</i> (Linnaeus, 1758)	N	A	Huni 1984
324	Gastropoda	Truncatellidae	<i>Truncatella subcylindrica</i> (Linnaeus, 1767)	N	A	Contransimex 1977
325	Gastropoda	Turbinidae	<i>Bolma rugosa</i> (Linnaeus, 1767)	N	E	Contransimex 1977

Table 1. Continued

326	Gastropoda	Turritellidae	<i>Turritellinella tricarinata</i> (Brocchi, 1814)	N	A	Contransimex 1977
327	Gastropoda	Turritellidae	<i>Mesalia brevis</i> (Lamarck, 1822)	N	W	Huni 1984
328	Gastropoda	Turritellidae	<i>Turritella turbona</i> (Monterosato, 1877)	N	E	Hadoud 1999
329	Gastropoda	Velutinidae	<i>Lamellaria perspicua</i> (Linnaeus, 1758)	N	E	Contransimex 1977
330	Gastropoda	Vermetidae	<i>Thylacodes arenarius</i> (Linnaeus, 1758)	N	W	Huni 1984
331	Gastropoda	Vermetidae	<i>Vermetus granulatus</i> (Gravenhorst, 1831)	N	E	Howege 1998
332	Gastropoda	Vermetidae	<i>Vermetus triquetrus</i> (Bivona-Bernardi, 1832)	N	E	Contransimex 1977
333	Gastropoda	Zebinidae	<i>Stosicia annulata</i> (Dunker, 1860)	N	W	Huni 1984
334	Polyplacophora	Acanthochitonidae	<i>Notoplax speciosa</i> (H. Adams, 1862)	N	E	Contransimex 1977
335	Polyplacophora	Callochitonidae	<i>Callochiton septemvalvis</i> (Montagu, 1803)	N	E	Contransimex 1977
336	Polyplacophora	Chitonidae	<i>Rhyssoplax olivacea</i> (Spengler, 1797)	N	W	Abushaala <i>et al.</i> 2014
337	Polyplacophora	Ischnochitonidae	<i>Ischnochiton</i> sp. (Gray, 1847)	N	E	Contransimex 1977
338	Polyplacophora	Leptochitonidae	<i>Leptochiton cancellatus</i> (G.B. Sowerby II, 1840)	N	E	Contransimex 1977
339	Scaphopoda	Dentaliidae	<i>Antalis</i> sp. H. Adams & A. Adams, 1854	N	E	Contransimex 1977
340	Scaphopoda	Dentaliidae	<i>Antalis panorma</i> (Chenu, 1843)	N	E	Contransimex, 1977
341	Scaphopoda	Dentaliidae	<i>Antalis vulgaris</i> (da Costa, 1778)	N	W	Sogreah 1977
342	Scaphopoda	Dentaliidae	<i>Dentalium</i> sp. (Linnaeus, 1758)	N	E	Howege 1998
343	Scaphopoda	Fustiariidae	<i>Fustiaria rubescens</i> (Deshayes, 1826)	N	A	Contransimex 1977
344	Scaphopoda	Pulsellidae	<i>Pulsellum lofotense</i> (M. Sars, 1865)	N	E	Contransimex 1977

Discussion

The information about the distribution of marine Mollusca along the Libyan coast have increased due to the increasing of the field surveys during the recent years, which contributed to filling the information gaps in this area. Although the previous studies did not directly focus on Mollusca, the checklist presented in this work was compiled from the previous available data. Therefore, the present study is considered to be the first inventory of Mollusca in Libya and it is believed that it will provide the useful base for comprehensive environmental and biological studies of many marine Mollusca species.

A total of 344 Mollusca species have been recorded along the Libyan coast by the first half of 2020, among which Gastropoda was the most common taxa, followed by Bivalvia, Cephalopoda, Polyplacophora, and Scaphopoda (Table 1, Figure 2). The results of the current study are different from the results of other studies of Mediterranean countries. For example; in the Turkish coasts, a total of 1065 Mollusca species were recorded up to the first half of 2014 (Öztürk *et al.* 2014). Despite the habitat diversity and topographies in the Libyan coast, the numbers of these species are very low compared to the other Mediterranean countries (Minelli 1996; Öztürk *et al.* 2014; Gofas *et al.* 2017). Moreover, in the Italian coast, a total of 1602 marine Mollusca species were mentioned in the revised checklist assembled by the Italian Society of Marine Biology (SIBM) (Relini 2008). In the South Adriatic Sea (Montenegro), the number of Mollusca was 354 species, where twelve species were the first records, 7 species were non-native origin, while 14 taxa were recognized as endangered and threatened species (Petović *et al.* 2017). In the Spanish water, the reported number was very high compared to the other Mediterranean countries, reaching 2466 species (Gofas *et al.* 2017), representing about 5.5% of the global marine Mollusca richness which is estimated between 43600 and 46000 species (Rosenberg 2014). These variations are due to the number of recorded species in relation to the size of the studied area and points to a rich malacofauna zone (Petović *et al.* 2017). One of the important reasons affecting the distribution of Mollusca in the Libyan coasts is the habitat variation. The existence of a wide continental shelf in the western region, which is considered as one of the best areas in the Mediterranean for fishing and industrial activities, therefore, is a photic area and assures availability and variability of food, protection and rich biodiversity. The central region (Sirt Gulf) is also suitable for the reproduction of these species. Moreover, the area is warmer than western and eastern regions.

It is certainly true that there is a lack of studies in this area (Shakman 2008), the potential reason for the difference in the abundance of Mollusca species in Libyan coast in comparison with the other Mediterranean countries might be due to the lack of benthic macrofauna studies in Libya, and the rarity of preferred habitats of the Mollusca species such as soft and hard substrates. The difference might be also due to the lack of specialists in this field in Libya.

This study revealed that the distribution of Mollusca species in Libya in the western and eastern regions was 32.56% and 29.94%, respectively, and the lowest percentage was found in the area that extended from the western region to Sirt Gulf (WS) with 1.74% (Figure 4). Libya has an interesting geographic location in the central and warm part of the Mediterranean. Such a region can host tropical species arriving from the east (Indo-Pacific origin) or expanding from the west (Tropical Atlantic origin) (Shakman *et al.* 2017; 2019). Despite the huge length of the coast and habitat diversity, 18 non-indigenous marine Mollusca species have been reported in this inventory, but in comparison with the other Mediterranean countries, this number is very low. For example, 38 non-indigenous Mollusca species were recorded in Spanish coast (Gofas *et al.* 2017). In the Italian coast 28 non-indigenous Mollusca species were recorded (Minelli 1996), and in the Turkish coast the number of non-indigenous Mollusca species is 118 and the latter is the highest number in the Mediterranean (Öztürk *et al.* 2014), possibly the most updated and carefully gathered in the Mediterranean Sea. A total of 31 non-indigenous Mollusca species were listed in the Tunisian coast which is near to the Libyan coast (Ben-Amor *et al.* 2016). However, the lack in the numbers of non-indigenous species along the Libyan coast is likely due to the limited research effort and a lack of taxonomic expertise; nevertheless, this has intensified in the recent years (Shakman *et al.* 2019). Another reason for the low number of non-indigenous species along the Libyan coast could be the geographic position of Libya, which is (i) to the west of the predominant circulation currents that disperse propagules to the north and east from the Suez Canal and (ii) not sufficiently close to the western Atlantic and the Sicily Strait, which is considered a boundary zone between the western and eastern Mediterranean Basins and an invasion hotspot (Azzurro *et al.* 2014; Mannino *et al.* 2017; Shakman *et al.* 2019).

This paper provides the first inventory of Mollusca species in the southern coast of the Mediterranean Sea, more specifically in the Libyan coast. It provides an baseline information about the number of these species, their distribution and status. It is highly recommended to conduct comprehensive researches on these species; in particular, the biological and environmental studies, as well as, those regarding the impact of alien species on these coasts.

Acknowledgments

The authors would like to express their thanks to Dr. Khaled Etayeb, Zoology Department, the University of Tripoli for his help, and the fishermen along the Libyan coast for their help. The Libyan Authority for Research, Science and Technology has funded this project.

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