Inventory of marine molluscs in Gulf of Oran (Western Algerian coastline)

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Received: May 2021 Accepted: October 2021

Abstract

This present paper made it possible to update the inventory of benthic malacofauna in the soft bottoms of gulf of Oran. Samples of macrobenthic fauna were collected and separated from the Molluscs from other zoological groups. 116 Molluscs inventoried and determined by the species, including 13 orders, 20 families, 24 genuses and 29 species. Bivalvia is represented better than Gastropoda with respectively, 24 and 5 species. The analyzed taxa highlighted the dominant and main species on the bottom of the study sites, including *Nuculana commutata*, which appeared as the major species, followed by *Nucula sulcata* with respectively 23,46% and 12,34%. The present inventory indicates that the malacological fauna is less diversified than in the other zones studied of the Algerian coast.

Keywords: Malacofauna, Softbottom, Mollusc, Bivalvia, Gasteropoda, Gulf of Oran

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Introduction

In the west Algerian coast, few works were done on marine macrobenthic fauna. Most of the previous inventories of the benthic fauna of continental shelf in the west coast of Algeria were not updated (Dautzemberg, 1895; Pallary, 1900; Llabador, 1935; Amar, 1998, Kerfouf et *al.,* 2007; Bakalem *et al*., 2008). The benthic fauna found in abundance in all marine ecosystems is a food source for a great diversity of animals, vertebrates, and invertebrates, some of which either fished or reared. The Molluscs are one of the biological keys to detecting any disturbance of the ecological system (Benzaoui *et al.,* 2015; Rouabhi, 2020). Molluscs are an essential indicator of estuaries and coastal ecosystem health, and the absence or presence of some species can give information about the water quality status (Dauvin *et al.,* 2010). The objective of this research is an inventory and an update of the list of mollusc species of the soft bottom in the gulf of Oran.

Material and methods

Study area

Gulf of Oran is between Cap Aiguille and Cap Falcon on the Algerian West coast (Fig. 1). Two of the largest harbor in Algeria is in this area: Oran and Mers El Kébir. Waters coming from the Atlantic Ocean nourished the gulf of Oran. The circulation is very turbulent along the North African continent, which favors the dispersion of possible sources of pollution (Millot, 1989). This coastal water of the gulf of Oran exposed to different pollution whose origin is the urban concentration and socio-economic development (Remili and Kerfouf, 2013; Dilem *et al.,* 2014; Benali *et al.,* 2017).

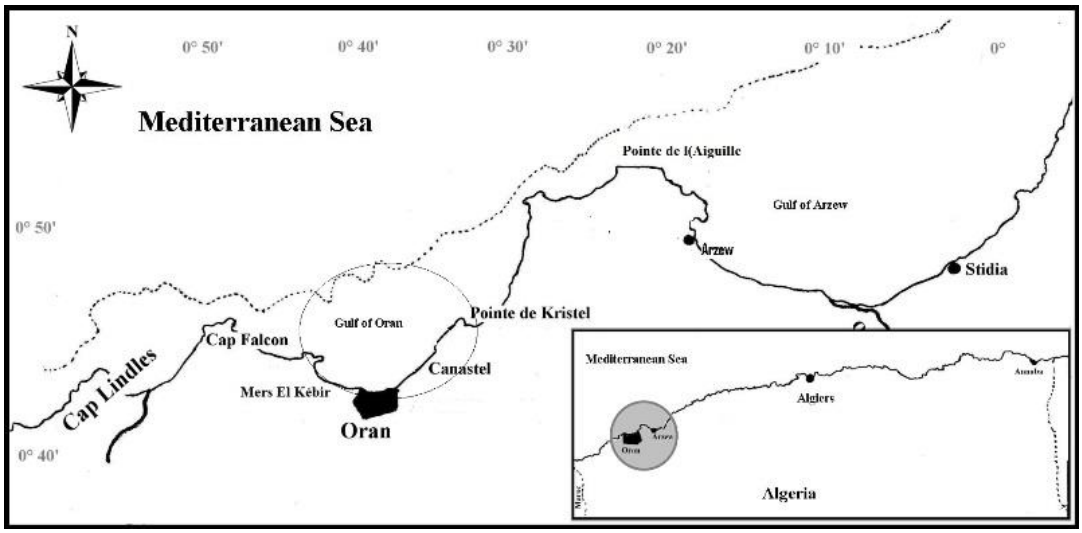

Figure 1: Study area.

Sampling

We explored Forty-nine stations in this study. Samples were taken from a depth ranging from 30 to 106 m along the shore region and from offshore (Table 1).

Table 1: Geographic position and depth of stations.

Stations	Position Latitude N	Position Longitude W	Depht (m)
1.7	35°45’45’’	00°42’65’’	70
1.8	35°46’95’’	00°42’75’’	80
1.9	35°47’23’’	00°41’55’’	90
1.9’	35°37’47’’	00°41’60’’	92
1.10	35°47’95’’	00°41’55’’	102
2.1	35°44’23’’	00°41’08’’	46
2.2	35°44’95’’	00°40’05’’	73
2.2’	35°44’95’’	00°40’05’’	73
2.3	35°45’80’’	00°40’90’’	81
2.4	35°46’70’’	00°40’60’’	82
2.5	35°47’60’’	00°40’50’’	87
2.6	35°48’50’’	00°40’35’’	98
3.1	35°44’38’’	00°40’25’’	61
3.2	35°45’05’’	00°40’00’’	73
3.3	35°45’85’’	00°39’80’’	81
3.4	35°46’90’’	00°39’50’’	82
3.5	35°47’90’’	00°39’25’’	91
3.6	35°48’50’’	00°38’80’’	91
4.1	35°42’00’’	00°39’03’’	42
4.2	35°43’05’’	00°39’00’’	66
4.3	35°44’05’’	00°39’00’’	74
4.4	35°44’09’’	00°38’09’’	77
4.5	35°46’05’’	00°38’05’’	77
4.6	35°47’03’’	00°78’01’’	82
4.7	35°48’02’’	00°73’05’’	84
4.8	35°49’50’’	00°37’40’’	110
5.5	35°43’05’’	00°37’05’’	56
5.6	35°43’08’’	00°37’05’’	60
5.7	35°45’00’’	00°37’00’’	70
5.8	35°47’08’’	00°36’07’’	82
5.9	35°48’06’’	00°36’05’’	94
5.10	35°48’04’’	00°36’08’’	106
6.4	35°44’68’’	00°35’67’’	39
6.5	35°45’42’’	00°35’70’’	55
6.6	35°46’35’’	00°35’75’’	61
6.6’	35°47’55’’	00°35’85’’	66
7.4	35°47’10’’	00°34’60’’	60
7.5	35°46’77’’	00°34’45’’	70
7.6	35°48’96’’	00°34’50’’	50
7.7	35°47’10’’	00°34’60’’	60
7.8	35°48’15’’	00°35’20’’	70
7.9	35°48’50’’	00°35’50’’	80
7.10	35°49’15’’	00°35’55’’	100
8.3	35°47’10’’	00°33’30’’	32
8.4	35°47’40’’	00°33’50’’	41
8.5	35°47’60’’	00°33’65’’	49
8.6	35°48’20’’	00°34’00’’	61
8.7	35°48’70’’	00°34’75’’	70
8.8	35°49’20’’	00°34’55’’	80
8.10	35°49’78’’	00°34’95’’	95

Sampling have been randomly selected in the coastal regions having both sandy and gravel substrates. The type of machine used for the sample was Aberdeen or “Smith Mc Intyre” grab. The residue was fixed with formalin (N/ 10) for laboratory study after sieving the samples. A first segregation was made, according to their belonging to one of the largest zoological groups. All molluscs were identified down to the species level, using Marsh (1964), Hinton (1972), Dance (1976), Springsteen and Leobrera (1986), Abbott (1991), Poppe (2008), Wong and Arshad (2011) and (http://www.marinespecies.org/) as references.

Data analysis

For each inventoried species, the frequency was noted to establish species abundance and dominance calculations.

Results

The 164 individuals of Molluscs were collected and inventoried in the Gulf of Oran. The determination of each specimen allowed us to identify 2 class, 13 orders, 20 families, 24 genus, and 29 species.

Two classes are highlighted: Bivalvia, and Gastropoda with 24 and 5 species.

Class: Bivalvia

We noted four (4) subclasses: Pteriomorphia, Heterodonta, Protobranchia, and Autobranchia.

Subclass: Pteriomorphia
Three (3) orders are identified: Mytiloida, Pectinoida, and Limoida.
Order: Mytiloida
Super family: Mytiloidea
Family: Mytilidae
Genus: Lioberus
Species: *Lioberus agglutinans* (Cantraine, 1835) synonym *Amygdalum agglutinans* (Cantraine, 1835)
Genus: Amygdalum
Species: *Amygdalum phaseolinum* (Philippi, 1844)
Order: Pectinoida
Superfamily: Pectinoidea
Family: Pectinidae
Subfamily: Palliolinae
Genus: Peplum
Species: *Peplum clavatum* (Poli, 1795)
Order: Limoida
Superfamily: Limoidea
Family: Limidae
Genus: Limatula
Species: *Limatula subauriculata* (Montagu, 1808)
Subclass: Heterodonta
Six (6) orders are identified: Carditoida, Myoida, Euheterodonta, Lucinoida, Anomalodesmata and Veneroida.
Order: Carditoida
Superfamily: Carditoidea
Family: Carditidae
Genus: Centrocardita
Species : *Centrocardita aculeata* (Poli, 1795) synonym *Cardita aculeata* (Poli, 1795)
Genus: Cardites
Species: *Venericardia antiquata* (Linné, 1758) Synonym: *Cardites antiquatus* (Linnaeus, 1758)
Superfamily: Crassatelloidea
Family: Astartidae
Genus: Gonilia
Species: *Gonilia calliglypta* (Dall, 1903)
Order: Myoida
Superfamily: Myoidea
Family: Corbulidae
Genus: Corbula
Species: *Corbula gibba* (Olivi, 1792)
Order: Euheterodonta
Superfamily: Hiatelloidea
Family: Hiatellidae
Genus: Hiatella
Species: *Saxicava arctica* (Linnaeus, 1767)
Order: Lucinoida
Superfamily: Lucinoidea
Family: Lucinidae
Genus: Loripes
Species: *Loripes lacteus* (Poli, 1791) synonym *Loripes lucinalis* (Lamarck, 1818)
Order: Anomalodesmata
Superfamily: Pandoroidea
Family: Lyonsiidae
Genus: Lyonsia
Species: *Lyonsia norwegica* (Gmelin, 1791)
Order: Veneroida
Superfamily: Cardioidea
Family: Cardiidae
Subfamily: Fraginae
Genus: Papillicardium
Species: *Papillicardium papillosum* (Poli, 1791)
Species: *Parvicardium scabrum* (Philippi, 1844)
Superfamily: Veneroidea
Family: Veneridae
Genus: Pitar
Species: *Pitar dione* (Linnaeus, 1758)

Species: *Pitar rudis* (Poli, 1795)
Genus: Timoclea
Species: *Venus ovata* (Pennant, 1777) *synonym Timoclea ovata* (Pennant, 1777)
Superfamily: Tellinoidea
Family: Tellinidae
Genus: Moerella
Species: *Tellina donacina (Linnaeus, 1758) synonym Moerella donacina* (Linnaeus, 1758)
Superfamily: Tellinoidea
Family: Tellinidae
Genus: Tellina
Species: *Tellina distorta* (Poli, 1791)
Superfamily: Tellinoidea
Family: Psammobiidae
Genus: Gari
Species: *Gari costulata* (Turton, 1822)
Subclass: Protobranchia
Three (3) are identified: Nuculanoida, Nuculida, and *Cardiida.*
Order: Nuculanoida
Superfamily: Nuculanoidea
Family: Nuculanidae
Subfamily: Nuculaninae
Genus: Nuculana
Species: *Nuculana commutata* (Philippi, 1844) synonym *Leda fragilis* (Chemnitz, 1784)
Order: Nuculida
Superfamily: Nuculoidea
Family: Nuculidae
Genus: Nucula
Species: *Nucula turgida* (Gould, 1846)
Species: *Nucula sulcata* (Bronn, 1831
Species: *Nucula nucleus* (Linnaeus, 1758)
Subclass: Autobranchia
Order: ***Cardiida***
Family: *Tellinidae*
Genus: Gastrana
Species: Gastrana fragilis (Linnaeus, 1758) synonym *Uncidens arupinensis* (Coen, 1933)

Class: Gastropoda
We noted one (1) subclass
Subclass: Caenogastropoda
Order: Neogastropoda
Superfamily: Buccinoidea
Family: Nassariidae
Genus: Nassarius
Species: *Nassa limata* (Philippi, 1836) synonym *Nassarius lima* (Dillwyn,1817) **Species**: *Hinia reticulata* (Linné, 1758) *synonyme Nassarius reticulatus* (Linnaeus, 1758)
Family: Fasciolariidae
Subfamily: Fusininae
Genus: Fusinus
Species: *Fusinus rostratus* (Olivi, 1792)
Family: Buccinidae
Genus: Euthria
Species: *Euthria cornea* (Linnaeus, 1758)
Superfamily: Naticoidea
Family: Naticidae
Subfamily: Naticinae
Genus: Natica
Species: *Natica Dillwyni (*Payraudeau, 1826)

Discussion
The abundance of Molluscs varies from one site to another, depending on the substrate nature and the environmental quality. There is a high abundance in coastal stations of pollution indicator species, particularly those located at the level of wastewater discharges (Fig. 2).

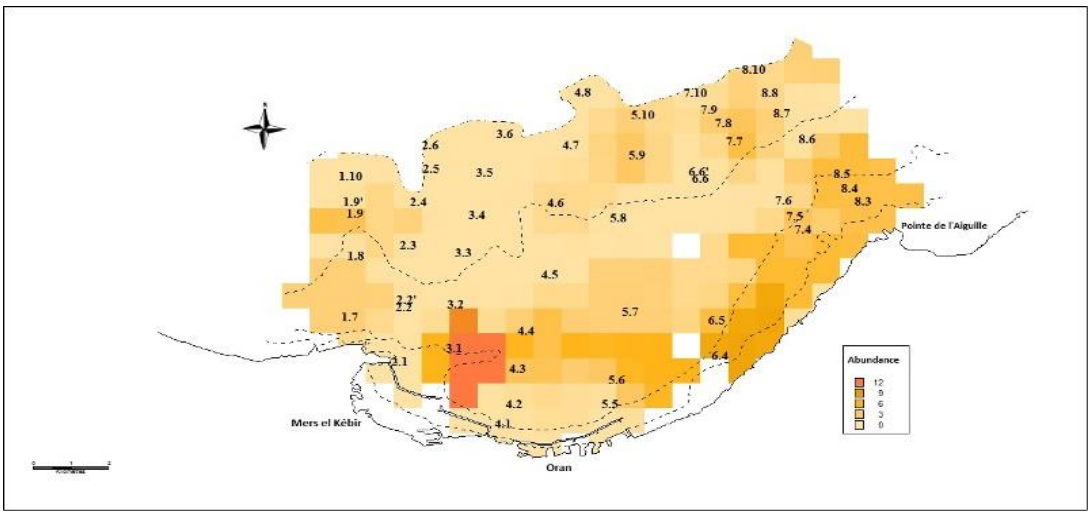

Figure 2: Abundance of Molluscs in the study area.

The specific richness is high in the coastal stations, particularly in the east of the gulf of Oran, that is in the Oran's harbour, in a little disturbed area without any anthopic activities (Fig. 3).

The specific richness is high in the coastal stations, particularly in the east of the Gulf of Oran, which is at the port of Oran, in a less disturbed area without any anthropic activities.

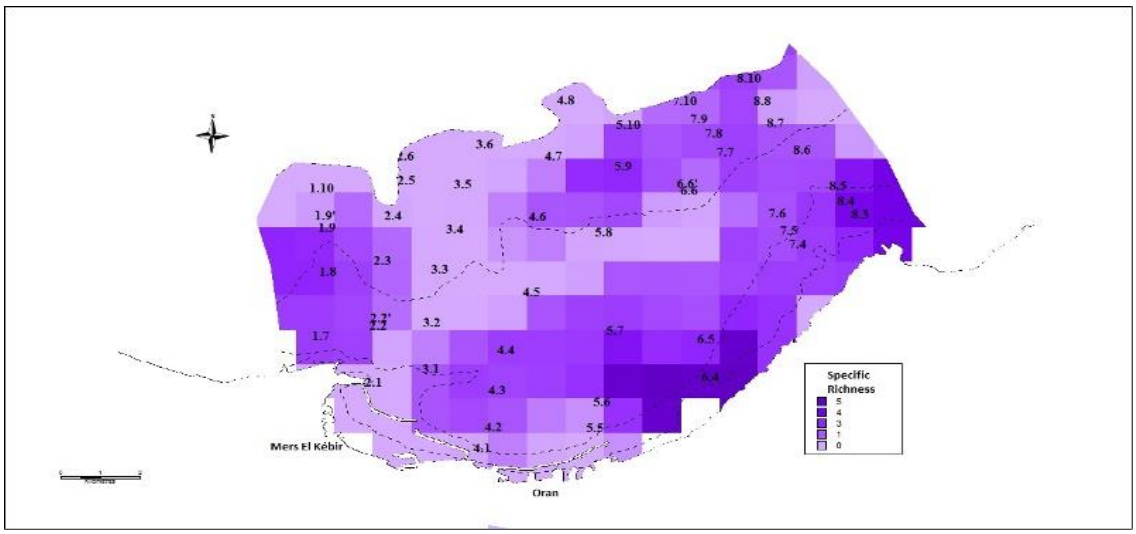

Figure 3: Specific richness of Molluscs in the study area.

Molluscs from the Gulf of Oran are all considered rare species (frequency <25%). Only five species have a frequency greater than 5%. Seven species have a frequency of 4.08% (*Corbula gibba, Hinia reticulata, Nassa limata, Nucula nucleus, Parvicardium scabrum, Tellina donacina, Venus ovata*). The other species represent only 2.04%. *Nuculana commutata* shows the highest dominance (23.46%), followed by *Nucula sulcata* (12.34%) and *Nucula turgida* (9.87%). Most of the species sampled are represented by only one species per sample, except for the species *Lima subauriculata*

(4.93%), *Papillicardium papillosum*, and *Tellina donacina* with a dominance of (3.70%). Ecologically the mixticole (Mix) species dominate in the gulf of Oran, followed by the coastal detritus species (DC). This Gulf is distinguished from other open Algerian environments by the absence of large rivers draining terrigenous inputs to the coastal bottoms of the gulf as is the case in other bays and gulfs: Algiers, Annaba, Bejaia, and Arzew. This situation explains to a large extent the organization of the benthic fauna settlements in the Gulf of Oran. The distribution of Molluscs in the gulf of Oran depends on the nature of the substrate, its composition in organism matter, and the quality of the environment, as reported in the Mediterranean Sea (Bakalem *et al.*, 2020).

The comparison of the marine molluscs of the gulf of Oran with other areas in the Algerian coast (Gulf of Arzew, Bou Ismail bay, and Algiers bay) confirmed the superiority of species with wide ecological distribution. In this study about of the gulf of Arzew, a total of 66 species identified wich which is higher than what is observed in the gulf of Oran. The distribution of molluscs showed that their ecological preference to the substratum and higher species richness may be explained to the siltation of this gulf (Amar, 1998). This difference may be linked to a temporal evolution since the data for the Gulf of Arzew date back more than 20 years and or to a difference in the ecological state of the environment. As observed in the Gulf of Oran, molluscs have a clear quantitative dominance in Bou-Ismail Bay (Hassam, 1991; Oulmi, 1991) and in Algiers bay (Bakalem *et al.*, 2020). In contrast to the dominance of bivalves in the gulf of Oran, the prospecting of rocky substrates of the Algerian west coast made it possible to identify 26 species of Gastropoda molluscs divided into 11 families (Meziane *et al.*, 2020). All research work carried out on marine mollusks in the western Algerian coast is related to one species within the framework of the Biomonitoring Programs (Bendoula et *al.*, 2017; Benali et *al.*, 2017; Meziane and Kerfouf, 2018).

Conclusion

The faunistic composition analysis of the sampled stations in the Gulf of Oran allowed us to count 116 individuals of Molluscs inventoried and determined by the species, including 13 orders, 20 families, 24 genuses and 29 species. The large ecological stocks are mixicole species and coastal detritus species. The malacofauna of the gulf of Oran is scarce and less diversified (29 species) due to the nature of the soft bottoms (sand and gravel) and the absence of terrigenous imputs. The present study carried out on samples of macrofauna in the gulf of Oran made it possible to update the inventory of benthic macrofauna in the soft bottoms of these coasts. Spatio-temporal monitoring will provide more information on the dynamics of these macrobenthic communities. The present list of

molluscs in Oran's gulf is the first step of an inventory which will be completed with a future article that will provide information and argumentation on each species with their references.

Acknowledgement

We thank reviewers for their comments and suggestions. We are grateful to all persons who contributed to the field and Laboratory analysis.

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