diversity

MDPI

Article

New Records of Marine Mollusca from the Culuccia Peninsula (NW Sardinia, Italy)

Paolo Mariottini [1], Carlo Smriglio [1], Marco Oliverio [2], Sabrina Rossi [3] and Andrea Di Giulio [1,*]

[1] Department of Science, Roma Tre University, 00146 Rome, Italy; paolo.mariottini@uniroma3.it (P.M.)
[2] Department of Biology and Biotechnologies "Charles Darwin", Sapienza University of Rome, 00185 Rome, Italy; marco.oliverio@uniroma1.it
[3] Biru s.r.l. Agricola, 07028 Santa Teresa di Gallura, Italy
* Correspondence: andrea.digiulio@uniroma3.it; Tel.: +39-3920570920

Abstract

The aim of this work is to update the checklist of the marine malacofauna of the Culuccia Peninsula (NW Sardinia, Italy), based on research carried out over two years by SCUBA and free diving in all the main marine habitats of the peninsula. We provide here new records, all accompanied by in situ images of living animals or photographs of shells. In some cases, ecological and systematic notes are provided. With the new records of 39 species (27 gastropods and 12 bivalves), a total of 295 taxa belonging to the classes Bivalvia (84), Gastropoda (199), Polyplacophora (11), and Scaphopoda (1) have been listed from this Sardinian high-biodiversity spot. Two alien species already reported, *Pinctada radiata* (Leach, 1814) and *Bursatella leachii* Blainville, 1817, can now be considered to be well established.

Keywords: molluscan fauna; inventory; Sardinia; biodiversity; wildlife conservation

Academic Editor: Michael Wink

Received: 13 October 2025
Revised: 10 November 2025
Accepted: 20 November 2025
Published: 22 November 2025

Citation: Mariottini, P.; Smriglio, C.; Oliverio, M.; Rossi, S.; Di Giulio, A. New Records of Marine Mollusca from the Culuccia Peninsula (NW Sardinia, Italy). *Diversity* **2025**, *17*, 809. https://doi.org/10.3390/d17120809

1. Introduction

The study of Mediterranean marine Mollusca is an interesting field of research that has gained more and more attention in recent decades due to the increased effort to describe and protect the biodiversity of marine environments and monitor the presence of Non-Native Species (NNS, acronym according to [1]), especially nowadays when the alteration of marine biodiversity in the Mediterranean Sea is a major concern [2,3].

The Phylum Mollusca comprises ca. 100,000 recent species, predominantly marine, and represents one of the most diverse and species-rich phyla of the animal kingdom [4–10]. It is classified into eight classes (Solenogastres, Caudofoveata, Polyplacophora, Monoplacophora, Cephalopoda, Gastropoda, Scaphopoda and Bivalvia) with an extraordinary degree of diversification of the body-plan, as well as of life strategies and ecological niche colonisation [9,10]. Of the eight molluscan classes, gastropods constitute more than 80% of the species, while bivalves represent a major part of the rest (15%) [4]. The marine molluscs of the Mediterranean Sea are commonly regarded as the best-known malacofauna in the world [2]; in spite of that, every year dozens of species are described that are new to science [5,11], and an increasing number of NIS have been continuously observed colonising and establishing stable populations in the Mediterranean basin, often with the previous cooperation of citizen scientists [12,13]. Due to their ubiquitous distribution and vast species number, molluscan communities play a crucial role in the dynamics of benthic ecosystems [14]. Furthermore, molluscs contribute to huge amounts of the biomass on the different trophic levels in ecosystems and provide valuable macroecological indicators for

ecosystem health, water quality, marine pollution, and litter decomposition [4,15]. Filter-feeding bivalves (e.g., Mytilidae, Pteriidae, Ostreidae, etc.) and grazing gastropods (e.g., Patellidae, Neritidae, Trochidae, etc.) are considered primary consumers, since they play a crucial role in filtering suspended particles and removing benthic algae, contributing to ecological stability by controlling primary biomass [15,16]. In contrast, predators (e.g., Conidae, Muricidae, Naticidae, etc.) and scavengers (e.g., Muricidae, Nassariidae, Olividae, etc.), which are generally less abundant, represent secondary consumers [15].

Culuccia is a small peninsula of < ca. 3 Km^2, situated in northwestern Sardinia (Italy) at the margin of the Maddalena Archipelago [17]. The marine area surrounding this peninsula is a Special Area of Conservation, included in the European Natura 2000 Ecological Network of protected areas. In 2021, a research project to study both the terrestrial and marine diversity of Culuccia was started [17–21]. Mariottini et al. [17] produced the first checklist of the marine malacofauna occurring in this peninsula, which proved to be a remarkable biodiversity spot.

The 295 species belonging to the classes Bivalvia, Gastropoda, Polyplacophora and Scaphopoda, were sampled in 15 sites around the peninsula, at 0–25 m depth. The aim of the present work is to update the checklist of Mariottini et al. [17], reporting newly recorded taxa concerning only the classes gastropods and bivalves, since no further new records have been observed for polyplacophorans and scaphopods, all of them accompanied by in situ images of living animals or shell photographs. Additionally, for some particular species, notes on their systematics and ecology are presented, with the goal of better describing the molluscan diversity occurring in this Special Area of Conservation and monitoring the presence of NNS [1].

2. Materials and Methods

The geographical spot under investigation, the Culuccia Peninsula, is located along the northwestern coastline of Sardinia, within the Santa Teresa di Gallura territory, facing the "Conca Verde" to the west and the "Isola dei Gabbiani" to the east. It is characterised by rocky coasts, with a few small embedded sandy beaches. The western coast faces a narrow fjord, which hosts the small marina of Porto Pozzo, small stream mouths and a suspended oyster aquaculture plant, while the northeastern coast faces the open sea. The southernmost part of the peninsula encloses a small, shallow-water, and brackish lagoon, which is connected to internal salt marshes (Figure 1a–c).

Fifteen sampling sites (SS#1–15, Figure 1c), described in Mariottini et al. [17], were monitored regularly (from 10 to 20 dives per month, over the years 2024 and 2025), through SCUBA and free diving, by using the same sampling methods adopted in the former study. In particular, molluscs were collected by hand-picking and using an air-lift suction sampler during diving, carried out mainly in benthic infralittoral environments. The explored habitats include *Posidonia oceanica* (Linnaeus) Delile, 1813 meadows; infralittoral assemblages; and soft- and hard-bottom substrates, particularly on/under rocks, rubbles, and algal biocoenoses (Figure 2a–f). Dives (1 h each) were carried out at depths ranging from 0 to 25 m. The intertidal zone was also regularly monitored on the rocky shore of the Culuccia Peninsula, especially with the aim of confirming the presence of the endangered limpet *Patella ferruginea* Gmelin, 1791, previously recorded in SS#4 and SS#8.

New molluscan records were illustrated; the systematics adopted were in accordance with MolluscaBase WoRMS [11]. An ethical approach was adopted in this research, complying with local, regional, national and international rules and regulations for access to biodiversity, sustainable use and benefit sharing (Convention on Biological Diversity and its Nagoya Protocol, and national regulations). Species identification was initially performed by each collector, but all specimens were then cross-checked by all authors, who are

experienced malacological taxonomists. Live animals were photographed in situ or in the Culuccia laboratory (Osservatorio Naturalistico) with digital cameras (Canon Powershot G11 and Olympus TG-6), equipped with housing for marine photographs. Sorting and identification of the micro material were performed by using stereomicroscopes. Representative specimens were photographed by using a ZEISS Axio Zoom V16 stereomicroscope, equipped with a ZEISS AxioCam 503 camera. Specimens of particular interest were anaesthetised with 7.5% magnesium chloride ($MgCl_2$) and preserved in 95% ethanol as reference material for future molecular studies. All shells of gastropods, bivalves, polyplacophorans (Tables S1–S3) and the scaphopod *Antalis vulgaris* (da Costa, 1778) sampled in this study were catalogued with a voucher number. The material was deposited in the Malacology Collection of the Department of Biology and Biotechnologies Charles Darwin, Sapienza University of Rome (Rome, Italy).

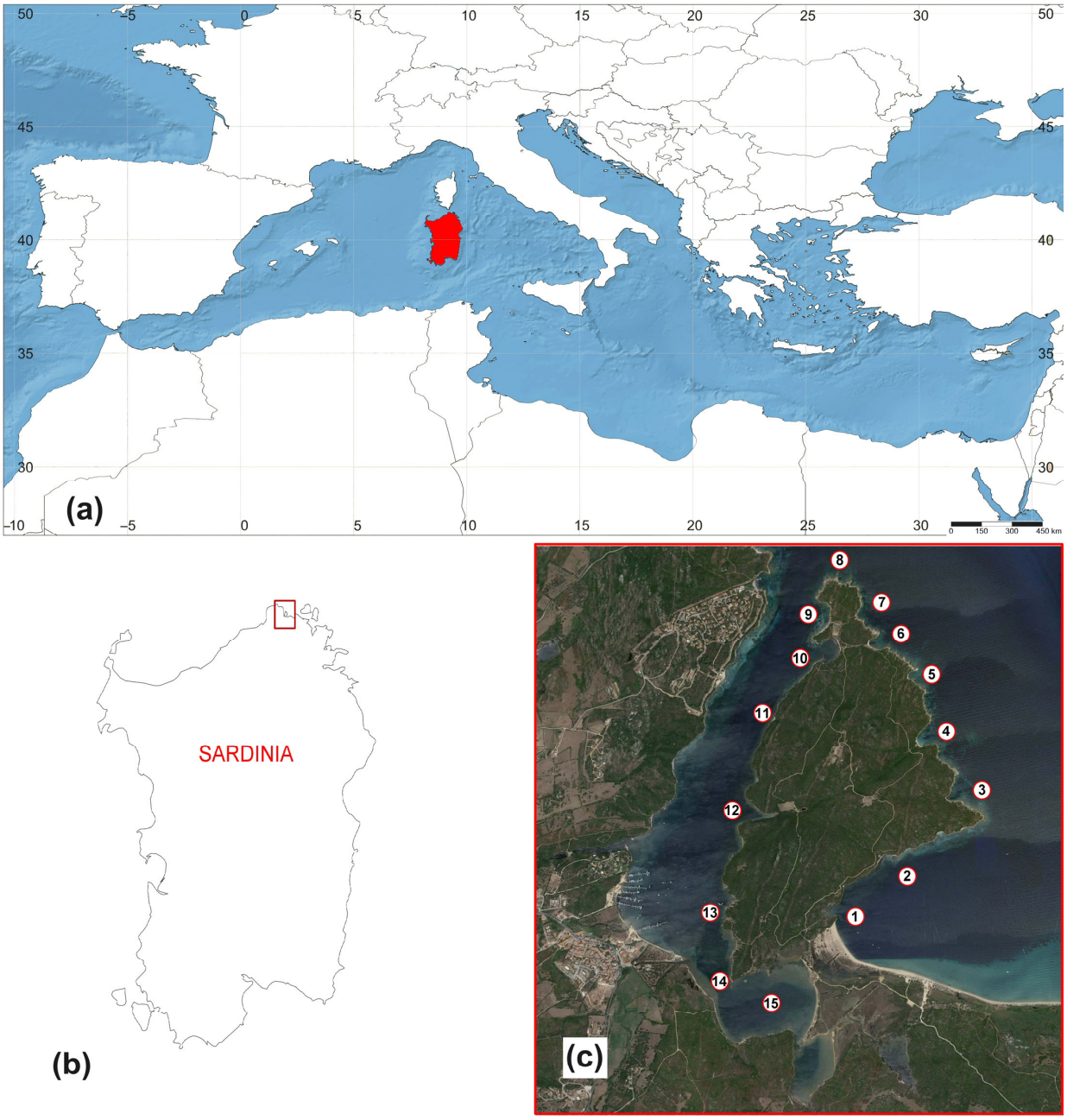

Figure 1. (**a**,**b**) Geographic map of the Culuccia Peninsula. (**c**) Localisation of the sampling sites. Description of the sites in Mariottini et al. [1].

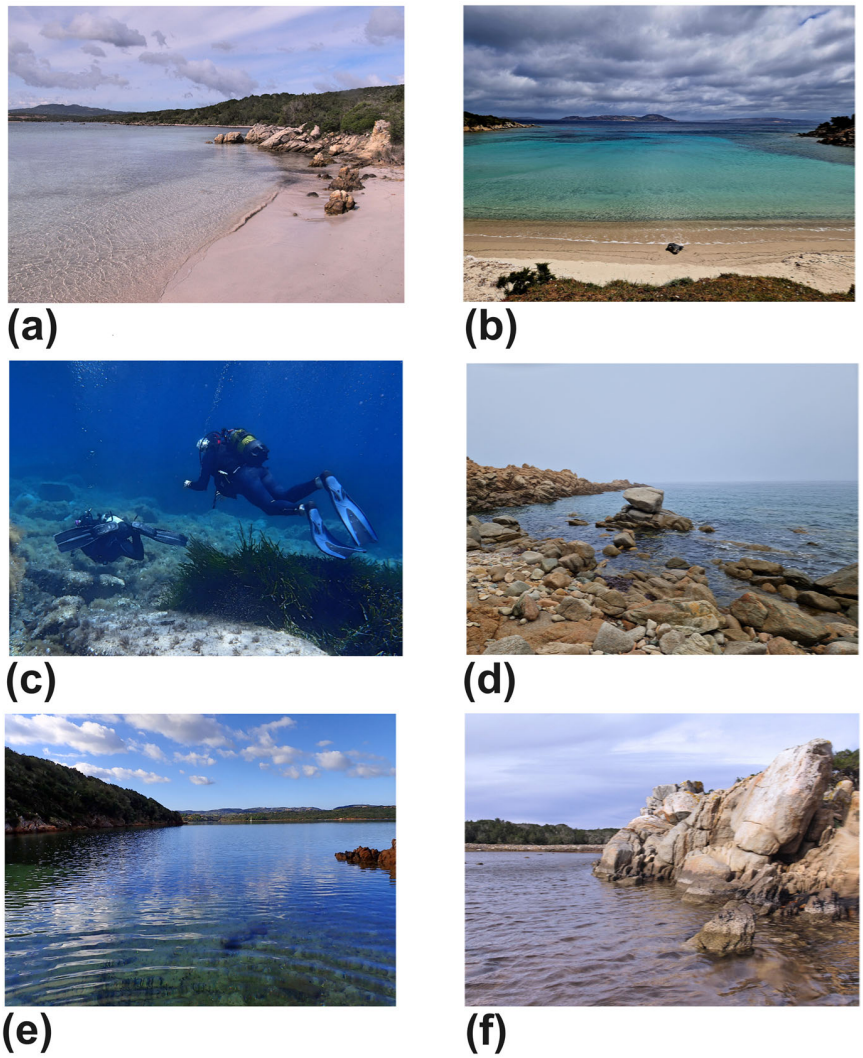

Figure 2. Sampling sites of the Culuccia peninsula from the land and underwater: (**a**) SS#2; (**b**) SS#4; (**c**) SS#4, scuba divers monitoring *Posidonia oceanica* meadow and rocky substrate, 5–20 m depth; (**d**) SS#8; (**e**) SS#12; (**f**) SS#15.

3. Results

3.1. New Records

New records [39 species (27 gastropods and 12 bivalves) in bold in Tables 1 and 2] have produced a comprehensive inventory of 295 taxa belonging to the four classes: Gastropoda (199), Bivalvia (84), Polyplacophora (11) and Scaphopoda (1). Taxonomic corrections to the previous checklist are listed here:

(1) The removal of *Leptochiton asellus* (Gmelin, 1791) from the inventory—valves of *Leptochiton scabridus* (Jeffreys, 1880) were misidentified;
(2) Substitution of *Vermetus granulatus* (Gravenhorst, 1831) with *Thylacodes arenarius* (Linnaeus, 1758);
(3) Substitution of *Ebenomitra granum* (Forbes, 1844) with *Ebenomitra savignyi* (Payraudeau, 1826);
(4) Substitution of *Parthenina alesii* Micali, Nofroni & Perna, 2012 with *Parthenina* cf. suturalis (R. A. Philippi, 1844).

The new records are reported in bold font in Table 1 (Gastropoda) and Table 2 (Bivalvia), together with data on sampling sites and collecting status (shell/alive) and illustrated with in situ or shell photographs (Figures 3–9). For polyplacophorans and scaphopods, no new records have been observed.

Table 1. Gastropoda occurring in the Culuccia Peninsula, with sampling sites and collection status. New records shown in bold.

Family	Species	Sampling Site	Shell/Alive
Patellidae	*Patella caerulea* Linnaeus, 1758	#2,#3,#4,#5,#7,#8,#9,#10,#11	alive
	Patella ferruginea Gmelin, 1791	#4,#5,#8	alive
	Patella rustica Linnaeus, 1758	#4,#5,#6,#7	alive
	Patella ulyssiponensis Gmelin, 1791	#1,#2,#3#,#7	alive
Lottiidae	*Tectura virginea* (Mueller O.F., 1776)	#8	shell
Scissurellidae	*Scissurella costata* d'Orbigny, 1824	#8	shell
Haliotidae	*Haliotis tuberculata* Linnaeus, 1758	#4,#5,#8,#12,#13	alive
Fissurellidae	*Emarginula adriatica* OG Costa, 1830	#12	alive
	Emarginula huzardii Payraudeau, 1826	#14	alive
	Emarginula pustula Thiele in Küster, 1913	#8	shell
	Emarginula sicula JE Gray, 1825	#8	shell
	***Diodora dorsata* (Monterosato, 1878)** (Figure 3a)	#9	alive
	Diodora gibberula (Lamarck, 1822)	#8	shell
	***Diodora graeca* (Linnaeus, 1758)** (Figure 3b)	#1,#13	alive
	Diodora italica (Defrance, 1820)	#4	alive
	***Fissurella nubecula* (Linnaeus, 1758)** (Figure 3c)	#9	alive
Trochidae	*Phorcus articulatus* (Lamarck, 1822)	#13	alive
	Phorcus turbinatus (Born, 1778)	#4,#5,#9	alive
	Gibbula ardens (Salis Marschlins, 1793)	#6	alive
	Gibbula fanulum (Gmelin, 1791)	#8	alive
	Gibbula guttadauri (Philippi, 1836)	#8	shell
	Gibbula turbinoides (Deshayes, 1835)	#8	shell
	***Steromphala adansonii* (Payraudeau, 1826)** (Figure 3d)	#10	shell
	***Steromphala divaricata* (Linnaeus, 1758)** (Figure 3e)	#1,#2	alive
	Steromphala umbilicaris (Linnaeus, 1758)	#4,#9,#10	alive
	***Steromphala varia* (Linnaeus, 1758)** (Figure 3f)	#10	alive
	Jujubinus baudoni (Monterosato, 1891)	#8	shell
	Jujubinus depictus (Deshayes, 1835)	#8	shell
	Jujubinus exasperatus (Pennant, 1777) (Figure 12a,b)	#4,#5,#8	alive
	Jujubinus striatus (Linnaeus, 1758)	#8	shell
	Jujubinus vulgaris (Risso, 1826) (Figure 12c,d)	#4,#8,#12	alive
	Clanculus corallinus (Gmelin, 1791)	#8	shell
	Clanculus cruciatus (Linnaeus, 1758)	#4,#5,#10	alive
	Clanculus jussieui (Payraudeau, 1826)	#4,#5,#9,#10	alive

Table 1. *Cont.*

Family	Species	Sampling Site	Shell/Alive
Calliostomatidae	*Calliostoma laugieri* (Payraudeau, 1826)	#8	alive
	Calliostoma conulus (Linnaeus, 1758)	#8	alive
Skeneidae	*Skenea serpuloides* (Montagu, 1808)	#8	shell
Turbinidae	*Bolma rugosa* (Linnaeus 1767)	#3,#4,#7	alive
	Homalopoma sanguineum (Linnaeus, 1758)	#8	shell
Phasianellidae	*Tricolia pullus* (Linnaeus, 1758)	#8	shell
	Tricolia speciosa (Von Muhelfeldt, 1824)	#8,#12	alive
Neritidae	*Smaragdia viridis* (Linnaeus, 1758)	#9,#10,#12	alive
Cerithiidae	*Bittium reticulatum* (da Costa, 1778)	#4,#5,#6	alive
	Cerithium renovatum Monterosato, 1884	#4,#5#8,12,#13,#14	alive
	Cerithium vulgatum Bruguiere, 1792	#2,#4,#5,#6	alive
Potamididae	*Pirenella conica* (Blainville, 1826)	#15	alive
Turritellidae	*Turritella turbona* Monterosato, 1887	#8	shell
Triphoridae	*Marshallora adversa* (Montagu, 1803)	#8	shell
	Monophorus perversus (Linnaeus, 1758)	#8	shell
	Metaxia metaxa (Delle Chiaje, 1828)	#8	shell
Cerithiopsidae	***Dizoniopsis coppolae* (Aradas, 1870)** (Figure 4a)	#8	shell
	Cerithiopsis tubercularis (Montagu, 1803)	#8	shell
Epitoniidae	*Epitonium clathrus* (Linnaeus, 1758)	#8	shell
Eulimidae	*Eulima glabra* (da Costa, 1778)	#8	shell
	Eulima sp.	#8	shell
	Melanella polita (Linnaeus, 1758)	#8	shell
	Parvioris ibizenca (F. Nordsieck, 1968)	#8	shell
Vanikoridae	*Megalomphalus azoneus* (Brusina, 1865)	#8	shell
Rissoidae	*Pusillina inconspicua* (Alder, 1844)	#8	shell
	Pusillina marginata (Michaud, 1830)	#8	shell
	Pusillina radiata (Philippi, 1836)	#8	shell
	Rissoa auriscalpium (Linnaeus, 1758) (Figure 4b)	#8	shell
	Rissoa lia (Monterosato, 1884)	#8	shell
	Rissoa membranacea (J. Adams, 1800) (Figure 4c)	#8	shell
	Rissoa variabilis (Megerle von Mühlfeld, 1824)	#8	shell
	Rissoa ventricosa Desmarest, 1814	#8	shell
	Rissoa violacea Desmarest, 1814	#8	shell

Table 1. *Cont.*

Family	Species	Sampling Site	Shell/Alive
Rissoidae	*Alvania beanii* (Hanley, 1844)	#8	shell
	Alvania carinata (da Costa, 1778)	#8	shell
	Alvania lactea (Michaud, 1830)	#8	shell
	Alvania lineata Risso, 1826	#8	shell
	Alvania mamillata Risso, 1826	#8	shell
	Alvania scabra (Philippi, 1844)	#8	shell
	Rissoina bruguieri (Payraudeau, 1826)	#8	shell
	Crisilla semistriata (Montagu, 1808)	#8	shell
	Manzonia crassa (Kanmacher, 1798)	#8	shell
Caecidae	*Caecum subannulatum* de Folin, 1870	#8	shell
	Caecum trachea (Montagu, 1803)	#8	shell
Truncartellidae	*Truncatella subcylindrica* (Linnaeus, 1767)	#8	shell
Calyptreidae	*Calyptraea chinensis* (Linnaeus, 1758)	#8	shell
	Crepidula unguiformis Lamarck, 1822	#8	shell
Triviidae	*Trivia arctica* (Pulteney, 1799)	#8	shell
	Trivia mediterranea (Risso, 1826)	#8	shell
Vermetidae	*Thylacodes arenarius* (Linnaeus, 1758)	#2,#4,#5	alive
	***Vermetus triquetrus* Bivona e Bernardi, 1832** (Figure 4d)	#6	alive
Cypreaidae	*Luria lurida* (Linnaeus, 1758)	#4,#8,#9	alive
	Naria spurca (Linnaeus, 1758)	#4,#8	alive
Naticidae	*Euspira intricata* (Donovan, 1804)	#8	shell
	***Euspira macilenta* (Philippi, 1844)** (Figure 4e)	#2	shell
	Euspira nitida (Donovan, 1803)	#8	shell
	Naticarius hebraeus (Martyn, 1786)	#1	shell
	***Notocochlis dillwynii* (Payraudeau, 1826)** (Figure 4f)	#2	shell
	Neverita josephinia Risso, 1826	#1,#2	alive
Cassidae	*Semicassis granulata* (Born, 1778)	#1	shell
Bursidae	*Talisman scrobilator* (Linnaeus, 1758)	#8	shell
Cymatiidae	***Cabestana cutacea* (Linnaeus, 1767)** (Figure 5a)	#8	alive
	***Monoplex parthenopeus* (Salis-Marschlins, 1793)** (Figure 5b,c)	#8	shell, crabbed
Muricidae	*Bolinus brandaris* (Linnaeus, 1758)	#14	alive
	Hexaplex trunculus (Linnaeus, 1758)	#1,#4,#5,#9,#14,#15	alive
	Dermomurex scalaroides (de Blainville, 1829)	#8	shell

Table 1. *Cont.*

Family	Species	Sampling Site	Shell/Alive
Muricidae	*Ocenebra edwardsii* (Payraudeau, 1826)	#8	shell
	Ocinebrina corallina Scacchi, 1836	#8	shell
	Muricopsis cristata (Brocchi, 1814)	#1,#2,#4,#6,#8,#10,#13	alive
	Typhinellus labiatus (de Cristofori & Jan, 1832)	#8	shell
	Stramonita haemastoma (Linnaeus, 1767)	#2,#5,#6,#8	alive
	Coralliophila meyendorffii (Calcara, 1845)	#5	alive
Cystiscidae	*Granulina marginata* (Bivona, 1832)	#8	shell
Marginellidae	***Gibberula caelata* (Monterosato, 1877)** (Figure 5d)	#8	shell
	Gibberula miliaria (Linnaeus, 1758)	#8	shell
	Gibberula philippii (Monterosato, 1878)	#8	shell
Costellaridae	*Ebenomitra ebenus* (Lamark, 1811)	#9,#10	shell
	Ebenomitra savignyi (Payraudeau, 1826)	#8	shell
	Ebenomitra tricolor (Gmelin, 1790)	#8	shell
Chauvetiidae	*Chauvetia mamillata* (Risso, 1826)	#8	shell
	Chauvetia turritellata (Deshayes, 1835)	#8	shell
Pisaniidae	*Pisania striata* (Gmelin, 1791)	#4,#5,#7,#10,#12	alive
	Aplus dorbigny (Payraudeau, 1826)	#4,#10,#12	alive
	Aplus scaber (Locard, 1891)	#8	shell
Nassariidae	*Tritia corniculum* (Olivi, 1792)	#1,#2	alive
	Tritia incrassata (Strøm, 1768)	#8	alive
	***Tritia grana* (Lamarck, 1822)** (Figure 5e)	#8	shell
	Tritia mutabilis (Linnaeus, 1758)	#1,#2	shell
	Tritia neritea (Linnaeus, 1758)	#15	alive
	Tritia pellucida (Risso, 1827)	#1,#4	shell
Tudiclidae	*Euthria cornea* (Linnaeus, 1758)	#2,#4,#9	alive
Columbellidae	*Columbella rustica* (Linnaeus, 1758)	#1,#2,#3,#8	alive
	Mitrella minor (Scacchi, 1836)	#8	shell
	Mitrella scripta (Linnaeus, 1758)	#12	alive
Mitridae	*Episcomitra cornicula* (Linnaeus, 1758)	#4,#7	alive
Fasciolariide	*Tarantinaea lignaria* (Linnaeus, 1758)	#4,#5,#8,#10,#12	alive
	Pseudofusus pulchellus (R. A. Philippi, 1844)	#8	shell
	Aptyxis syracusana (Linnaeus, 1758)	#1,#2	shell
Horaiclavidae	*Haedropleura septangularis* (Montagu, 1803)	#8	shell

Table 1. *Cont.*

Family	Species	Sampling Site	Shell/Alive
Mitromorphidae	*Mitromorpha columbellaria* (Scacchi, 1836)	#8	shell
Conidae	*Conus ventricosus* Gmelin, 1791	#1,#2,#4,#14	alive
Raphitomidae	*Cyrillia linearis* (Montagu, 1803)	#8,#10	alive
	Leufroyia concinna (Scacchi, 1836)	#8	shell
	Leufroyia leufroyi (Michaud, 1828)	#8	shell
	Raphitoma bicolor (Risso, 1826)	#8	shell
	Raphitoma densa (Monterosato, 1884)	#8	shell
	Raphitoma horrida (Monterosato, 1884)	#8	shell
	Raphitoma lineolata (Bucquoy, Dautzenberg & Dollfus, 1883)	#8	shell
	Raphitoma locardi Pusateri, Giannuzzi-Savelli & Oliverio, 2013	#8	shell
	Raphitoma philberti (Michaud, 1829)	#8	shell
Mangeliidae	*Lyromangelia taeniata* (Deshayes, 1835)	#8	shell
	Mangelia multilineolata (Deshayes, 1835)	#8	shell
	Mangelia unifasciata (Deshayes, 1835)	#8	shell
	Pseudomangelia vauquelini (Payraudeau, 1827)	#8	shell
	Pyrgocythara stosiciana (Brusina, 1869)	#8	shell
	***Smithiella costulata* (Risso, 1826)** (Figure 5f)	#8	shell
Pleurobranchidae	*Berthella plumula* (Montagu, 1803)	#12,#13,#14	alive
	Berthella aurantiaca (Risso, 1818)	#4,#5,#8,#9,#10	alive
Chromodorididae	*Felimida elegantula* (R. A. Philippi, 1844)	#12	alive
	Felimida krohni (Vérany, 1846)	#9,#10	alive
	Felimida luteorosa (Rapp, 1827)	#1,#2	alive
	Felimida purpurea (Risso, 1831)	#5,#8	alive
	Felimare orsinii (Vérany, 1846)	#5	alive
	Felimare picta (Schultz in Philippi, 1836)	#1	alive
	Felimare villafranca (Risso, 1818)	#5,#12	alive
Phyllidiidae	*Phyllidia flava* Aradas, 1847	#8	alive
Dendrodorididae	*Dendrodoris grandiflora* (Rapp, 1827)	#8,#10	alive
	Dendrodoris limbata (Cuvier, 1804)	#8,#12,#13,#14	alive
	***Doriopsilla rarispinosa* Pruvot-Fol, 1951** (Figure 6a)	#12	alive
	Taringa armata Swennen, 1961	#4,#12	alive
Discodorididae	***Paradoris indecora* (Bergh, 1881)** (Figure 6b)	#13	alive
	***Peltodoris atromaculata* Bergh, 1880** (Figure 6c)	#7,#8	alive
	***Platydoris argo* (Linnaeus, 1767)** (Figure 6d)	#4	alive
	***Tayuva lilacina* (A. Gould, 1852)** (Figure 6e)	#4	alive

Table 1. *Cont.*

Family	Species	Sampling Site	Shell/Alive
Calycidoridiidae	***Diaphorodoris alba* Portmann & Sandmeier, 1960** (Figure 6f)	#2	alive
	***Diaphorodoris papillata* Portmann & Sandmeier, 1960** (Figure 7a)	#2	alive
Janolidae	*Antiopella cristata* (Delle Chiaje, 1841)	#8	alive
Aeolidiidae	*Aeolidiella alderi* (Cocks, 1852)	#12,#14	alive
	Spurilla neapolitana (Delle Chiaje, 1841)	#1,#2,#9,#12	alive
Facelinidae	***Caloria elegans* (Alder & Hancock, 1845)** (Figure 7b)	#8	alive
	***Caloria quatrefagesi* (Vayssière, 1888)** (Figure 7c)	#2	alive
	Cratena peregrina (Gmelin, 1791)	#1,#13,#14	alive
Tylodinidae	*Tylodina perversa* (Gmelin, 1791)	#8	shell
Umbraculidae	*Umbraculum umbraculum* ([Lighfoot], 1786)	#10	alive
Cylichnidae	*Cylichna cylindracea* (Pennant, 1777)	#8	shell
Haminoeidae	*Haminoea hydatis* (Linnaeus, 1758)	#1,#14	shell
	Lamprohaminoea cyanomarginata (Heller & T. E. Thompson, 1983) *	#9	alive
Philinidae	*Philine catena* (Montagu, 1803)	#8	shell
Aplysidae	*Aplysia depilans* Gmelin, 1791	#10,#12	alive
	***Aplysia fasciata* Poiret, 1789** (Figure 7d)	#1	alive
	***Aplysia punctata* (Cuvier, 1803)** (Figure 7e)	#12	alive
	Bursatella leachii Blainville, 1817 * (Figure 11a,b)	#12	alive
	Petalifera petalifera (Rang, 1828)	#9	alive
Caliphyllidae	***Cyerce cristallina* (Trinchese, 1881)** (Figure 7f)	#12	alive
Plakobranchidae	*Elysia timida* (Risso, 1818)	#2,#4,#9,#12,#13	alive
	Thuridilla hopei (Vérany, 1853)	#9,#12	alive
Siphonariidae	*Williamia gussoni* (O. G. Costa, 1829)	#8	shell
Pyramidellidae	*Euparthenia humboldti* (Risso, 1826)	#8	shell
	Folinella excavata (Philippi, 1836)	#8	shell
	Parthenina cf. *suturalis* (R. A. Philippi, 1844)	#8	shell
	Parthenina angulosa (Monterosato, 1889)	#8	shell
	Parthenina monozona (Brusina, 1869)	#8	shell
	Pyrgiscus jeffreysii (Forbes & Hanley, 1850)	#8	shell
	Megastomia conoidea (Brocchi, 1814)	#8	shell
	Turbonilla gradata Bucquoy, Dautzenberg & Dollfus, 1883	#8	shell

NIS are labelled with *.

Table 2. Bivalvia occurring in the Culuccia Peninsula, with sampling sites and collection status. New records shown in bold.

Family	Species	Sampling Site	Shell/Alive
Nuculidae	***Nucula nitidosa* Winckworth, 1930** (Figure 8a)	#8	shell
Arcidae	*Arca noae* Linnaeus, 1758	#12,	alive
	Barbatia barbata (Linnaeus, 1758)	#4,#12,#13,#14,#15	alive
Noetiidae	*Striarca lactea* (Linnaeus, 1758)	#1,#2,#11,#14	alive
Mytilidae	*Litophaga lithophaga* (Linnaeus, 1758)	#1,#2	alive
	***Modiolus barbatus* (Linnaeus, 1758)** (Figure 8b)	#1,#2	alive
	Mytilaster marioni (Locard, 1889)	#13	alive
	Mytilus galloprovincialis Lamarck, 1819	#1,#2,#15	alive
	Musculus subpictus (Cantraine 1835)	#8	shell
	Gregariella semigranata (Reeve, 1858)	#8	shell
Spondylidae	*Spondylus gaederopus* Linnaeus, 1758	#2,#8	alive
Pectinidae	*Flexopecten hyalinus* (Poli, 1795) (Figure 8c)	#8	shell
		#12	alive (1)
	***Flexopecten flexuosus* (Poli, 1795)** (Figure 8d)	#8	alive
	Mimachlamys varia (Linnaeus, 1758)	#10,#14,#15	alive
	Manupecten pesfelis (Linnaeus, 1758)	#8	alive
	Talochlamys multistriata (Poli, 1795)	#8,#14	shell
	Palliolum incomparabile (Risso, 1826)	#8	shell
	***Pecten jacobeus* (Linnaeus, 1758)** (Figure 8e)	#1	shell
Anomiidae	*Anomia ephippium* Linnaeus, 1758	#1,#2	alive
	Heteranomia squamula Linnaeus, 1759	#8	shell
	***Pododesmus squama* (Gmelin, 1791)** (Figure 8f)	#10	alive
Limidae	*Lima lima* (Linnaeus, 1758)	#4,#9	alive
	Limaria hians (Gmelin, 1791)	#5,	alive
	Limaria tuberculata (Olivi, 1792)	#2,#12,#13,#14,#15	alive
Ostreidae	*Ostrea edulis* Linnaeus, 1758	#1,#2,#10,#11,#13,#14	alive
	Ostrea stentina Payraudeau, 1826	#2,#13,#14	alive
	Magallana gigas (Thunberg, 1793) *	#12,#14	shell
Pinnidae	*Pinna nobilis* Linnaeus, 1758	#10,#11	shell
	***Pinna rudis* Linnaeus, 1758** (Figure 9a)	#8	alive
Margaritidae	*Pinctada radiata* (Leach, 1814) * (Figure 11c,d)	#2	alive (2)
		#10	shell

Table 2. *Cont.*

Family	Species	Sampling Site	Shell/Alive
Lucinidae	*Ctena decussata* (O. G. Costa, 1829)	#8	shell
	Loripes orbiculatus Poli,1791	#4	shell
Galeommatidae	*Galeomma turtoni* W. Turton, 1825	#9	shell
Carditidae	*Glans trapezia* (Linnaeus, 1767)	#8	shell
	Cardites antiquatus (Linnaeus, 1758)	#1,#2	shell
	Cardita calyculata (Linnaeus, 1758)	#15	alive
Cardiidae	*Acanthocardia paucicostata* (G. B. Sowerby II, 1834)	#1,#2	shell
	Acanthocardia tuberculata (Linnaeus, 1758)	#1.#2,#4	alive
	Cerastoderma glaucum (Brugui ère, 1789)	#14,#15	alive
	Parvicardium exiguum (Gmelin, 1791)	#1	shell
	Papillicardium papillosum (Poli, 1791)	#1	shell
Tellinidae	*Bosemprella incarnata* (Linnaeus, 1758) (Figure 12e)	#4	shell
	***Bosemprella daniliana* (Brusina, 1866)** (Figure 12f)	#1	beached
	Fabulina fabula (Gmelin, 1791)	#4	shell
	Moerella donacina (Linnaues, 1758)	#1,#4,#8	alive
	Moerella pulchella (Lamarck, 1818)	#1,#2	shell
	Peronaea planata (Linnaeus, 1758)	#1,#2,#4	alive
	Peronidia albicans (Gmelin, 1791)	#1, #2	alive
	Arcopella balaustina (Linnaeus, 1758)	#8	alive
	Gastrana fragilis (Linnaeus, 1758)	#1,#2,#3,#4	alive
Solecurtidae	*Solecurtus strigilatus* (Linnaeus, 1758)	#4	shell
Donacidae	*Donax trunculus* Linnaeus, 1758	#1,#2	shell
	Donax variegatus (Gmelin, 1791)	#1,#2,#8	shell
	***Donax venustus* Poli, 1795** (Figure 9b)	#2	shell
Psammobiidae	*Gari costulata* (W. Turton, 1822)	#8	shell
	Gari depressa (Pennant, 1777)	#1,#2	alive
Chamidae	*Chama circinata* Monterosato, 1878	#4,	alive
	Chama gryphoides (Linnaeus, 1758)	#2,#4,#9	alive
	Pseudochama gryphina (Lamarck, 1819)	#1,#2,#5	alive
Neoleptonidae	*Neolepton sulcatulum* (Jeffreys, 1859)	#8	shell
Lasaeidae	***Bornia sebetia* (O. G. Costa, 1830)** (Figure 9c)	#1	alive

Table 2. *Cont.*

Family	Species	Sampling Site	Shell/Alive
Mactridae	***Eastonia rugosa* (Helbling, 1779)** (Figure 9d)	#1,#2	shell
	Mactra stultorum (Linnaeus, 1758)	#1,#2	shell
	Spisula subtruncata (da Costa, 1778)	#1	shell
	Lutraria oblonga (Gmelin, 1791)	#1	shell
Mesodesmatidae	*Donacilla cornea* (Poli, 1795)	#1,#15	alive
Veneridae	*Venus verrucosa* Linnaeus, 1758	#1	alive
	Dosinia exoleta (Linnaeus, 1758)	#1,#2	alive
	Dosinia lupinus (Linnaeus, 1758)	#1	alive
	Irus irus (Linnaeus, 1758)	#1	shell
	***Pitar rudis* (Poli, 1795)** (Figure 9e)	#1,#2	shell
	***Lajonkairialajonkairii* (Payraudeau, 1826)** (Figure 9f)	#1,#2	shell
	Polititapes aureus (Gmelin, 1791)	#1,#2	shell
	Polititapes lucens (Locard, 1886)	#8	shell
	Ruditapes decussatus (Linnaeus, 1758)	#1	shell
	Callista chione (Linnaeus, 1758)	#1	shell
Trapezidae	*Coralliophaga lithophagella* (Lamarck, 1819)	#8	shell
Ungulinidae	*Microstagon trigonum* (Scacchi, 1835)	#8	shell
Solenidae	*Solen marginatus* Pulteney, 1799	#1	shell
Pharidae	*Ensis minor* (Chenu, 1843)	#1	shell
Myidae	*Sphenia binghami* W. Turton, 1822	#8	shell
Thraciidae	*Thracia convexa* (W. Wood, 1815)	#1,#2	shell
	Thracia phaseolina (Lamarck, 1818)	#1,#2	shell
	Thracia villosiuscula (MacGillivray, 1827)	#1,#2	shell

NIS are labelled with *.

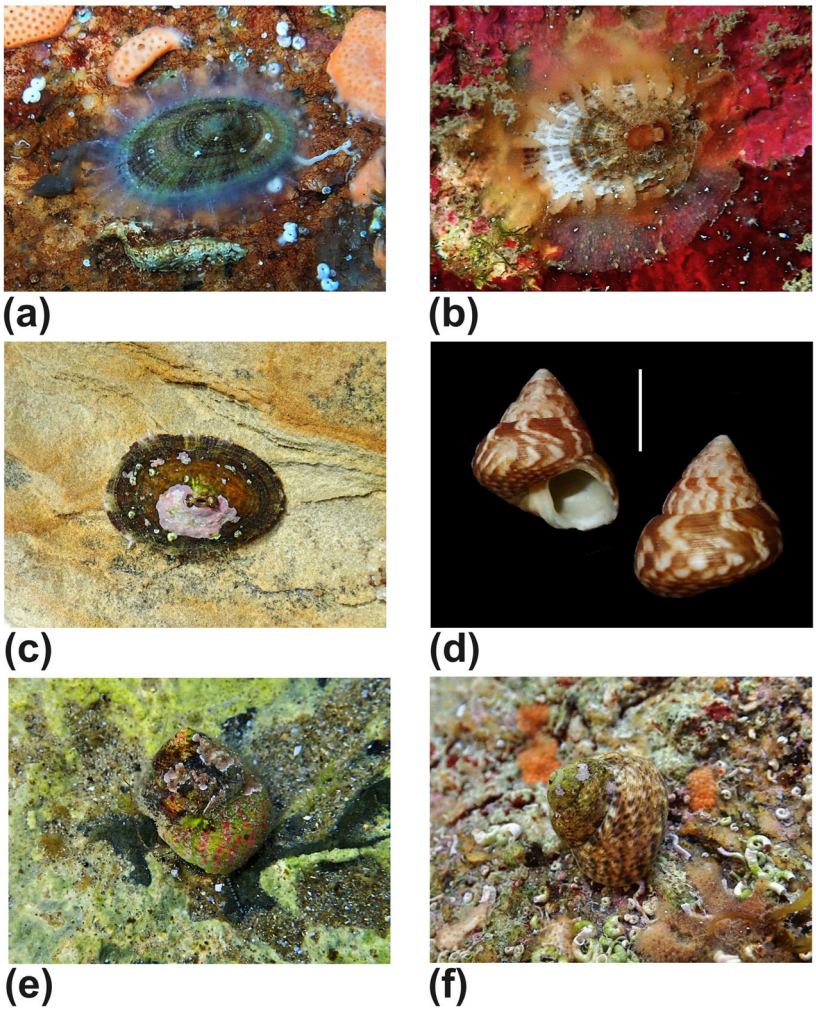

Figure 3. (**a**) *Diodora dorsata*. (**b**) *Diodora graeca*. (**c**) *Fissurella nubecula*. (**d**) *Steromphala adansonii*. (**e**) *Steromphala divaricata*. (**f**) *Steromphala varia*. Scale bar (**d**): 5 mm.

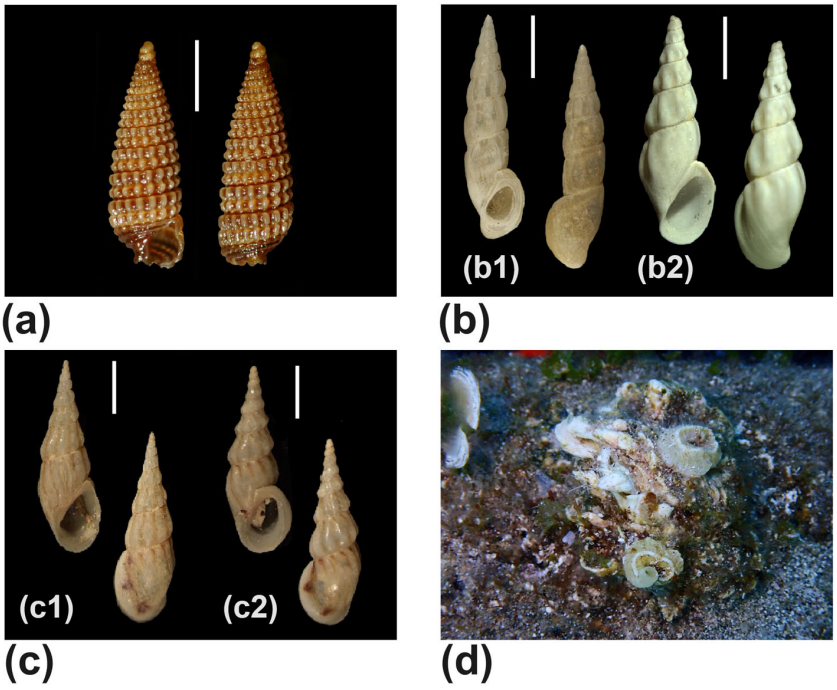

Figure 4. *Cont.*

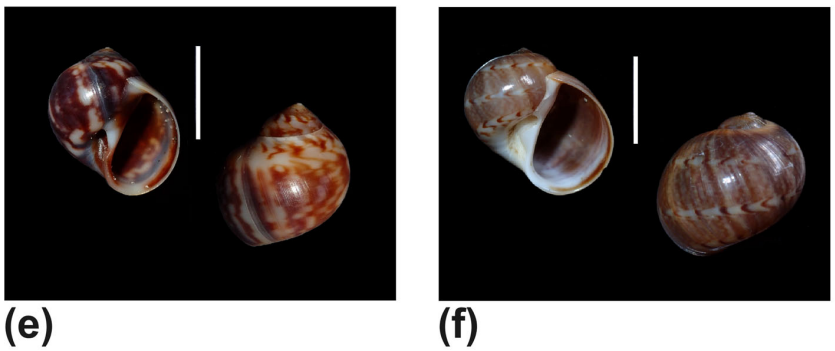

Figure 4. (**a**) *Dizoniopsis coppolae*. (**b**) *Rissoa auriscalpium*, (**b1**) Typical form, (**b2**) *"aartseni"* form. (**c**) *Rissoa membranacea*. (**c1**) Shell with thin outer lip, (**c2**) shell with thick outer lip. (**d**) *Vermetus triquetrus*. (**e**) *Euspira macilenta*. (**f**) *Notocochlis dillwynii*. Scale bar (**a**): 1 mm. Scale bars (**b1**,**b2**,**c1**,**c2**): 2 mm. Scale bars (**e**,**f**): 1 cm.

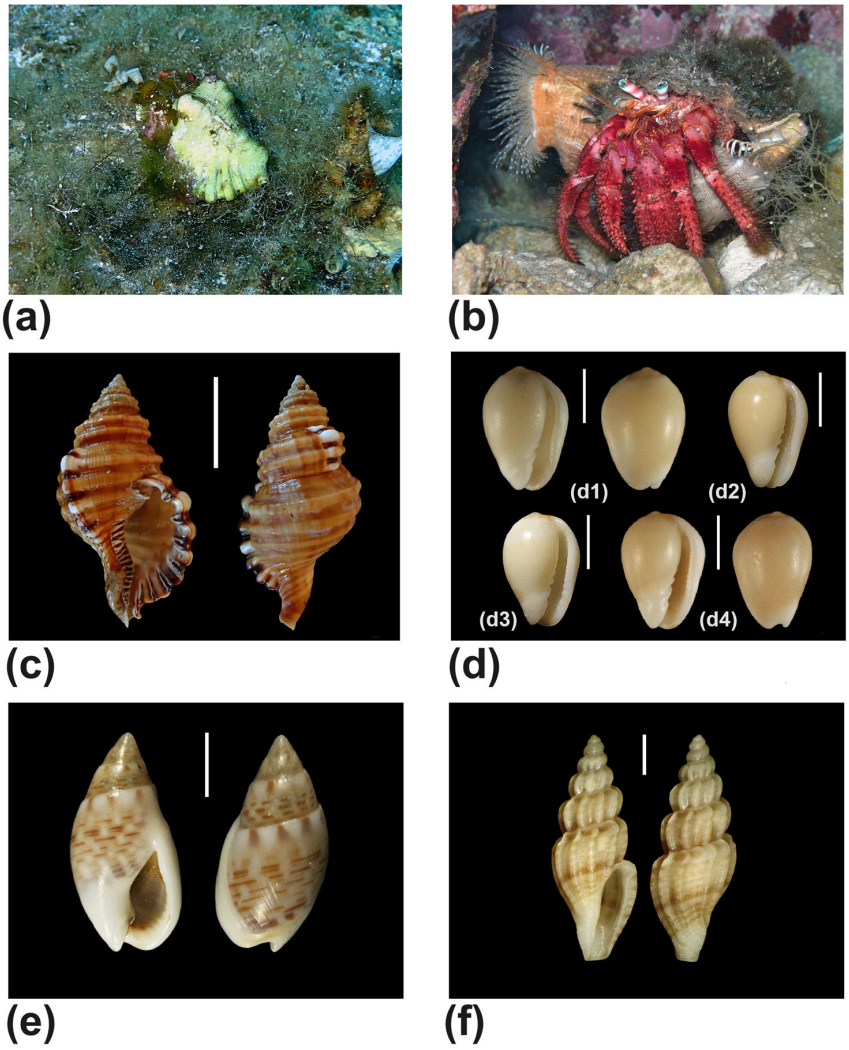

Figure 5. (**a**) *Cabestana cutacea*. (**b**) *Monoplex parthenopeus*, crabbed. (**c**) *Monoplex parthenopeus*, shell. (**d**) *Gibberula caelata*, (**d1**) from Culuccia, (**d2**,**3**) type material from Algeria, (**d4**) from Malaga (Spain). (**e**) *Tritia grana*. (**f**) *Smithiella costulata*. Scale bar (**c**): 5 cm. Scale bars (**d1**–**d4**): 2 mm. Scale bar (**e**): 3 mm. Scale bar (**f**): 1 mm.

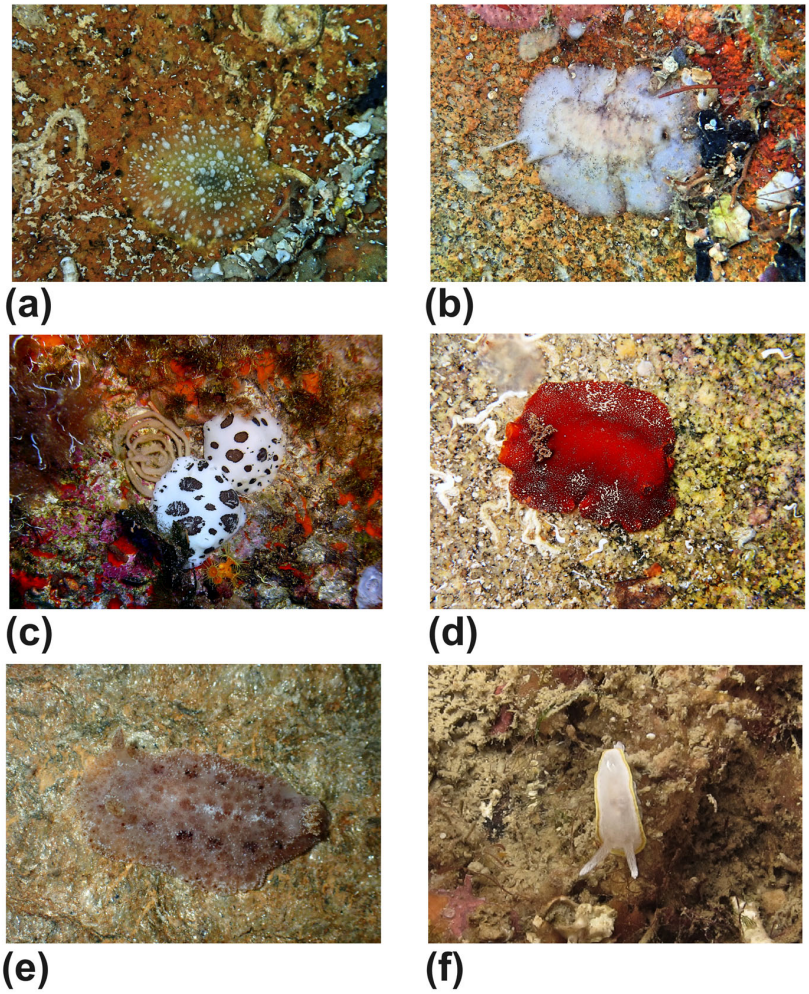

Figure 6. (**a**) *Doriopsilla rarispinosa*. (**b**) *Paradoris indecora*. (**c**) *Peltodoris atromaculata*. (**d**) *Platydoris argo*. (**e**) *Tayuva lilacina*. (**f**) *Diaphodoris alba*.

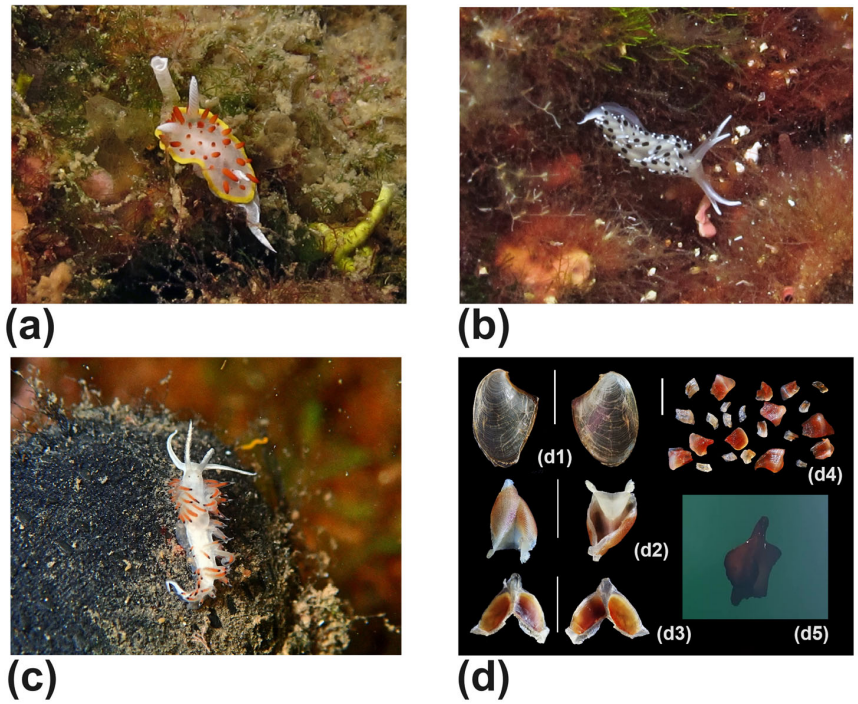

Figure 7. *Cont.*

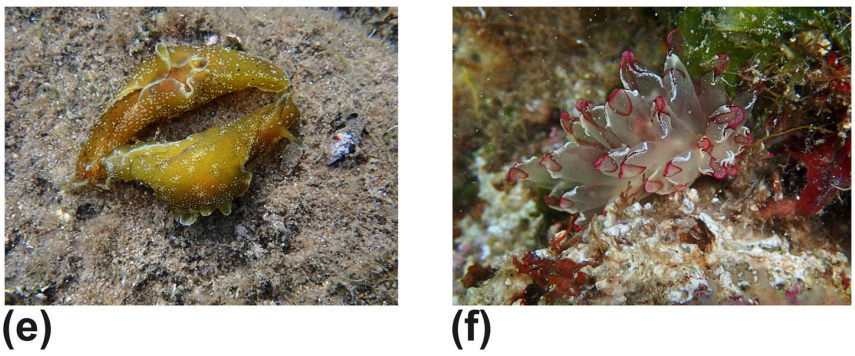

Figure 7. (**a**) *Diaphodoris papillata*. (**b**) *Caloria elegans*. (**c**) *Caloria quatrefagesi*. (**d**) *Aplysia fasciata*, (**d1**) internal shell, (**d2**) radula, (**d3**) masticatory jaws, (**d4**) gizzard plates, (**d5**) swimming animal. (**e**) *Aplysia punctata*. (**f**) *Cyerce cristallina*. Scale bar (**d1**): 2 cm. Scale bars (**d2**–**d4**), 1 cm.

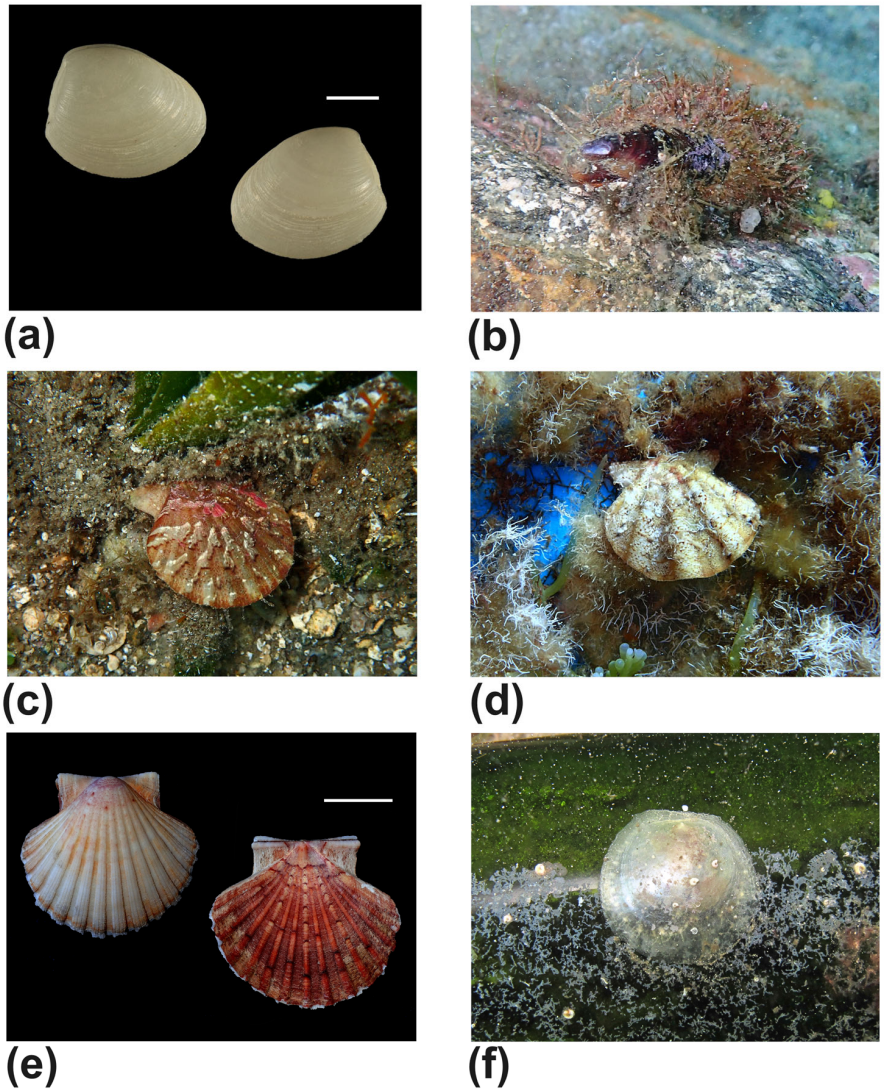

Figure 8. (**a**) *Nucula nitidosa*. (**b**) *Modiolus barbatus*. (**c**) *Flexopecten hyalinus*. (**d**) *Flexopecten flexuosus*. (**e**) *Pecten jacobaeus*. (**f**) *Pododesmus squama*. Scale bar (**a**): 2 mm. Scale bar (**e**): 2 cm.

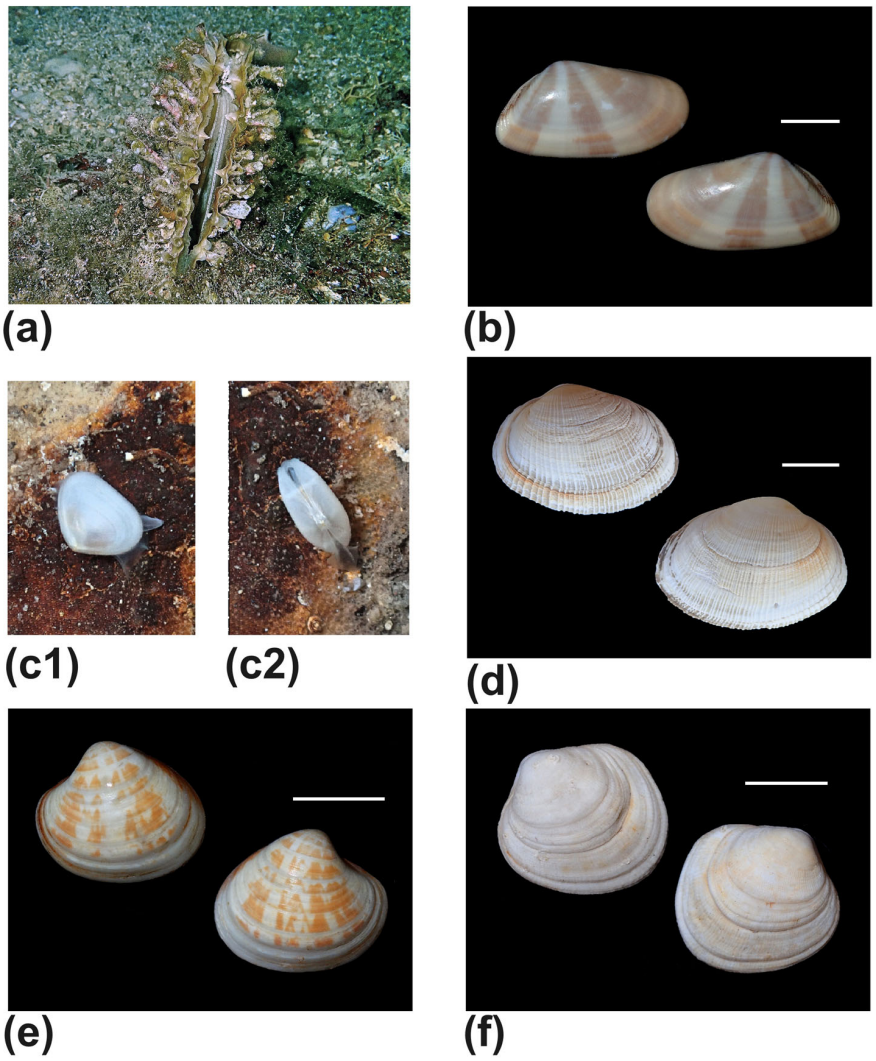

Figure 9. (**a**) *Pinna rudis*. (**b**) *Donax venustus*. (**c1**,**c2**) *Bornia sebetia*. (**d**) *Eastonia rugosa*. (**e**) *Pitar rudis*. (**f**) *Lajonkairia lajonkairii*. Line bar (**b**): 5 mm. Scale bar (**d**): 2 cm. Scale bars (**e**,**f**): 1 cm.

Amongst the four molluscan classes reported, gastropods were the most represented (68% of the total number of species), followed by bivalves (28%), polyplacophorans (3.7%) and scaphopods (0.3%) (Figure 10).

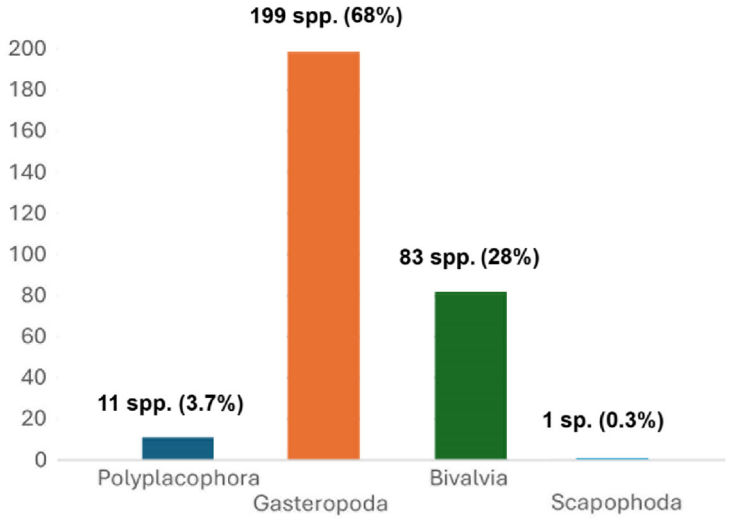

Figure 10. Composition of the marine molluscs of the Culuccia Peninsula.

3.2. Non-Native Species (NNS)

The four NNS recorded in the previous inventory have been confirmed. The sea hare *Bursatella leachii* Blainville, 1817 can be considered well established along the western coast of the peninsula (SS#9), having been frequently observed (Figure 11a,b). On the contrary, the cephalaspidean *Lamprohaminoea ovalis* (Pease, 1868) has not been recorded again. Many juvenile individuals of the rayed pearl oyster *Pinctada radiata* (Leach, 1814) [22] have been recorded byssed on rocky substrates (Figure 11c,d) at the site SS#2. The oyster *Magallana gigas* (Thunberg, 1793) seems to be confined to the suspended aquaculture plants located in the narrow fjord hosting the small marina of Porto Pozzo and facing the western coast of the peninsula (Figure 1c).

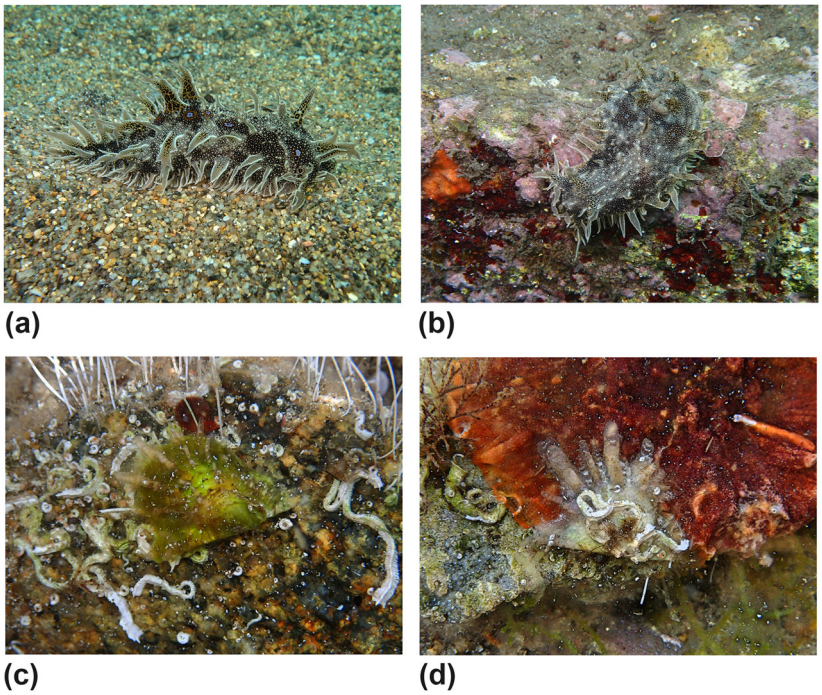

Figure 11. (**a**,**b**) *Bursatella leachii* grazing on the soft and hard bottoms of the SS#12. (**c**,**d**) Juveniles of *Pinctada radiata* byssed to hard substrate in the SS#4.

4. Discussion

As also stated by the Marine Strategy Framework Directive (2008/56/EC), molluscs are among the best bioindicators of the effects of human impact on marine ecosystems, of climate change, and of the status of protected areas [4,15]. Therefore, constant monitoring and field observation are needed to improve our understanding of biodiversity changes that can occur in the marine areas of the Mediterranean Sea. This work is part of a project devoted to gaining insight into the local and regional biodiversity of northern Sardinia. Systematics and nomenclature adopted for some of the species reported in the previous inventory [17], as well as for new records, need explanation, together with some ecological notes.

4.1. Jujubinus vulgaris (Risso, 1826)

Jujubinus vulgaris (Risso, 1826), listed in the previous checklist by Mariottini et al. [17], deserves a nomenclatural explanation. This is the oldest name for the Mediterranean species commonly called *Jujubinus exasperatus* (Pennat, 1777), which is a distinct species [23]. Both taxa have been observed syntopically grazing on *Posidonia* leaves at the site SS#4, where they feed on a variety of microalgal food sources, such as diatoms and green algal epiphytes (Figure 12a–d).

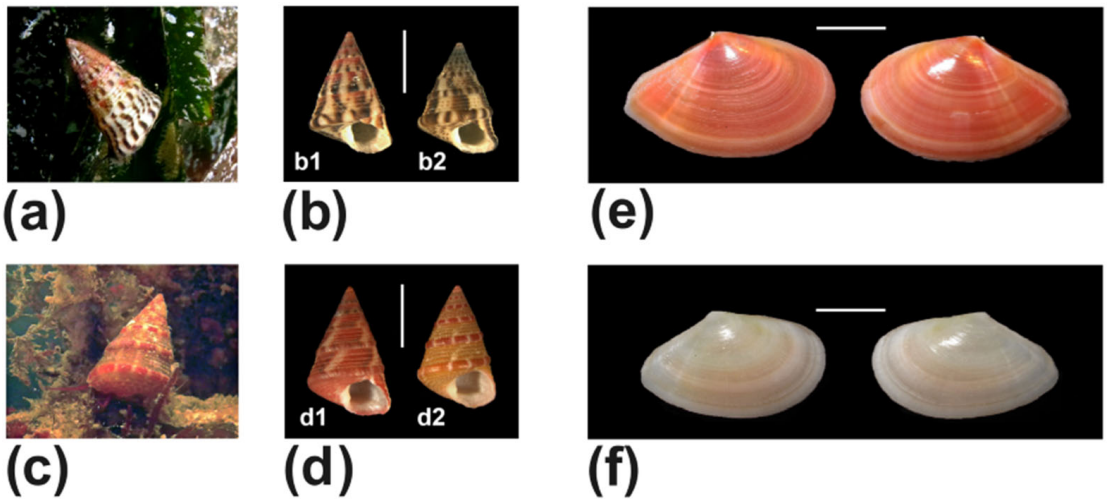

Figure 12. (**a**) *Jujubinus vulgaris*, in situ photograph. (**b1**,**b2**) *Jujubinus vulgaris*, shells. (**c**) *Jujubinus exasperatus*, in situ photograph. (**d1**,**d2**) *Jujubinus exasperatus*, shells. (**e**) *Bosemprella incarnata*. (**f**) *Bosemprella daniliana*. Scale bars (**b**,**d**): 5 mm. Scale bars (**e**,**f**): 1 cm.

4.2. Rissoa auriscalpium (Linnaeus, 1758)

It is still not clear how many species belong to the complex of *Rissoa auriscalpium*, which includes morphotypes with different teleoconchs but also specimens with two distinct protoconch types, i.e., multispiral vs. paucispiral, indicating two different larval developments, planktotrophic vs. non-planktotrophic, respectively [24–26]. We have found specimens with typical *R. auriscalpium* phenotype (Figure 4(b1)) at the site SS#8, along with individuals (Figure 4(b2)), reported as *Rissoa* sp. 1 in the previous checklist, recalling the type material of *Rissoa aartseni* Verduin, 1985, known so far only from the Gulf of Gabès. We keep all those phenotypes within *R. auriscalpium* pending a genetic assessment of the status of the various nominal taxa within this complex.

4.3. Rissoa membranacea (J. Adams, 1800)

Rissoa membranacea is a rather variable species with a broad range across the Mediterranean and European Atlantic coasts. The specimens collected at the site SS#8 are very peculiar, with a rather slender shell (Figure 4(c1,c2)). Also in this case, a modern genetic assay would help assess the status of the various phenotypes, including the relationships with the sibling *Rissoa labiosa* (Montagu, 1803) [27].

4.4. Gibberula caelata (Monterosato, 1877)

Gibberula caelata was originally described from Algeria and thereafter recorded from southern Italy, Sicily, Morocco, southern Spain, Portugal and the Canaries ([2,28], p. 39), ([29], p. 320). Specimens (Figure 5(d1)) sorted out from bioclastic sand samples collected at the site SS#8 (15 m depth) matched individuals of the type material (Figure 5(d2,d3) stored at the Museo Civico di Zoologia, Rome) ([30], p. 62, Figure 23c,d), as well as shells from other Mediterranean spots (Figure 5(d4)). This is the first record of this species from Sardinian waters, for Sector 2 of "The New Checklist of the Italian Fauna" [2].

4.5. Doriopsilla areolata (Bergh, 1880)

Taxa of the genus *Doriopsilla* Bergh 1880 in the Mediterranean Sea have been discussed by Furfaro et al. [31], who have resurrected the name of *D. rarispinosa* Pruvot-Fol, 1951 for specimens occurring in the Central Mediterranean Sea, confused in the past with *Doriopsilla areolata* Bergh, 1880, which seems to be restricted to the Adriatic Sea. At the site SS#12 (Figure 2e), we collected a specimen of *D. rarispinosa* under a stone in shallow water (Fig-

ure 6a). This site is rich in Heterobranchia species that share the same habitat: we observed *Felimare villafranca* (Risso, 1818), *Dendrodoris limbata* (Cuvier, 1804), *Aeolidiella alderi* (Cocks, 1852), *Spurilla neapolitana* (Delle Chiaje, 1841). In open water on muddy bottom with *Cymodocea nodosa* (Ucria) Ascherson, 1870, *Caulerpa prolifera* (Forsskål) J.V. Lamouroux, 1809 and seasonally *Caulerpa cylindracea* Sonder, 1845, we recorded the NNS *Bursatella leachii* Blainville, 1817 (Figure 11a,b) and the three sea hares *Aplysia fasciata* Poiret, 1789 (Figure 7d), *A. depilans* Gmelin, 1791, and *A. punctata* (Cuvier, 1803) (Figure 7e). At the site SS#12, we also confirmed the abundant presence of the sacoglossans *Elysia timida* (Risso,1818) and *Thuridilla hopei* (Vérany, 1853).

4.6. Cyerce cristallina (Trinchese, 1881)

Among the new records, a single specimen of the nocturnal *Cyerce cristallina* (Trinchese, 1881) (Figure 7f) was found beneath a stone at the site SS#12. This species seems to have a large distribution, ranging from the western Atlantic (Florida) to the Mediterranean Sea. Recently, Moreno et al. [32] published an integrative assessment of diversity in Caribbean *Cyerce* Bergh, 1871. Since they did not analyse specimens of *C. cristallina* from the Mediterranean Sea, they could not evaluate whether this species is truly amphiatlantic in distribution or whether the Mediterranean and Caribbean populations are taxonomically distinct.

4.7. Bosemprella daniliana (Brusina, 1866)

Two distinct species can be recognised among specimens commonly identified as *Bosemprella incarnata* (Linnaeus, 1758). They occur sympatrically in the Mediterranean Sea and can be easily distinguished morphologically. *Bosemprella incarnata* (Figure 12e) has been traditionally used for Mediterranean specimens that show a brilliant and vivid pink/reddish dominant colour. The second species, almost neglected by Mediterranean specialists, has a yellowish or pale pinkish colour, is smaller in size and more globose, and corresponds to the taxon *Tellina daniliana* Brusina, 1866, currently considered a synonym of *B. incarnata* [11]. Many specimens of *Bosemprella* have been collected beached with soft parts after a strong storm at the site SS#1, and after a careful examination we identified them as *B. daniliana* (Figure 12f), perfectly fitting the original description by Brusina ([33], p. 41), with their yellowish or pale pink shell, more globose and smaller than *B. incarnata*. *Bosemprella daniliana* lives in coarse sandy bottom, generally at 10–20 m depth sympatrically but not in syntopy with *B. incarnata* (personal observation): the latter prefers shallower fine sandy bottom, and shells have been collected at the site SS#4 at 2–5 m depth (Figure 2b).

Molluscs represent the second largest Phylum after arthropods, with approximately 100,000 described species and potentially still 100,000 species to be described [34]. In this respect, the Mediterranean basin is considered a hot spot of marine molluscan diversity, with high levels of endemism and cryptic species, and new species are continually discovered [2,35]. Furthermore, Mollusca represents the marine Phylum with major invasion success in the Mediterranean Sea, since it is the most abundant taxonomic group among NNS, accounting for 225 allochthonous taxa [13,36]. Describing molluscan communities along the Italian coast is an important and ongoing task aimed at monitoring and preserving biodiversity, since molluscs are effective indicators of Good Environmental Status as defined by the Marine Strategy Framework Directive (MSFD; Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008). The updated checklist of the marine malacofauna of the Culuccia Peninsula includes four NNS; two of them, the sea hare *Bursatella leachii* and the rayed pearl oyster *Pinctada radiata*, can now be considered common inhabitants of the water of the peninsula, since their populations are well established. Regarding the occurrence of the fan pen shell *Pinna nobilis* (Linnaeus, 1758), after the Mass Mortality Event [37], in the infralittoral zone of the peninsula, we observed no live

individuals during SCUBA and free dive monitoring. Another endangered species present in North Sardinia [38] and listed in the previous checklist is the limpet *Patella ferruginea* Linneus, 1758; in this case, we could confirm the presence of living specimens at the same sites earlier recorded (SS#4 and SS#8) [17].

5. Conclusions

To summarise, in this work, 39 species have been reported as new records, and added to the previous malacofaunal inventory of the Culuccia Peninsula, which now comprises a total of 295 taxa belonging to the four classes Gastropoda (199), Bivalvia (84), Polyplacophora (11) and Scaphopoda (1). Within this list, four NNS are present, two of which show stable populations during the two-year monitoring of the infralittoral zone that surrounds the peninsula. The fan pen shell *Pinna nobilis* seems not to have recovered in the area, while we could confirm the occurrence of the limpet *Patella ferruginea* along the rocky coast of the peninsula. The research project devoted to the study of marine diversity of the Culuccia Peninsula will continue in the future with the goal of monitoring, preserving and managing the remarkable biodiversity of this area.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/d17120809/s1, Table S1. GA-stroPO-da occurring in the peninsula Culuccia, voucher numbers; Table S2. BI-valvia occurring in the peninsula Culuccia, voucher numbers; Table S3. PO-lyplacophora occurring in the peninsula Culuccia, voucher numbers.

Author Contributions: Conceptualisation, A.D.G., M.O. and P.M.; Methodology, A.D.G., C.S., M.O., P.M. and S.R.; Validation, C.S., M.O. and P.M.; Investigation, A.D.G., M.O., P.M. and S.R.; Data Curation, A.D.G., C.S., M.O. and P.M.; Writing—Original Draft, A.D.G., C.S. and P.M.; Writing—Review and Editing, A.D.G., C.S., M.O., P.M. and S.R.; Supervision, P.M.; Project Administration, A.D.G. and P.M.; Funding Acquisition, A.D.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by the University Roma Tre, Department of Science (grants of Departments of Excellence—L. 232/2016—art.1, commi 314–337 awarded to Department of Science—University Roma Tre—Rome—Italy for 2018–2022, and grants 2023–2027). ADG and AR acknowledge the support of the NBFC to the University of Roma Tre, Department of Science. Funder: Project funded under the National Recovery and Resilience Plan (NRRP), Mission 4 Component 2 Investment 1.4—Call for tender No. 3138 of 16 December 2021, rectified by Decree n.3175 of 18 December 2021 of Italian Ministry of University and Research funded by the European Union—NextGenerationEU; Award Number: Project code CN_00000033, Concession Decree No. 1034 of 17 June 2022 adopted by the Italian Ministry of University and Research, CUP F83C22000730006, Project title "National Biodiversity Future Center—NBFC".

Institutional Review Board Statement: No ethical statement is reported.

Data Availability Statement: The original contributions presented in this study are included in the article/Supplementary Material. Further inquiries can be directed to the corresponding author.

Acknowledgments: Our sincere thanks to Marco Boglione and Stella Lin Hung for their excellent care provided in hosting and logistics and to Lucrecia Meani for diving logistic support. We would like to thank Egidio Trainito for documentation and collaboration during diving.

Conflicts of Interest: Author Sabrina Rossi was employed by the company Biru s.r.l. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Abbreviations

The following abbreviations are used in this manuscript:

NNS	Non-Native Species
SS	Sampling Site(s)

References

1. Soto, I.; Balzani, P.; Carneiro, L.; Cuthbert, R.N.; Macêdo, R.; Serhan Tarkan, A.; Ahmed, D.A.; Bang, A.; Bacela-Spychalska, K.; Bailey, S.A.; et al. Taming the terminological tempest in invasion science. *Biol. Rev.* **2024**, *99*, 1357–1390. [CrossRef] [PubMed]
2. Renda, W.; Amati, B.; Bogi, C.; Bonomolo, G.; Capua, D.; Dell'Angelo, B.; Furfaro, G.; Giannuzzi-Savelli, R.; La Perna, R.; Nofroni, I.; et al. The new checklist of the Italian fauna: Marine Mollusca. *Biogeogr.—J. Integr. Biogeogr.* **2022**, *37*, ucl005. [CrossRef]
3. Hassoun, A.E.R.; Mojtahid, M.; Merheb, M.; Lionello, P.; Gattuso, J.-P.; Cramer, W. Climate change risks on key open marine and coastal mediterranean ecosystems. *Sci. Rep.* **2025**, *15*, 24907. [CrossRef]
4. Oehlmann, J.; Schulte-Oehlmann, U. Chapter 17 Molluscs as Bioindicators. In *Trace Metals and Other Contaminants in the Environment*; Markert, B.A., Breure, A.M., Zechmeister, H.G., Eds.; Elsevier: Amsterdam, The Netherlands, 2003; Volume 6, pp. 577–635.
5. Bouchet, P. The magnitude of marine biodiversity. In *The Exploration of Marine Biodiversity: Scientific and Technological Challenges*; Duarte, C.M., Ed.; Fundación BBVA: Bilbao, Spain, 2006; p. 158.
6. Chapman, M.G.; Blockley, D.J. Engineering novel habitats on urban infrastructure to increase intertidal biodiversity. *Oecologia* **2009**, *161*, 625–635. [CrossRef]
7. Zhang, Z. Animal biodiversity: An introduction to higher-level classification and taxonomic richness. *Zootaxa* **2011**, *3148*, 7–12. [CrossRef]
8. Zhang, Z. Phylum Arthropoda. In: Zhang, Z.-Q. Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness (Addenda 2013). *Zootaxa* **2013**, *3703*, 17–26. [CrossRef]
9. Ponder, W.F.; Lindberg, D.R.; Ponder, J.M. *Biology and Evolution of the Mollusca*; CRC Press: Boca Raton, FL, USA, 2019; Volume 1.
10. Ponder, W.F.; Lindberg, D.R.; Ponder, J.M. *Biology and Evolution of the Mollusca*; CRC Press: Boca Raton, FL, USA, 2020; Volume 2.
11. MolluscaBase. World Register of Marine Species (WoRMS). Available online: https://www.marinespecies.org/aphia.php?p=taxdetails&id=137914 (accessed on 15 October 2025).
12. Galil, B.S.; Marchini, A.; Occhipinti-Ambrogi, A. East is east and West is west? Management of marine bioinvasions in the Mediterranean Sea. *Estuar. Coast. Shelf Sci.* **2018**, *201*, 7–16. [CrossRef]
13. Zenetos, A.; Delongueville, C.; Scaillet, R. An Overlooked group of citizen scientists in NIS information: Shell collectors and their contribution to molluscan NIS diversity. *Diversity* **2024**, *16*, 299. [CrossRef]
14. Guelorget, O.; Perthuisot, J.P. Paralic ecosystems biological organization and functioning. *Vie et Milieu* **1992**, *42*, 215–251.
15. Novoa, L.; Aldea, C.; Andrade, C.; Guarda, B.; Holtheuer, J.; Schories, D. Unveiling hidden molluscan diversity: New species records in Bougainville Bay, Strait of Magellan. *Biodivers. Data J.* **2025**, *13*, e157304. [CrossRef]
16. Underwood, A.J. The effects of grazing by gastropods and physical factors on the upper limits of distribution of intertidal macroalgae. *Oecologia* **1980**, *46*, 201–213. [CrossRef] [PubMed]
17. Mariottini, P.; Smriglio, C.; Oliverio, M.; Rossi, S.; Di Giulio, A. Checklist of the marine malacofauna of Culuccia Peninsula (NW Sardinia, Italy), with notes on relevant species. *Biodivers. Data J.* **2024**, *12*, e115051. [CrossRef] [PubMed]
18. Annessi, M.; Riccieri, A.; Marconi, M.; Rossi, S.; Di Giulio, A. Integrating taxonomic, genetic and ecological data to explore the diversity of wild bees (Hymenoptera: Apoidea: Anthophila) of the Culuccia Peninsula (NE Sardinia, Italy). *J. Hymenopt. Res.* **2025**, *98*, 117–145. [CrossRef]
19. Annessi, M.; Marzialetti, F.; Marconi, M.; Acosta, A.T.R.; Di Giulio, A. Butterfly diversity in relation to the CORINE Land Cover of the Culuccia Peninsula (Sardinia, Italy). *J. Insect Conserv.* **2025**, *29*, 17. [CrossRef]
20. Annessi, M.; Riccieri, A.; Di Giulio, A. A new species of *Andrena* (Hymenoptera, Andrenidae) from northern Sardinia (Italy). *J. Hymenopt. Res.* **2025**, *98*, 795–816. [CrossRef]
21. Annessi, M.; Forte, F.; Di Giulio, A. Flower visitor insects of *Myrtus communis* L., 1753 in the Culuccia Peninsula (NE Sardinia, Italy). *Fragm. Entomol.* **2025**, *57*, 293–296.
22. Garzia, M.; Doneddu, M.; Giacobbe, S.; Salvi, D.; Trainito, E.; Mariottini, P. Molecular and morphological data provide evidence for only one alien species of pearl oyster in the Mediterranean Sea. *Sci. Mar.* **2025**, *88*, e085. [CrossRef]
23. Pezzotti, S. Il Genere *Jujubinus* (Gastropoda; Vetigastropoda; Trochidae): Un Approccio Molecolare. Master's Thesis, University of Roma Tre, Rome, Italy, 2018.
24. Colognola, R.; Masturzo, P.; Russo, G.F.; Scardi, M.; Vinci, D.; Fresi, E. Biometric and genetic analysis of the marine rissoid *Rissoa auriscalpium* (Gastropoda, Prosobranchia) and its ecological implications. *Mar. Ecol.* **1986**, *7*, 265–285. [CrossRef]

25. Oliverio, M. Developmental vs genetic variation in two Mediterranean rissoid gastropod complexes. *J. Molluscan Stud.* **1994**, *60*, 461–465. [CrossRef]
26. Russo, G.F.; Patti, F.P. Early life history of two closely related gastropods, *Rissoa auriscalpium* and *Rissoa italiensis* (Caenogastropoda: Rissoidae). *Mar. Biol.* **2005**, *147*, 429–437. [CrossRef]
27. Munksgaard, C. Electrophoretic separation of morphologically similar species of the genus *Rissoa* (Gastropoda: Prosobranchia). *Ophelia* **1990**, *31*, 97–104. [CrossRef]
28. van Aartsen, J.J.; Menkhorst, H.P.M.G.; Gittenberger, E. The marine mollusca of the Bay of Algeciras, Spain, with general notes on Mitrella, Marginellidae and Turridae. *Basteria* **1984**, 1–135. Available online: http://natuurtijdschriften.nl/download?type=document;docid=645087 (accessed on 15 October 2025).
29. Gofas, S.; Moreno, D.; Salas, C. *Moluscos Marinos de Andalucía*; Servicio de Publicaciones e Intercambio Científico, Universidad de Málaga: Málaga, Spain, 2011; Volume 1, pp. 1–342. ISBN 978-84-9747356-9.
30. Appolloni, M.; Smriglio, C.; Amati, B.; Lugli, È.L.; Nofroni, I.; Tringali, L.P.; Mariottini, P.; Oliverio, M. Catalogue of the primary types of marine molluscan taxa described by Tommaso Allery Di Maria, Marquis of Monterosato, deposited in the Museo Civico di Zoologia, Roma. *Zootaxa* **2018**, *4477*, 1–138. [CrossRef] [PubMed]
31. Furfaro, G.; Schreier, C.; Trainito, E.; Pontes, M.; Madrenas, E.; Girard, P.; Mariottini, P. The Sea Slug *Doriopsilla areolata* Bergh, 1880 (Mollusca, Gastropoda) in the Mediterranean Sea: Another Case of Cryptic Diversity. *Diversity* **2022**, *14*, 297. [CrossRef]
32. Moreno, K.; Rico, D.M.; Middlebrooks, M.; Medrano, S.; Valdés, Á.A.; Krug, P.J. A cryptic radiation of Caribbean Sea slugs revealed by integrative analysis: *Cyerce 'antillensis'* (Sacoglossa: Caliphyllidae) is six distinct species. *Zool. J. Linn. Soc.* **2024**, *4*, 940–979. [CrossRef] [PubMed]
33. Brusina, S. *Contribuzione Pella Fauna dei Molluschi Dalmatic*; Imperiale e Reale Società Zoologico-Botanica: Vienna, Austria, 1866; p. 134.
34. Strong, E.E.; Gargominy, O.; Ponder, W.F.; Bouchet, P. Global Diversity of Gastropods (Gastropoda; Mollusca) in Freshwater. *Hydrobiologia* **2008**, *595*, 149–166. [CrossRef]
35. Coll, M.; Piroddi, C.; Steenbeek, J.; Kaschner, K.; Ben Rais Lasram, F.; Aguzzi, J.; Ballesteros, E.; Bianchi, C.N.; Corbera, J.; Voultsiadou, E.; et al. The biodiversity of the Mediterranean Sea: Estimates, patterns, and threats. *PLoS ONE* **2010**, *5*, e11842. [CrossRef]
36. Zenetos, A.; Albano, P.G.; López Garcia, E.; Stern, N.; Tsiamis, K.; Galanidi, M. Established non-indigenous species increased by 40% in 11 years in the Mediterranean Sea. *Mediterr. Mar. Sci.* **2022**, *23*, 196–212. [CrossRef]
37. Scarpa, F.; Sanna, D.; Azzena, I.; Mugetti, D.; Cerruti, F.; Hosseini, S.; Cossu, P.; Pinna, S.; Grech, D.; Cabana, D.; et al. Multiple nonspecies-specific pathogens possibly triggered the mass mortality in *Pinna nobilis*. *Life* **2020**, *10*, 238. [CrossRef]
38. Cossu, P.; Mura, L.; Dedola, G.L.; Lai, T.; Sanna, D.; Scarpa, F.; Azzena, I.; Fois, N.; Casu, M. Detection of genetic patterns in endangered marine species is affected by small sample sizes. *Animals* **2022**, *12*, 2763. [CrossRef]