

Marine invertebrate fauna of the Chausey archipelago: an annotated checklist of historical data from 1828 to 2008

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Abstract: The first updated list of the marine invertebrate fauna of the Chausey archipelago (Normand-Breton Gulf, France) is presented. All publications regarding the natural history of the area, as well as the existing collections of marine invertebrates from 1828 to 2008 were examined. A total of 769 species (including 245 Arthropoda, 197 Mollusca, 146 Polychaeta), have been recorded in this area covering 5000 ha. This species richness is largely the result of the complexity of benthic habitats of the archipelago and its long history of field work, dating back to the 19th Century. The historical data set of this region presents an opportunity to assess long-term changes in nearshore communities and to design conservation sites based on their scientific value.

Résumé : *Invertébrés marins de l'archipel des Iles Chausey : une liste commentée des données publiées de 1828 à 2008.* La première liste actualisée des invertébrés marins de l'archipel des Iles Chausey (Golfe Normand-Breton, France) est proposée. L'ensemble des manuscrits publiés de 1828 à 2008 relatifs à l'histoire naturelle du site, ainsi que différentes collections d'invertébrés marins ont été explorés. Un total de 769 espèces (parmi lesquelles 245 arthropodes, 197 mollusques, 146 polychètes), a été recensé sur ce site ne couvrant que 5000 ha. La complexité de la mosaïque d'habitats benthiques du site ainsi que son histoire naturaliste particulièrement riche, débutant dès le début du 19^{ème} siècle, expliquent largement cette richesse spécifique. Un tel jeu de données historiques sur un seul site donne une opportunité d'évaluation des changements à long terme sur le littoral et souligne l'enjeu de conservation d'un site au regard de sa valeur scientifique.

Keywords: Chausey • Marine invertebrates • Inventory • Historical data

Introduction

Fauna and flora inventories are critical components in designing conservation policies. However, historical data are often lacking along the world's coastlines and it is often difficult for scientists to assess long-term impacts of human activities. European countries such as Denmark (e.g. Petersen, 1913 & 1915), Sweden (e.g. Molander, 1928), the United Kingdom (e.g. Holme, 1950 & 1961), and France (e.g. Cabioch, 1968) are among those benefiting from historical data on invertebrate marine fauna. In France, the analysis of works by early naturalists has led to updated checklists of marine species for several coastal areas (e.g. De Montaudoin & Sauriau, 2000; Bachelet et al., 2003; Dauvin et al., 2003) and has permitted the assessment of long-term changes in the spatial distribution of invertebrate species or habitats (e.g. Godet et al., 2008).

The Chausey archipelago (Normand-Breton Gulf, France, Fig. 1) can be considered as a 'living museum' of French marine biology which merits conservation due to its high scientific value (Godet, 2008). However, with the exception of Godet (2008), no comprehensive review has been conducted in this area. In this paper, we present the first checklist of the marine invertebrates of the Chausey archipelago.

Material and Methods

Fifty-two manuscripts, three zoological collections, and a series of recent personal observations related to marine invertebrate fauna of Chausey Archipelago were examined in this study. All sources are numbered in chronological order (included in the caption of the Table 1).

We compiled all data on marine invertebrate species in a checklist (Table 1) including: i) species names with classification by Phylum, Class, and Order; ii) the source of the original data; and iii) information on the storage of type specimens in the collections of the French Museum of Natural History.

The species names and classification have been updated according to the European Register of Marine Fauna (Costello et al., 2001). Specimens identified to the genus level (e.g. *Capitella* sp.) are mentioned only if they are the single members of this genus having been reported in Chausey. Finally, collection catalogues available at the French Museum of Natural History were examined to identify potential holotypes (H) and syntypes (S) (column 'T' - Table 1) that were collected from Chausey for the following groups: Mollusca, Crustacea, Polychaeta, and Octocorallia.

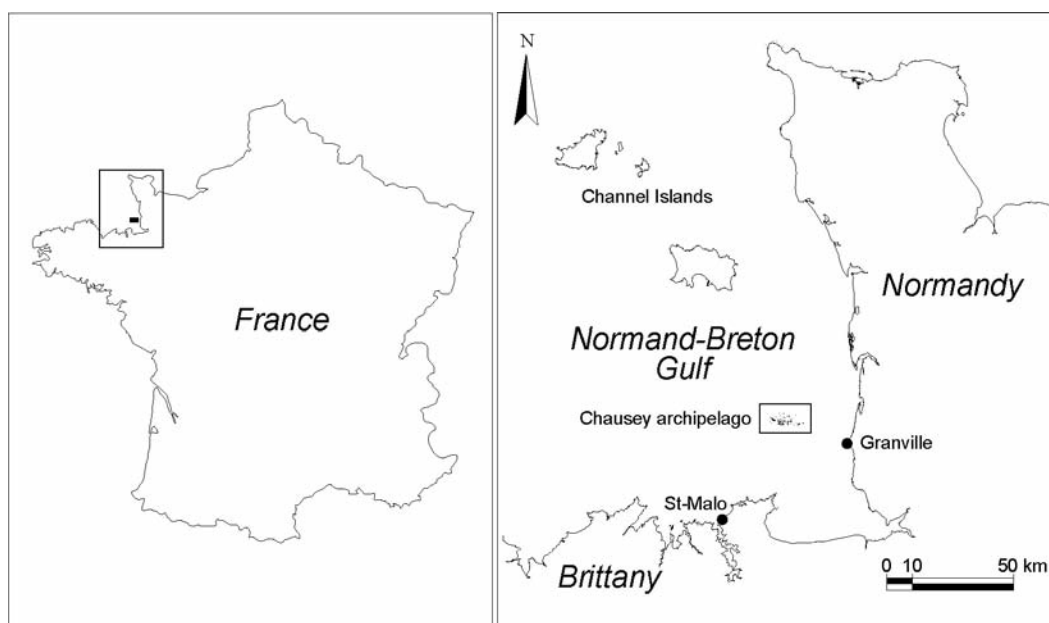


Figure 1. Location map of the study site.

Figure 1. Carte de localisation du site d'étude.

Results

A total of 14 phyla and 769 species have been reported from Chausey (Table 1), among which Arthropoda (245

species), Mollusca (197 species) and Polychaeta (146 species) covered more than 75% of the total species number (Fig. 2).

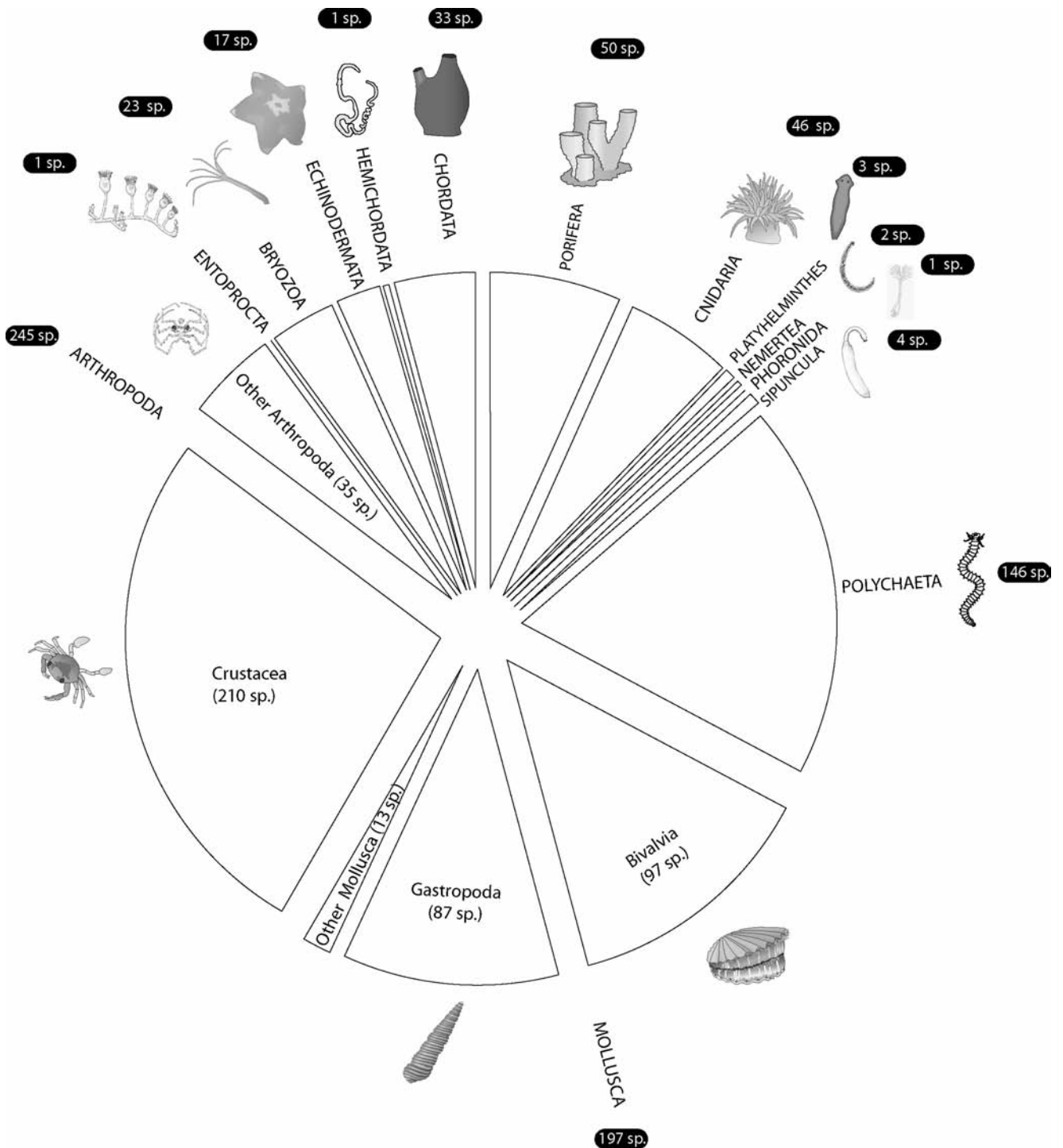


Figure 2. Total number of marine invertebrates reported in Chausey, sorted by phyla.

Figure 2. Nombre total d'invertébrés marins recensés à Chausey, classés par phyla.

Table 1. Updated checklist of the marine invertebrate species reported in Chausey.

Holotypes (H) and Syntypes (S) collected in Chausey are mentioned in the 'T' (Type) column.

Tableau 1. Liste actualisée des invertébrés marins recensés à Chausey. Les Holotypes (H) et Syntypes (S) récoltés à Chausey sont mentionnés dans la colonne 'T' (Type).

(1) Audouin & Milne-Edwards, 1828; (2) Milne-Edwards & Audouin, 1832; (3) De Quatrefages, 1854; (4) Crié, 1876; (5) Locard, 1886; (6) Fisher, 1887; (7) Joyeux-Laffuie, 1891; (8) Canu, 1894; (9) Gadeau de Kerville, 1894a; (10) Gadeau de Kerville, 1894b; (11) Trousseart, 1894; (12) Gadeau de Kerville, 1898; (13) Gadeau de Kerville, 1901; (14) Fauvel, 1905; (15) Sinel, 1906; (16) Joubin, 1910; (17) De Beauchamp, 1923; (18) Harant, 1924; (19) Pasquet, 1923 (20) Fisher-Piette, 1932; (21) Fisher-Piette, 1936; (22) Gruvel & Fisher-Piette, 1939; (23) Bertrand, 1940; (24) Bertrand, 1941; (25) Bertrand, 1949; (26) Gaillard, 1955; (27) Lubet, 1968; (28) Lami, 1972; (29) Benard et al., 1975; (30) Hamon, 1983; (31) Debout & Leneveu, 1993; (32) Livory, 1995; (33) Noël et al., 1995; (34) Livory, 1996; (35) Severijns, 1996; (36) Livory, 1997; (37) Livory, 1997-1998; (38) Elder, 1998; (39) Le Monnier, 1998; (40) Livory, 1998; (41) Livory, 2000a; (42) Castric-Fey et al., 2001; (43) Livory, 2000b; (44) Livory, 2002; (45) Ngoc-Hô, 2003; (46) Ecosub, 2006; (47) Livory, 2007; (48) Godet, 2008; (49) Le Granché, 2008; (50) Nebout et al., 2008; (51) Nebout & Olivier, in prep.; (52) Grant, in prep; (53) personal observations (C1) Dautzenberg collection of the French Museum of Natural History; (C2) coleopteran collection of the Marine Station of Dinard; (C3) Collections of the French Museum of Natural History.

Species names	Author's Source	T				
			<i>Haliclona elegans</i> (Bowerbank, 1866)	17		
			<i>Haliclona fistulosa</i> (Bowerbank, 1866)	17		
			<i>Haliclona indistincta</i> (Bowerbank, 1866)	9		
			<i>Haliclona oculata</i> (Pallas, 1766)	46		
			<i>Haliclona simulans</i> (Johnston, 1841)	17,46,49		
			<i>Haliclona viscosa</i> (Topsent, 1888)	46		
			Order Poecilosclerida			
			<i>Amphilectus fucorum</i> (Esper, 1794)	46,49		
			<i>Clathria (Microconia) atrasanguinea</i> (Bowerbank, 1862)	49		
			<i>Crella rosea</i> (Topsent, 1892)	46,49		
Phylum Porifera						
Class Calcarea						
Order Clathrinida						
<i>Clathrina coriacea</i> (Montagu, 1818)	17		<i>Hemimyscale columella</i> (Esper, 1794)	46,49		
Order Leucosolenida						
<i>Grantia compressa</i> (Fabricius, 1780)	17,19		<i>Mycale contareni</i> (Martens, 1823)	14,17		
<i>Leucosolenia variabilis</i> (Haeckel, 1870)	49		<i>Mycale irregularis</i> (Czerniavski, 1880)	9		
<i>Sycon ciliatum</i> (Fabricius, 1780)	46,49		<i>Mycale macilenta</i> (Bowerbank, 1866)	9,49		
Class Demospongiae						
Order Astrophorida						
<i>Pachymastima johnstonia</i> Bowerbank in Johnston, 1841	14,17,46,49		<i>Mycale subclavata</i> (Bowerbank, 1866)	46		
<i>Stelletta grubii</i> (Schmidt, 1862)	17		<i>Myxilla rosacea</i> (Lieberkühn, 1859)	17		
<i>Stryphnus ponderosus</i> (Bowerbank, 1866)	46		<i>Phorbas fictitius</i> (Bowerbank, 1866)	46,49		
Class Homoscleromorpha						
Order Homosclerophorida						
<i>Thymosia guernei</i> Topsent, 1895	49		<i>Oscarella lobularis</i> (Schmidt, 1862)	17,46		
Order Dictyoceratida						
<i>Dysidea fragilis</i> (Montagu, 1818)	9,17,46,49			Phylum Cnidaria		
Class Staurozoa						
Order Stauromedusae						
<i>Adreus fascicularis</i> (Bowerbank, 1866)	17,46,49				<i>Haliclystus octoradiatus</i> (Lamarck 1816)	14
<i>Homaxinella subdola</i> (Bowerbank, 1866)	46				<i>Lucernariopsis campanulata</i> (Lamouroux, 1815)	14
<i>Polymastia boletiformis</i> (Lamarck, 1813)	46,49				Subphylum Medusozoa	
<i>Polymastia mamillaris</i> (Müller, 1806)	46,49				Class Hydroida	
<i>Pseudosuberites sulphureus</i> (Bean in Bowerbank, 1866)	9				Order Capitata	
<i>Stelligera rigida</i> (Montagu, 1818)	17,46,49				<i>Ectopleura larynx</i> (Ellis & Solander, 1786)	17
<i>Stelligera stuposa</i> (Montagu, 1818)	46				<i>Tubularia indivisa</i> Linnaeus, 1758	49
<i>Suberites carnosus</i> (Johnston, 1841)	46,49		Order Conica			
<i>Suberites ficus</i> (Johnston, 1841)	9,14,46		<i>Aglaophenia tubulifera</i> (Hincks, 1861)	46		
<i>Tethya aurantium</i> (Pallas, 1766)	17,46,48,49		<i>Diphasia attenuata</i> (Hincks, 1866)	46		
Order Halichondrida						
<i>Axinella damicornis</i> (Esper, 1794)	46,49		<i>Dynamena pumila</i> (Linnaeus, 1758)	46		
<i>Axinella dissimilis</i> (Bowerbank, 1866)	46,49		<i>Halecium halecium</i> (Linnaeus, 1758)	46,49		
<i>Axinella egregia</i> sensu Uriz & Maldonado, 1993	46		<i>Hydrallmania falcata</i> (Linnaeus, 1758)	46		
<i>Axinella polypoides</i> Schmidt, 1862	46		<i>Nemertesia antennina</i> (Linnaeus, 1758)	46,49		
<i>Ciocalypta penicillus</i> Bowerbank, 1862	46,49		<i>Nemertesia ramosa</i> (Lamarck, 1816)	4,46,49		
<i>Halichondria</i> spp. (Pallas, 1766)	17,46,49		<i>Sertularella gayi</i> (Lamouroux, 1820)	46		
<i>Higginsia pumila</i> (Keller, 1889)	49		<i>Sertularia cupressina</i> Linnaeus, 1758	4		
<i>Hymeniacion perlevis</i> (Montagu, 1818)	9		<i>Sertularia distans</i> Lamouroux, 1816	46		
<i>Raspailia agnata</i> (Topsent, 1896)	46		Order Proboscoidea			
<i>Raspailia hispida</i> (Montagu, 1818)	46		<i>Campanularia</i> sp. Lamarck, 1816	46		
<i>Raspailia ramosa</i> (Montagu, 1818)	17,46,49		<i>Clytia hemisphaerica</i> (Linnaeus, 1767)	46		
Order Haplosclerida						
<i>Chalinula limbata</i> (Montagu, 1818)	9		<i>Obelia geniculata</i> (Linnaeus, 1758)	46,49		
<i>Haliclona cinerea</i> (Grant, 1825)	9					

Subphylum Anthozoa**Class Octocorallia**Order Alcyonacea*Alcyonium coralloides* (Pallas, 1766) 46,49*Alcyonium digitatum* Linnaeus, 1758 46*Alcyonium glomeratum* (Hassal, 1842) 17*Alcyonium palmatum* Pallas, 1766 14Order Gorgonacea*Eunicella verrucosa* (Pallas, 1766) 14,46,49**Class Hexacorallia**Order Ceriantharia*Cerianthus lloydi* Gosse, 1859 35,46,48,49*Cerianthus membranacea* (Spallanzani, 1784) 17,46,49Order Zoantharia*Epizoanthus couchii* (Jonhston in Couch, 1844) 46*Parazoanthus anguicomus* (Norman, 1868) 46Order Actinaria*Actinia equina* (Linnaeus, 1758) 17,35,48,49*Actinothoe sphyrodeta* (Gosse, 1858) 46,49*Aiptasia mutabilis* (Gravenhorst, 1830) 14,17,35,46,49*Anemonia viridis* (Forskål, 1775) 9,35,46,48,49*Aureliana heterocera* (Thompson, 1853) 35*Bunodactis verrucosa* (Pennant, 1777) 35*Calliactis parasitica* (Couch, 1837) 48,49*Cereus pedunculatus* (Pennant, 1777) 35,46,48,49,50*Edwardsia beautempsi* Quatrefages, 1841 3,17*Edwardsia timida* Quatrefages, 1841 14*Haliplanella luciae* (Verrill, 1899) 35*Sagartia elegans* (Dalyell, 1848) 49*Scolanthus callimorphus* Gosse, 1853 35*Urticina felina* (Linnaeus, 1767) 17,46,49Order Scleractinia*Balanophyllia regia* Gosse, 1860 14,17*Caryophyllia smithii* Stokes et Broderip, 1828 14,17,49*Hoplangia durotrix* Gosse, 1860 46*Leptopsammia pruvoti* Lacaze-Duthiers, 1897 42Order Corallimorpharia*Corynactis viridis* Allman, 1846 17,46,49**Superclass Scyphozoa**Order Semaostomeae*Chrysaora hysoscella* (Linnaeus, 1767) 49**Phylum Platyhelminthes****Class Turbellaria**Order Acoela*Convoluta roscoffensis* Graff, 1882 7,14,17,28,29,35,48Order Polycladida*Prostheceraeus vittatus* (Montagu, 1815) Lang 884 49Order Prolecithophora*Plagiostomum* sp. Schmidt, 1852 17**Phylum Nemertea****Class Anopla***Tubulanus polymorphus* Renier, 1804 48*Valencinia longirostris* Quatrefages, 1846 14**Phylum Phoronida***Phoronis* sp. 48**Phylum Sipuncula****Class Sipunculidea***Golfingia elongata* (Keferstein, 1862) 14,17,30,48*Golfingia vulgaris* (de Blainville, 1826) 17,30,48*Nephasoma minutum* (Keferstein, 1862) 14*Phascolion strombi* (Montagu, 1804) 30**Phylum Annelida****Class Polychaeta**Order Capitellida*Arenicola marina* (Linnaeus, 1758) 9,48,50,51,52*Capitella capitata* (Fabricius, 1780) 30,48,50*Capitella minima* Langerhans, 1880 50,51*Clymenura clypeata* (de Saint Joseph, 1894) 17,30,48*Clymenura tricirrata* (Bellan & Reys, 1967) 48*Euclymene droebachiensis* (M. Sars, 1872) 48,52*Euclymene oerstedii* (Claparède, 1863) 30,48*Mediomastus fragilis* Rasmussen, 1973 30,52*Notomastus latericeus* M. Sars, 1851 17,30,48,50,51,52*Petaloproctus terricola* Quatrefages, 1865 17,48*Praxillella affinis* (M. Sars in G.O. Sars, 1872) 52Order Eunicida*Arabella (Arabella) iricolor* (Montagu, 1804) 52*Dorvillea rubrovittata* (Grube, 1855) 14*Eunice harassii* Audouin & Milne-Edwards, 1832 9,14,17,52*Lumbrineriopsis paradoxa* (Saint-Joseph, 1888) 52*Lumbrineris fragilis* (O.F. Müller, 1766) 52 **P***Lumbrineris gracilis* (Ehlers, 1868) 30*Lumbrineris latreilli* Audouin & Milne-Edwards, 1833 14,48,52 **HS***Lysidice ninetta* Audouin & Milne-Edwards, 1832 14,52*Marphysa bellii* Audouin & Milne-Edwards, 1832 14,48,50,51 **S***Marphysa sanguinea* (Montagu, 1815) 17,48*Nematonereis unicornis* (Grube, 1839) 9,30,48*Ophryotrocha* sp. Claparède & Mecznirow, 1869 52*Protodorvillea kefersteini* (McIntosh, 1869) 30,48,52*Schistomeringos caeca* (Webster & Benedict, 1884) 48*Schistomeringos neglecta* (Fauvel, 1922) 30*Schistomeringos rudolphi* (Delle Chiaje, 1827) 48Order Ophelida*Armandia polyophthalma* Kükenthal, 1887 14*Ophelia celtica* Amoureux & Dauvin, 1981 30*Ophelia rathkei* McIntosh, 1908 30(?),48,52*Scalibregma celticum* Mackie, 1991 30,48*Travisia forbesi* Johnston, 1839 17,30,48Order Orbiniida*Aricidea jeffreysi* (McIntosh, 1879) 52*Orbinia cuvieri* (Audouin & Milne Edwards, 1833) 52*Orbinia latreilli* (Audouin & Milne-Edwards, 1832) 14*Orbinia sertulata* (Savigny, 1820) 14*Paradoneis fulgens* (Levinson, 1884) 30,52*Paradoneis lyra* (Southern, 1914) 48,52*Scoloplos armiger* (O. F. Müller, 1776) 30,48,50,51Order Oweniida*Myriochele oculata* Zachs, 1922 48,50,51Order Phyllodocida*Alentia gelatinosa* (M. Sars, 1834) 9*Brania pusilla* (Dujardin, 1851) 52

<i>Eteone longa</i> (Fabricius, 1780)	30,48,51	<i>Filograna</i> sp. Oken, 1815	46
<i>Eulalia mustela</i> Pleijel, 1987	52	<i>Megalomma vesiculosum</i> (Montagu, 1815)	17,30,48
<i>Eulalia viridis</i> (Johnston, 1828)	35,49,52	<i>Pomatoceros lamarcki</i> (Quatrefages, 1865)	35,46
<i>Eumida punctifera</i> (Grube, 1860)	17	<i>Pomatoceros triquetus</i> (Linnaeus, 1767)	22,52
<i>Eumida sanguinea</i> (Oersted, 1842)	30,48	<i>Sabella discifera</i> Grube, 1874	46
<i>Eunereis longissima</i> (Johnston, 1839)	30,50,52	<i>Sabella pavonina</i> Savigny, 1820	46,48,49
<i>Exogone (Exogone) naidina</i> Örsted, 1845	48,52	<i>Sabella spallanzanii</i> (Viviani, 1805)	46
<i>Exogone (Parexogone) hebes</i> (Webster & Benedict, 1884)	30,48,51,52	<i>Salmacina dysteri</i> (Huxley, 1855)	46,49
<i>Fimbriosthenelais zetlandica</i> (McIntosh, 1876)	30	<i>Spirorbis spirorbis</i> (Linnaeus, 1758)	9
<i>Glycera capitata</i> Oersted, 1842	30,52	Order Spionida	
<i>Glycera gigantea</i> Quatrefages, 1865	30,48	<i>Aonides oxycephala</i> (Sars, 1862)	30,48,52
<i>Glycera lapidum</i> Quatrefages, 1865	52	<i>Aonides paucibranchiata</i> Southern, 1914	52
<i>Glycera oxycephala</i> Ehlers, 1887	48,52	<i>Dipolydora flava</i> Claparède, 1870	48
<i>Goniada emerita</i> Audouin & Milne-Edwards, 1832	14	<i>Malacoceros ciliatus</i> (Keferstein, 1862)	30
<i>Goniadella bobrezkii</i> (Annenkova, 1928)	30,48,52	<i>Malacoceros girardii</i> Quatrefages, 1842	30
<i>Harmothoe extenuata</i> (Grube, 1839)	9,48,52	<i>Malacoceros tetraceros</i> (Schmarda, 1861)	30
<i>Harmothoe impar</i> (Johnston, 1838)	48	<i>Malacoceros vulgaris</i> (Johnston, 1826)	48
<i>Hediste diversicolor</i> (O.F. Müller, 1776)	31,48	<i>Microspio mecznikowianus</i> (Claparède, 1869)	51
<i>Hesionura elongata</i> (Southern, 1914)	52	<i>Pseudopolydora antennata</i> (Claparède, 1868)	30,48,52
<i>Hesiospina similis</i> (Hessle, 1924)	30	<i>Pygospio elegans</i> Claparède, 1863	48,50,51
<i>Kefersteinia cirrata</i> (Keferstein, 1862)	52	<i>Scolecopsis squamata</i> (O. F. Müller, 1789)	30,48,52
<i>Lepidonotus squamatus</i> (Linnaeus, 1758)	30	<i>Spio decoratus</i> Bobretzky, 187	48,50,51,52
<i>Malmgreniella arenicolae</i> (de Saint Joseph, 1888)	30,48,50,52	<i>Spio filicornis</i> (O. F. Müller, 1776)	30,48,52
<i>Microphthalmus pseudoaberrans</i> Campoy & Vieitez, 1982	52	<i>Spio martinensis</i> Mesnil, 1896	48,51,52
<i>Myrianida prolifera</i> (O.F. Müller, 1788)	52	<i>Spiophanes bombyx</i> (Claparède, 1870)	30,48,50
<i>Neanthes irrorata</i> (Malmgren, 1867)	17,30,48	Order Spioniformia	
<i>Nephtys caeca</i> (Fabricius, 1780)	9,30,48,52	<i>Ampharete acutifrons</i> (Grube, 1860)	48,50,51
<i>Nephtys cirrosa</i> Ehlers, 1868	30,48,52	<i>Ampharete baltica</i> Eliason, 1955	14,30
<i>Nephtys hombergii</i> Savigny, 1818	30,48,50,51,52	<i>Amphicteis gunneri</i> (M. Sars, 1834)	48
<i>Nephtys incisa</i> Malmgren, 1865	30	<i>Aphelochaeta marioni</i> (de Saint Joseph, 1894)	48
<i>Odontosyllis</i> sp. Claparède, 1863	30	<i>Cauteriella alata</i> (Southern, 1914)	30
<i>Palposyllis prosostoma</i> Hartmann-Schröder, 1977	30,52	<i>Chaetozone setosa</i> Malmgren, 1867	30,48,50,51
<i>Parapionosyllis minuta</i> (Pierantoni, 1903)	48,52	<i>Cirriiformia tentaculata</i> (Montagu, 1808)	9,30,48,50,51,52
<i>Perinereis cultrifera</i> (Grube, 1839)	48,52	<i>Euphosine foliosa</i> Audouin & Milne-Edwards, 1832	14
<i>Pholoe inornata</i> Johnston, 1838	30,48	<i>Eupolymnia nebulosa</i> (Montagu, 1818)	14,17
<i>Phyllodoce (Anatides) mucosa</i> Oersted, 1842	30,48,50	<i>Janice conchilega</i> (Pallas, 1766)	1,17,30,35,48,51,52
<i>Plakosyllis brevipes</i> Hartmann-Schröder, 1956	52	<i>Melinna palmata</i> Grube, 1870	14,30,51
<i>Platynereis dumerilii</i> (Audouin & Milne-Edwards, 1832)	9,48	<i>Pista cristata</i> (O. F. Müller, 1776)	48,52
<i>Polynoe laevis</i> Audouin & Milne Edwards, 1831	C3	<i>Poecilochaetus serpens</i> Allen, 1904	30,48
<i>Polynoe scolopendrina</i> Savigny, 1818	9	<i>Sabellaria alveolata</i> (Linnaeus, 1767)	17
<i>Protomystides bidentata</i> Lagerhans	52	<i>Sabellaria spinulosa</i> Leuckart, 1849	22
<i>Pseudomystides limbata</i> de Saint Joseph, 1888	30	Subclass Archiannelida	
<i>Salvatoria swedmarki</i> (Gidholm, 1962)	52	<i>Archiannelida</i> sp.	30
<i>Sigalion mathildae</i> Audouin & Milne Edwards in Cuvier, 1829	14	<i>Saccocirrus papillocercus</i> Bobretzky, 1872	48,52
<i>Sphaerosyllis bulbosa</i> Southern, 1914	30,48,52,52		
<i>Sphaerosyllis glandulata</i> Perkins, 1981	52		
<i>Sphaerosyllis taylori</i> Perkins, 1981	30,52		
<i>Sthenelais boa</i> (Johnston, 1832)	30		
<i>Streptosyllis bidentata</i> Southern, 1914	30		
<i>Streptosyllis campoyi</i> Brito, Núñez & San Martín, 2000	52		
<i>Streptosyllis websteri</i> Southern, 1914	48,52		
<i>Syllides</i> sp. Örsted, 1845	52		
<i>Syllis amica</i> Quatrefages, 1865	30		
<i>Syllis armillaris</i> (O.F. Müller, 1776)	30		
<i>Syllis cornuta</i> Rathke, 1843	30		
<i>Syllis garciai</i> (Campoy, 1982)	48,52		
<i>Syllis hyalina</i> Grube, 1863	30		
<i>Syllis pontxioi</i> San Martín & López, 2000	48,52		
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<i>Trypanosyllis coeliaca</i> Claparède 1868	52		
<i>Websterinereis glauca</i> (Claparède, 1870)	48		
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<i>Emarginula fissura</i> (Linnaeus, 1758)	5,6	<i>Myosotella myosotis</i> (Draparnaud, 1801)	53
<i>Gibbula cineraria</i> (Linnaeus, 1758)	5,9,27,35,49	Subclass Opisthobranchia	
<i>Gibbula magus</i> (Linnaeus, 1758)	5,7,9,27,30,35,48,49,52	<u>Order Cephalaspidea</u>	
<i>Gibbula pennanti</i> (Philippi, 1846)	9,27,35,48,49	<i>Acteon tornatilis</i> (Linnaeus, 1758)	27
<i>Gibbula tumida</i> (Montagu, 1803)	6,9	<i>Haminoea hydatis</i> (Linnaeus, 1758)	27
<i>Gibbula umbilicalis</i> (da Costa, 1778)	6,9,27,35,46,48	<i>Philine aperta</i> (Linnaeus, 1767)	27
<i>Haliotis tuberculata</i> (Linnaeus, 1758)	5,9,14,16,17,27,29,35,48,49	<u>Order Sacoglossa</u>	
<i>Jujubinus exasperatus</i> (Pennant, 1777)	5	<i>Elysia viridis</i>	9,27
<i>Jujubinus montagui</i> (Wood W., 1828)	5	<i>Limapontia capitata</i> (O. F. Müller, 1776)	27
<i>Jujubinus striatus</i> (Pennant, 1777)	9,35	<u>Order Notaspidea</u>	
<i>Osilinus lineatus</i> (da Costa, 1778)	5,9,27,30,35,48	<i>Berthella plumula</i> (Montagu, 1803)	9,14
<i>Patella intermedia</i> Murray in Knap, 1857	20,35	<u>Order Anaspidea</u>	
<i>Patella ulyssiponensis</i> Gmelin, 1791	5,9,27,35	<i>Aplysia depilans</i> Gmelin, 1791	5,27
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<i>Bittium reticulatum</i> (da Costa, 1778)	9,27	<i>Archidoris pseudoargus</i> (Rapp, 1826)	17
<i>Buccinum undatum</i> Linnaeus, 1758	27	<i>Cadlina laevis</i> (Linnaeus, 1767)	49
<i>Caecum glabrum</i> (Montagu, 1803)	5	<i>Doto coronata</i> (Gmelin, 1791)	27
<i>Caecum trachea</i> (Montagu, 1803)	27	<i>Goniadoris castanea</i> Alder & Hancock, 1845	14,27
<i>Calyptrea chinensis</i> (Linnaeus, 1758)	5,7,22,27,30,35,46,48,49	<i>Goniadoris nodosa</i> (Montagu, 1808)	27
<i>Capulus hungaricus</i> (Linnaeus, 1758)	5	<i>Janolus cristatus</i> (delle Chiaje, 1840)	27,49
<i>Cerithiopsis tubercularis</i> (Montagu, 1803)	27	<i>Limacia clavigera</i> (O. F. Müller, 1776)	46
<i>Cingula trifasciata</i> (Adams, 1800)	27,35	<i>Okenia aspera</i> (Alder & Hancock, 1845)	27
<i>Crepidula fornicata</i> (Linnaeus, 1758)	27,35,46,48,49,52	<i>Polycera faeroensis</i> Lemche, 1928	46,49
<i>Crisilla semistriata</i> (Montagu, 1808)	9	<i>Polycera quadrilineata</i> (O. F. Müller, 1776)	14
<i>Epitonium clathrus</i> (Linnaeus, 1758)	27	<i>Rostanga rubra</i> (Risso, 1818)	14,27
<i>Euspira catena</i> (da Costa, 1778)	27,35	<i>Trapania</i> sp. Pruvot-Fol, 1931	46
<i>Euspira pulchella</i> (Risso, 1825)	27	<u>Order Systellommatophora</u>	
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<i>Lacuna pallidula</i> (da Costa, 1778)	9,27	Class Bivalvia	
<i>Lacuna vincta</i> (Montagu, 1803)	27	Subclass Protobranchia	
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<i>Littorina littorea</i> (Linnaeus, 1758)	9,27,35,48	<i>Nucula nucleus</i> (Linnaeus, 1758)	5,27
<i>Littorina obtusata</i> (Linnaeus, 1758)	9,27,30,48,52	<u>Order Arcoida</u>	
<i>Littorina saxatilis</i> (Olivier, 1792)	27,35,48	<i>Bathyarca pectunculoides</i> (Scacchi, 1834)	5
<i>Mangelia costata</i> (Donovan, 1804)	9	<i>Glycymeris glycymeris</i> (Linnaeus, 1758)	5,17,27,30,48,49,52
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<i>Melarhaphe neritoides</i> (Linnaeus, 1758)	27	<i>Modiolus adriaticus</i> (Lamarck, 1819)	5,27
<i>Nassarius incrassatus</i> (Ström, 1768)	27,49	<i>Modiolus barbatus</i> (Linnaeus, 1758)	5,17,27
<i>Nassarius reticulatus</i> (Linnaeus, 1758)	9,27,35,46,48,49,50,51,52	<i>Modiolus modiolus</i> (Linnaeus, 1758)	5,27
<i>Nucella lapillus</i> (Linnaeus, 1758)	9,20,27,35,48,49	<i>Mytilus edulis</i> Linnaeus, 1758	20,27,48,52
<i>Ocenebra erinacea</i> (Linnaeus, 1758)	22,27,35,46,49	<i>Mytilus galloprovincialis</i> Lamarck, 1819	5,27
<i>Ocenebrina aciculata</i> (Lamarck, 1821)	9,27	<u>Order Pterioda</u>	
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<i>Rissoa parva</i> (da Costa, 1778)	9,27	<i>Chlamys varia</i> (Linnaeus, 1758)	9,22,27,35,48,49
<i>Tornus subcarinatus</i> (Montagu, 1803)	6	<i>Pecten maximus</i> (Linnaeus, 1758)	5,9,16,27,28,35,46,48,49
<i>Trivia arctica</i> (Pulteney, 1799)	35,46,49	<i>Pododesmus patelliformis</i> (Linnaeus, 1761)	5
<i>Trivia monacha</i> (da Costa, 1778)	7,9,27	<i>Pteria hirundo</i> (Linnaeus, 1758)	5
<i>Turritella communis</i> Risso, 1825	27	<u>Order Ostreoida</u>	
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<i>Myosotella denticulata</i> (Montagu, 1803)	9	<i>Acanthocardia aculeata</i> (Linnaeus, 1758)	27,48

<i>Acanthocardia echinata</i> (Linnaeus, 1758)	5
<i>Acanthocardia tuberculata</i> (Linnaeus, 1758)	5,27
<i>Arcopagia crassa</i> (Pennant, 1777)	5,27,30,35,48,52
<i>Astarte elliptica</i> (Brown, 1827)	5
<i>Callista chione</i> (Linnaeus, 1758)	27
<i>Capsella variegata</i> (Gmelin, 1791)	27,30,48,52
<i>Cerastoderma edule</i> (Linnaeus, 1758)	5,9,27,29,35,48,51,51
<i>Cerastoderma glaucum</i> (Poirot, 1789)	5,27
<i>Chamelea gallina</i> (Linnaeus, 1758)	5
<i>Clausinella fasciata</i> (da Costa, 1778)	27
<i>Diplodonta rotundata</i> (Montagu, 1803)	27
<i>Donacilla cornea</i> (Poli, 1795)	5
<i>Donax vittatus</i> (da Costa, 1778)	5,27
<i>Dosinia exoleta</i> (Linnaeus, 1758)	5,27,30,48
<i>Dosinia lupulinus</i> (Linnaeus, 1758)	27
<i>Ensis arcuatus</i> (Jeffreys, 1865)	30,35
<i>Ensis ensis</i> (Linnaeus, 1758)	17,27,48
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<i>Gari depressa</i> (Pennant, 1777)	5,9,27,35,52
<i>Gari fervensis</i> (Gmelin, 1791)	27
<i>Gari tellinella</i> (Lamarck, 1818)	5
<i>Glossus humanus</i> (Linnaeus, 1758)	5,27
<i>Goodalia triangularis</i> (Montagu, 1803)	27,48,52
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<i>Laevicardium crassum</i> (Gmelin, 1791)	5,30,35,48
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<i>Lepton squamosum</i> (Montagu, 1803)	5
<i>Loripes lacteus</i> (Linnaeus, 1758)	5,17,30,35,48,49,50,51
<i>Lucinella divaricat</i> (Linnaeus, 1758)	5
<i>Lucinoma borealis</i> (Linnaeus, 1767)	C1,5,27,30,49,50
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<i>Lutraria lutraria</i> (Linnaeus, 1758)	27
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<i>Macoma balthica</i> (Linnaeus, 1758)	5,27
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<i>Macra stultorum</i> (Linnaeus, 1758)	27
<i>Montacuta ferruginosa</i> (Montagu, 1808)	30
<i>Mysella bidentata</i> (Montagu, 1803)	5
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<i>Paphia aurea</i> (Gmelin, 1791)	5,27,35,48
<i>Paphia rhomboides</i> (Pennant, 1777)	5,9,27,30,35,48,52
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<i>Ruditapes decussatus</i> (Linnaeus, 1758)	5,9,16,27,46,48
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<i>Tellinmya ferruginosa</i> (Montagu, 1808)	5
<i>Tellina donacina</i> (Linnaeus, 1758)	5,27
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<i>Tellina incarnata</i> (Linnaeus, 1758)	5,48
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<i>Tellina tenuis</i> da Costa, 1778	5,17,27,48
<i>Timoclea ovata</i> (Pennant, 1777)	27,30,35
<i>Venerupis senegalensis</i> (Gmelin, 1791)	5,27,35,48,49
<i>Venus casina</i> Linnaeus, 1758	5,27
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<i>Hiatella arctica</i> (Linnaeus, 1777)	27
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<i>Mya truncata</i> Linnaeus, 1758	27
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<i>Lyonsia norvegica</i> (Gmelin, 1791)	6
<i>Pandora inaequalis</i> (Linnaeus, 1758)	27
<i>Thracia papyracea</i> (Poli, 1791)	27
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<i>Porcellidium fimbriatum</i> Claus, 1863	8
<i>Tisbe furcata</i> (Baird, 1836)	8
<i>Zaus spinatus</i> Goodsir, 1845	8
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<i>Lichomolgus agilis</i> (Leidig, 1853)	8
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<i>Balanus perforatus</i> Bruguière, 1789	20,22,46,49
<i>Chtamalus stellatus</i> (Poli, 1795)	20,35,41
<i>Chthamalus montagui</i> Southward, 1976	53
<i>Elminius modestus</i> Darwin, 1854	52
<i>Semibalanus balanoides</i> (Linnaeus, 1758)	20,35,52
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<i>Cumopsis goodsir</i> (Van Beneden, 1861)	30,48,52	<i>Atylus guttatus</i> (Costa, 1851)	48
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<i>Apseudes talpa</i> (Montagu, 1808)	30,44,48	<i>Bathyporeia sarsi</i> Watkin, 1937	30,48
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<i>Bopyrina ocellata</i> (Czerniavski, 1869)	9,23	<i>Erichthonius punctatus</i> (Bate, 1857)	23,30
<i>Bopyrus squillarum</i> Latreille, 1802	9,23	<i>Gammarella fucicola</i> (Leach, 1814)	30,35,48
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<i>Cyathura carinata</i> (Krøyer, 1847)	23,48,50,51	<i>Harpinia crenulata</i> (Boeck, 1871)	48
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<i>Halophiloscia couchi</i> (Kinahan, 1858)	9,47	<i>Leucothoe incisa</i> Robertson, 1892	30,48,52
<i>Idotea emarginata</i> (Fabricius, 1793)	23,47	<i>Leucothoe lilljeborgi</i> Boeck, 1861	30
<i>Idotea balthica</i> (Pallas, 1772)	47	<i>Leucothoe procera</i> Bate, 1857	30
<i>Idotea granulosa</i> (Rathke, 1842)	47	<i>Leucothoe spinicarpa</i> (Abildgaard, 1789)	9
<i>Idotea neglecta</i> G.O. Sars, 1897	17,23	<i>Listriella picta</i> Norman, 1889	52
<i>Idotea pelagica</i> Leach, 1815	9,47	<i>Lysianassa ceratina</i> (Walker, 1889)	23,30,48
<i>Jaera albifrons</i> Leach, 1814	23,47	<i>Lysianassa insperata</i> (Lincoln, 1979)	30,48,52
<i>Jaera forsmanni</i> Bocquet, 1950	47	<i>Maera grossimana</i> (Montagu, 1808)	12,35
<i>Jaera prae-hirsuta</i> Forsman, 1949	47	<i>Maera tenuimana</i> (Bate, 1862)	30
<i>Lekanesphaera levii</i> (Argano et Ponticelli, 1981)	35,47,48,52	<i>Megamphopus cornutus</i> Norman, 1869	30
<i>Lekanesphaera rugicauda</i> (Leach, 1814)	23,47,48	<i>Melita palmata</i> (Montagu, 1804)	35
<i>Ligia oceanica</i> (Linnaeus 1758)	9,36	<i>Microdeutopus chelifera</i> (Bate, 1862)	48
<i>Miktoniscus patiencei</i> Vandel, 1946	47	<i>Microdeutopus stationis</i> Della Valle, 1893	30,48
<i>Paragnathia formica</i> (Hesse, 1864)	47	<i>Microdeutopus versiculatus</i> (Bate, 1856)	30
<i>Pleurocrypta galataeae</i> Hesse, 1865	12	<i>Monoculodes carinatus</i> (Bate, 1857)	12,30,48,52
<i>Sphaeroma serratum</i> (Fabricius, 1787)	47	<i>Orchestia gammarellus</i> (Pallas, 1766)	48
<u>Order Amphipoda</u>		<i>Orchestia mediterranea</i> Costa, 1853	35
<i>Abludomelita gladiosa</i> (Bate, 1862)	23	<i>Orchomene humilis</i> (Costa, 1853)	23
<i>Abludomelita obtusata</i> (Montagu, 1813)	30	<i>Pariambus typicus</i> Krøyer, 1847	48
<i>Ampelisca brevicornis</i> (Costa, 1853)	30,48,51	<i>Perioculodes longimanus</i> (Bate et Westwood, 1868)	30
<i>Ampelisca diadema</i> (Costa, 1853)	30,48	<i>Pherusa fucicola</i> Leach, 1814	23
<i>Ampelisca spinipes</i> Boeck, 1861	52	<i>Phtisica marina</i> Slabber, 1749	30
<i>Ampelisca tenuicornis</i> Liljeborg, 1855	30,48,51	<i>Podocerus variegatus</i> Leach, 1814	23
<i>Ampelisca typica</i> (Bate, 1856)	30	<i>Pontocrates altamarinus</i> (Bate et Westwood, 1862)	30
<i>Amphilochus spencebatai</i> (Stebbing, 1876)	30	<i>Pontocrates arenarius</i> (Bate, 1858)	30,48,52
<i>Ampithoe gammaroides</i> (Bate, 1856)	12	<i>Siphonocetes kroyeranus</i> Bate, 1856	30,48,52
<i>Ampithoe ramondi</i> Audouin, 1825	23	<i>Stegocephaloides christianiensis</i> Boeck, 1871	48
<i>Ampithoe rubricata</i> (Montagu, 1808)	12,30	<i>Sunamphitoe pelagica</i> (Milne-Edwards, 1829)	12,23,48
<i>Aora typica</i> Krøyer, 1845	12,30,48	<i>Talitrus saltator</i> (Montagu, 1808)	12
<i>Apherusa bispinosa</i> (Bate, 1857)	23,30	<i>Tryphosella sarsi</i> Bonnier, 1893	30
<i>Apherusa henneguyi</i> Chevreux & Fage, 1925	52	<i>Urothoe brevicornis</i> Bate, 1862	30,48
<i>Apherusa jurinei</i> (Milne-Edwards, 1830)	12	<i>Urothoe elegans</i> (Bate, 1857)	30

<i>Urothoe marina</i> (Bate, 1857)	23,48,52	<i>Portumnus latipes</i> (Pennant, 1777)	33
<i>Urothoe poseidonis</i> Reibish, 1905	30,48	<i>Processa edulis</i> (Risso, 1816)	30,32,33
Order Decapoda		<i>Thia scutellata</i> (Fabricius, 1793)	14,30,32,33,35,40,48,52
<i>Achaeus cranchi</i> Leach, 1817	29,33	<i>Thorulus cranchi</i> (Leach, 1817)	30,33
<i>Anapagurus hyndmanni</i> (Bell, 1845)	19,30,32,33,35,48	<i>Upogebia deltaura</i> (Leach, 1815)	14,30,33,45,C3
<i>Athanas nitescens</i> (Leach, 1814)	23,32,33,35	<i>Xantho</i> sp. Leach, 1814	27
<i>Axius stirhynchus</i> Leach, 1815	14,45,C3,34	Subphylum Chelicerata	
<i>Callianassa tyrrhena</i> (Petagna, 1792)	14(?),23(?),30,45,C3,32,33,34,48	Class Arachnida	
<i>Cancer pagurus</i> Linnaeus, 1758	17,29,32,33,35,46,48,49	Order Acarina	
<i>Carcinus maenas</i> (Linnaeus, 1758)	9,17,23,32,33,35,48,49,50,51,52	<i>Agave brevipalpus</i> Trousseart, 1889	11
<i>Crangon crangon</i> (Linnaeus, 1758)	3,12,32,33,34	<i>Halacarus anomalus</i> Trousseart, 1894	14
<i>Diogenes pugilator</i> (Roux, 1828)	30,33	<i>Halacarus chevreuxi</i> Trousseart, 1889	11
<i>Dromia personata</i> (Linnaeus, 1758)	29	<i>Halacarus gracilipes</i> Trousseart, 1889	11
<i>Ebalia cranchi</i> Leach, 1817	30	<i>Halacarus oculatus</i> Hodge, 1861	11
<i>Ebalia tumefacta</i> (Montagu, 1808)	32,33,40,48	<i>Halacarus rhodostigma</i> Gosse, 1855	11
<i>Eriphia verrucosa</i> (Forskål, 1775)	33	<i>Halacarus spinifer</i> Trousseart, 1889	11
<i>Eualus occultus</i> (Lebour, 1935)	33	<i>Halacarus tabellio</i> Trousseart, 1894	11
<i>Eurynome aspera</i> (Pennant, 1777)	37	<i>Leptognathus kervillei</i> Trousseart, 1894	11
<i>Eurynome spinosa</i> Hailstone, 1834	32	<i>Lohmannella kervillei</i> Trousseart, 1901	14
<i>Galathea intermedia</i> Lilljeborg, 1851	14	<i>Rhombognathus exoplus</i> Trousseart, 1901	14
<i>Galathea nexa</i> Embleton, 1833	14	<i>Simonognathus liomerus</i> Trousseart, 1901	14
<i>Galathea squamifera</i> Leach, 1814	12,32,33,49	Order Araneida	
<i>Galathea strigosa</i> (Linnaeus, 1767)	14,29,32,46,49	<i>Enoplognatha mordax</i> (Thorell, 1875)	48
<i>Hippolyte inermis</i> Leach, 1815	30,32,33	<i>Halorates reprobus</i> (O. P.-Cambridge, 1879)	10
<i>Hippolyte leptocerus</i> (Heller, 1863)	33	Class Pycnogonida	
<i>Hippolyte longirostris</i> (Czerniawski, 1868)	32	Order Pantapoda	
<i>Hippolyte varians</i> Leach, 1814	9,30,32,33,35	<i>Achelia echinata</i> Hodge, 1864	24
<i>Homarus gammarus</i> (Linnaeus, 1758)	3,9,29,32,33,46,49	<i>Ammothella longipes</i> (Hodge, 1864)	24
<i>Hyas coarctatus</i> Leach, 1815	33	<i>Endeis spinosa</i> (Montagu, 1808)	9,12,24
<i>Inachus dorsettensis</i> (Pennant, 1777)	33,37	<i>Nymphon gracile</i> Leach, 1814	24,35,44
<i>Inachus phalangium</i> (Fabricius, 1775)	32,33,46,49	<i>Pycnogonum littorale</i> (Strom, 1762)	44
<i>Liocarcinus corrugatus</i> (Pennant, 1777)	32	Subphylum Hexapoda	
<i>Liocarcinus depurator</i> (Linnaeus, 1758)	33	Class Insecta	
<i>Liocarcinus holsatus</i> (Fabricius, 1798)	30,32,33,48,52	Order Diptera	
<i>Liocarcinus navigator</i> (Herbst, 1794)	30,32,33,36,48	<i>Clunio marinus</i> Haliday, 1855	25
<i>Liocarcinus pusillus</i> (Leach, 1815)	32,33,35	Order Coleoptera	
<i>Liocarcinus vernalis</i> (Risso, 1826)	33	<i>Aegialia arenaria</i> (Fabricius, 1787)	36
<i>Macropodia deflexa</i> Forest, 1978	32,33,35	<i>Aepopsis robini</i> (Laboulbene, 1894)	39,48
<i>Macropodia rostrata</i> (Linnaeus, 1767)	9,30,32,33,36,46,48	<i>Agabus conspersus</i> (Marshall, 1802)	40
<i>Macropodia tenuirostris</i> (Leach, 1814)	9	<i>Aphodius prodromus</i> (Fabricius, 1792)	34
<i>Maja brachydactyla</i> Balss, 1921	17,29,32,33,46,49	<i>Aphodius rufipes</i> Linnaeus, 1758	38
<i>Necora puber</i> (Linnaeus, 1767)	29,32,33,35,36,46,48,49	<i>Bledius unicornis</i> (Germar, 1824)	C2
<i>Pagurus bernhardus</i> (Linnaeus, 1758)	12,30,32,33,48	<i>Broscus céphalotes</i> (Linnaeus, 1758)	39
<i>Pagurus cuanensis</i> Bell, 1845	32,33,35,48,52	<i>Cafius sericeus</i> Holme, 1836	9
<i>Pagurus prideaux</i> Leach, 1815	30,33	<i>Cafius xantholoma</i> Graenhorst, 1806	9
<i>Palaemon adspersus</i> Rathke, 1837	9,12	<i>Cilleus lateralis</i> Samouelle, 1819	48
<i>Palaemon elegans</i> Rathke, 1836	9,32,33,35	<i>Dicheirotichus gustavii</i> Crotch, 1871	19
<i>Palaemon serratus</i> (Pennant, 1777)	3,9,32,33,46,48,49	<i>Enochrus bicolor</i> (Fabricius, 1792)	40
<i>Palaemonetes varians</i> (Leach, 1814)	29	<i>Enochrus halophilus</i> Bedel, 1878	40
<i>Palinurus elephas</i> (Fabricius, 1787)	9,14	<i>Heterocerus</i> spp. Fabricius, 1792	48
<i>Pandalina brevirostris</i> (Rathke, 1842)	37	<i>Pogonus chalceus</i> (Marshall, 1802)	C2,39
<i>Periclimenes sagittifer</i> (Norman, 1861)	33,46,49		
<i>Philocheras fasciatus</i> (Risso, 1816)	9,29,30,32,33		
<i>Philocheras sculptus</i> (Bell, 1847)	33		
<i>Philocheras trispinosus</i> (Hailstone, 1834)	29,33		
<i>Pilumnus hirtellus</i> (Linnaeus, 1761)	9,17,23,32,33,35		
<i>Pinnotheres petunculi</i> Hesse, 1872	33		
<i>Pinnotheres pisum</i> (Linnaeus, 1767)	30		
<i>Pirimela denticulata</i> (Montagu, 1808)	14,32,33		
<i>Pisa nodipes</i> (Leach, 1815)	33		
<i>Pisa tetraodon</i> (Pennant, 1777)	12,32,33,49		
<i>Pisidia longicornis</i> (Linnaeus, 1767)	9,30,32,33,35,46,48		
<i>Pontophilus spinosus</i> (Leach, 1815)	30		
<i>Porcellana platycheles</i> (Pennant, 1777)	12,17,32,33,35,49		



Phylum Entoprocta

Order Coloniales

Pedicellina cernua (Pallas, 1774)

13



Phylum Bryozoa

Class Gymnolaemata

Order Cheilostomatida

Beania mirabilis Johnston, 1840

13

<i>Bugula calathus</i> Norman, 1864	46
<i>Bugula turbinata</i> Alder, 1857	46,49
<i>Carbasea carbasea</i> (Ellis & Solander, 1786)	4
<i>Cellaria fistulosa</i> (Linnaeus, 1758)	49
<i>Cellaria salicornioides</i> Lamouroux, 1816	4
<i>Cellepora pumicosa</i> (Pallas, 1766)	46
<i>Chartella papyracea</i> (Ellis & Solander, 1786)	46,49
<i>Electra pilosa</i> (Linnaeus, 1767)	35,46,49
<i>Electra verticillata</i> (Ellis & Solander, 1786)	4
<i>Escharoides coccinea</i> (Abildgaard, 1806)	46
<i>Flustra foliacea</i> (Linnaeus, 1758)	4,46,49
<i>Membranipora membranacea</i> (Linnaeus, 1767)	46,49
<i>Palmiskenia skenei</i> (Ellis & Solander, 1786)	49
<i>Pentapora fascialis</i> (Pallas, 1766)	46,49
<i>Schizomavella auriculata</i> (Hassall, 1842)	49
<i>Scruparia chelata</i> (Linnaeus, 1758)	13
<i>Scrupocellaria scrupaea</i> Busk, 1852	49
<i>Scrupocellaria reptans</i> (Linnaeus, 1767)	13
<u>Order Ctenostomatida</u>	
<i>Alcyonidium diaphanum</i> (Hudson, 1778)	46,49
Class Stenolaemata	
<u>Order Cyclostomatida</u>	
<i>Crisia denticulata</i> (Lamarck, 1766)	46
<i>Disporella hispida</i> (Fleming, 1827)	22,46



Phylum Echinodermata

Class Asteroidea	
<u>Order Valvatida</u>	
<i>Anseropoda placenta</i> (Pennant, 1777)	49
<i>Asterina gibbosa</i> (Pennant, 1777)	9,35,46,48,49
<i>Asterina phylactyla</i> Emson & Crump, 1979	35
Class Ophiuroidea	
<u>Order Ophiurida</u>	
<i>Amphipholis squamata</i> (delle Chiaje, 1828)	9,30,48,49,52
<i>Ophiothrix fragilis</i> Albidgaard in O.F. Müller, 1789	46
Subphylum Echinozoa	
Class Echinoidea	
Subclass Euechinoidea	
<u>Order Echinoida</u>	
<i>Paracentrotus lividus</i> (Lamarck, 1816)	17
<i>Psammechinus miliaris</i> (Müller, 1771)	17,49
Class Holothuroidea	
Subclass Dendrochirotacea	
<u>Order Dendrochirotida</u>	
<i>Aslia lefevrei</i> (Barrois, 1882)	49
<i>Cucumaria</i> sp. Blainville, 1829	46
<i>Neopentadactyla mixta</i> (Ostergren, 1848) Deichmann, 1947	49
<i>Ocnus lacteus</i> (Forbes & Goodsir, 1839)	49
<i>Pawsonia saxicola</i> (Brady & Robertson, 1871)	17
<i>Thyone</i> sp. Jaeger, 1833	52
<u>Order Apodida</u>	
<i>Leptosynapta bergensis</i> (Östergren, 1905)	3,48,52
<i>Leptosynapta cruenta</i> (Cherbonnier, 1953)	3
<i>Leptosynapta galliennii</i> (Herapath, 1865)	3
<i>Leptosynapta inhaerens</i> (O.F. Müller, 1776)	3



Phylum Hemichordata

Class Enteropneusta	
<u>Order Enteropneusta</u>	

<i>Glossobalanus sarniensis</i> (Koehler, 1886)	15
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Phylum Chordata

Subphylum Cephalochordata

Class Leptocardii

<i>Branchiostoma (Amphioxus) lanceolatum</i> (Pallas, 1774)	52
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Subphylum Tunicata

Class Ascidiacea

Suborder Stolidobranchia

<i>Botrylloides leachii</i> (Savigny, 1816)	49
<u>Order Enterogona</u>	
<i>Aplidium albicans</i> (Milne-Edwards, 1840)	18
<i>Aplidium argus</i> (Milne-Edwards, 1840)	9,14,17,46
<i>Aplidium caeruleum</i> (Sluiter, 1906)	18
<i>Aplidium densum</i> (Giard, 1872)	17
<i>Aplidium elegans</i> (Giard, 1872)	14,17
<i>Aplidium nordmani</i> (Milne-Edwards, 1840)	9,14,17
<i>Aplidium pallidum</i> (Verrill, 1871)	9,14,17,46,49
<i>Aplidium proliferum</i> (Milne-Edwards, 1840)	14,18
<i>Aplidium punctum</i> (Giard, 1873)	17,18
<i>Aplidium turbinatum</i> (Savigny, 1816)	17,18
<i>Ascidia conchilega</i> Moeller, 1841	18
<i>Ascidia mentula</i> Müller, 1776	17,46
<i>Ascidia aspersa</i> (Müller, 1776)	14,46
<i>Ciona intestinalis</i> (Linnaeus, 1758)	14,17,49
<i>Clavelina lepadiformis</i> Müller, 1776	9,14,17,49
<i>Didemnum fulgens</i> Milne-Edwards, 1840	18
<i>Didemnum maculosum</i> (Milne-Edwards, 1840)	14,17,18,46,49
<i>Diplosoma listerianum</i> (Milne-Edwards, 1840)	14,18
<i>Diplosoma spongiforme</i> Giard, 1872	14,46,49
<i>Morchellium argus</i> (Milne Edwards)	49
<i>Perophora listeri</i> Wiegman, 1834	14,17,18
<i>Polyclinum aurantium</i> Milne-Edwards, 1840	14,46
<i>Polysyncraton lacazei</i> (Giard, 1872)	14,17,46,49
<u>Order Pleurogona</u>	
<i>Botryllus schlosseri</i> (Pallas, 1766)	9,14,17,22,46,49
<i>Dendrodoa grossularia</i> (Van Beneden, 1846)	17,18,35
<i>Distomus variolosus</i> Gaertner, 1774	17,18,49
<i>Molgula oculata</i> Forbes, 1848	14,17,18,46
<i>Polycarpa mamillaris</i> (Gaertner, 1774)	14
<i>Stolonica socialis</i> Hatmeyer, 1903	46,49
<i>Styela clava</i> Herdman, 1881	46,49
<i>Styela rustiqua</i> Linnaeus, 1767	49

Discussion

The high level of diversity (769 marine invertebrate species) is particularly remarkable when considering the relatively small size of the study area (5000 ha). Chausey thus hosts a significant portion of the total species diversity of the Normand-Breton Gulf and the English Channel. Considering only Polychaeta and Amphipoda (two well-studied taxonomic groups in the region) 146 polychaete species were found in Chausey, representing 55% of the 265 species of the Normand-Breton Gulf and 30% of the 493 species recorded in the English Channel (Dauvin et al., 2003), while the 82 amphipod species in Chausey represented 42% of the 194 species in the Normand-Breton

Gulf and 32% of the 255 species in the English Channel (Dauvin, 1999).

The high-level of species richness in Causey is partly due to a rich naturalist history spanning 180 years. However, it also corresponds to particular environmental conditions. Causey is located in the Normand-Breton Gulf, dominated by a complex and fragmented mosaic of benthic habitats (Retière, 1979). Additionally, it is situated in the Western part of the English Channel, which has greater spatial heterogeneity than the Eastern part. This location explains the presence of both Lusitanian and Boreal species. For example, according to the geographical-ecological distribution typology of Lincoln (1979), the Gammaridea reported in Causey are essentially composed of temperate species (56%), but cold-temperate (21%), and warm-temperate species (18%) are also present (three Gammaridea species are not reported in the typology of Lincoln).

In addition to listing the most common and widespread species reported in Causey, comments are included below for five different categories of species.

Rare and localized species on a regional scale

Parazoanthus anguicomus

The report of this species from Causey is only the second record in the Normand-Breton Gulf, the first record being from the bay of Saint-Malo (Girard-Descatoire et al., 1997).

Clymenura tricurata

Initially described in the Marseille area (France) as *Leiochone tricurata* (see Bellan & Reys, 1967), this species was not reported by Dauvin et al. (2003) in the English Channel. It has been recently recorded in the Pertuis Charentais Bay (De Montaudouin & Sauriau, 2000) and, in 2007, at five stations in Normandy near Granville, the Havre de Lessay, Cherbourg, and the Cap Lévi (Olivier & Fournier, 2007).

Euclymene droebachiensis

Initially mentioned by Godet (2008) as *Euclymene* sp., upon reexamination, the specimens collected by this author correspond to *Euclymene droebachiensis* as described by Garwood (2007). This record has been confirmed by new specimens collected by Grant (in prep). According to Dauvin et al. (2003), this species has not been reported from the English Channel.

Schistomeringos caeca

This species, also not recorded by Dauvin et al. (2003) for

the English Channel, has been recently reported from the Eastern part, in Wimereux (France) and Belgium (Müller, 2004). The record of Godet (2008) is thus a new report for the Western part of the English Channel, and corresponds to two individuals collected in a *Lanice conchilega* bed from the Western side of the Archipelago in 2005.

Fimbriosthenelais zetlandica

The collection of this species in Causey (as *Sthenelais papillosa*) surprised Hamon (1983), who mentioned that the species has only been previously reported in South Africa. However, according to Pettibone (1971), this species seems to have a large distribution in the North and South Atlantic, stretching from Norway, Skagerrak, Shetland Islands, Great Britain, and the Isle of Man, to Northwest Africa (Cape Verde Islands) and South Africa (False Bay) where it is found between 33 to 558 meters depth. The data from Hamon (1983) may constitute the first record for the English Channel, and the first report of the species in the intertidal zone.

Hesiospina similis

This species, collected in Causey by Hamon (1983), was not reported by Dauvin et al. (2003) in the English Channel. Initially described in Japan, this species has been recorded in the Bay of Galway (O'Connor & Shin, 1983).

Corophium bonelli

The presence of this boreal species is of special interest, considering its scarcity and the retreat of its distribution in the Western English Channel (Lincoln, 1979). This retreat may correspond with the progression of the alien species, *Corophium sextonae*, and probably with the current global warming context.

Stegocephaloides christianiensis

The unique specimen collected by Godet (2008), in an intertidal *Lanice conchilega* bed of the archipelago, corresponds to the first report from the English Channel according to a recent checklist of amphipods (Dauvin, 1999). In France, this species has been reported from the southern Bay of Biscay (Bachelet et al., 2003), in the deep sea (Cap Ferret canyon, 346-1098 m) and on the continental shelf (Capbreton canyon, 1000 m). From the Arctic Ocean to the Western Mediterranean Sea, this species is known to be subtidal in distribution (depth range about 40-750 m; Lincoln, 1979).

Terrestrial species seldom reported in marine inventories

Halophiloscia couchi, *Armadillidium album*,

Miktoniscus patiencei

With the exception of *Ligia oceanica*, halophytic woodlice are rarely reported by marine biologists according to whom they are terrestrial species. Yet, *Halophiloscia couchi*, *Armadillidium album* and *Miktoniscus patiencei* are true coastal species, restricted to salt-marshes and high tide marks along cliffs, or in shingle and boulder beaches (Hopkin, 1991; Livory, 2007). *Halophiloscia couchi* is common along European shores and on the main island of Chausey archipelago. *Armadillidium album* has recently been recorded in Chausey and in numerous parts of the coast of the Cotentin peninsula (Livory, 2007). *Miktoniscus patiencei* is found much less-frequently, with very scattered records, mainly distributed along the English Channel and the South Irish coasts. It is very rare on French shores, and has been only recently been reported on the main island of Chausey archipelago (Livory, 2007).

Halorates reprobus

The first report of this species in France is from Chausey (Gadeau de Kerville, 1894b). This spider is a strictly coastal species, inhabiting the zone from the high tide mark to the *Fucus serratus* belt.

Enoplognatha mordax

This spider has seldom been reported by benthic biologists, despite being common in similar intertidal areas of the region, such as at the Bay of the Mont-Saint-Michel (Pétillon et al., 2003). Three specimens of *E. mordax* were collected by Godet (2008) in *Lanice conchilega* beds of the Western part of the archipelago.

Invasive species

Some species, introduced in European waters during the 19th Century or at the beginning of the 20th Century, are now extensively established in the Normand-Breton Gulf and are present in the Chausey archipelago.

Haliplanella luciae

H. luciae was introduced to Europe, possibly from Japan, in the 19th Century probably via imported mussels and oysters, but also from transoceanic transport on ship hulls (Gollasch & Riemann-Zürneck, 1996). Today, although this species has been reported from several sites, long-term settlements have not been detected in European seas (Gollasch & Riemann-Zürneck, 1996).

Elminius modestus

This antipodean cirripede was first introduced to European waters in the 1950s, probably via ships and flying boats

during World War II (Bishop, 1947). It was reported in Brittany at the beginning of the 1950s (Goulletquer et al., 2002). In the Normand-Breton Gulf, larvae were abundant in plankton samples collected in 1952 (Franc, 1952).

Balanus improvisus

This species, native to the North-West Atlantic, was introduced to France in the 19th Century (Goulletquer et al., 2002). Today, it has a wide distribution in the Normand-Breton Gulf, where it was first reported in 1864 (Ansted & Latham, 1864).

Corophium sextonae

The origin of this species is unknown. According to Turquier (1965), Crawford suggested that this species is a non-native species for the English Channel, mainly because it is totally absent from early specimen collections. However, Turquier (1965) encountered the species in several sites along the coasts of Normandy and Brittany and concluded that its absence from the historic collection probably arose from its potential confusion with *C. acherusicum*.

In addition to these species, there are other exotic and potentially very invasive species, mainly introduced via shellfish culture.

Eriphia verrucosa

Noël et al. (1996) considered the unpublished record of Lubet in 1978 as dubious, because the spatial range of this species is much more southern. However, a specimen was also collected in Jersey in 1994 (D'Udekem d'Acoz, 1999). This last record reflects that even if there are no population settled in the Normand-Breton Gulf, isolated specimens can be found in this area, perhaps due to the exchanges between this area and the Bay of Biscay for shellfish farming.

Ruditapes philippinarum

This species, native to the Western Pacific Ocean, has been introduced to several European countries and has since been naturalized in Italy, France, and Britain (Goulletquer & Héral, 1997). In Chausey, this species is cultivated, and the archipelago is the main national production site (Toupoint et al., 2008).

Crassostrea gigas

Since the mid-1990s, this oyster species has become invasive on the intertidal reefs of northern Brittany, especially near Brest and the Bay of Saint-Brieuc. In the Bay of Mont-Saint-Michel, this species has become invasive on *Sabellaria alveolata* reefs (Dubois et al., 2006) and on the sea walls of Granville harbour.

Mytilus edulis

The native mussel species of the Normand-Breton Gulf is *Mytilus galloprovincialis*, whereas *M. edulis* is a cultivated species. In Chausey, small *M. edulis* beds form on intertidal sandflats adjacent to mussel concessions.

Crepidula fornicata

This well-known, North American native species was reported in France for the first time in 1949 in Brest and Hemanville (Goulletquer et al., 2002). It colonized the Normand-Breton Gulf in the 1970s (Retière, 1979; Dupouy & Latrouite, 1979) and now attains high-densities, especially in the bays of Saint-Brieuc, Mont Saint-Michel, Granville, and in the Chausey archipelago (Blanchard & Erhold, 1999).

Species whose identification or taxonomic position is problematic

Myriochele oculata

The specimens recently collected in Chausey (Godet, 2008; Nebout et al., 2008; Nebout & Olivier, in prep.) were first identified as *Myriochele heeri* Malmgren, 1867 with the fauna of Fauvel (1927). The reexamination of these specimens for the present study using the key proposed by Parapar (2003) resulted in their identification as *Galathowenia oculata* (referenced here as *Myriochele oculata*, following the European Register of Marine Fauna (Costello et al., 2001)). According to Martin (1989), the two species *M. oculata* and *M. heeri* have been repeatedly confused in the past.

Syllidae family

Syllids are small polychaetes of several millimetres, typically found in subtidal coarse sediments and rocky environments. Their identification is complex, mainly based on the presence of ventral cirri, the type of palps and chaetae. During the last century, benthologists classically used Fauvel's fauna (Fauvel, 1923) to identify syllids, but recently San Martín and other contributing authors totally revised this family. The Fauna Iberica Vol. 21 is dedicated to the family of *Syllidae* in areas of Spanish North Africa (San Martín, 2003) and we used this guide when identifying syllids. A great deal of confusion and revisions have been brought to light when compared with Fauvel (1923); we thus strongly recommend the use of Fauna Iberica fauna or recent scientific publications when examining *Syllidae*.

Ampharete baltica & *Ampharete acutifrons*

According to Dauvin et al. (2003), *Ampharete baltica* is the unique polychaete of this genus reported in the English

Channel. However, the specimens collected by Godet (2008) in Chausey have been identified as *A. acutifrons*, as described by Holthe (1986). Moreover, the identification of similar specimens collected in the Bay of the Mont-Saint-Michel as *A. acutifrons* has been confirmed by Eibye-Jacobsen (pers. comm.). The specimens collected in this bay and in Chausey were subadults (length < 40 mm), which has two consequences: the palae are not as thick and are clearly different from subsequent notochaete, as one would expect in adults, and the dorsal cirri on the dorsal edge of the last thoracic and all abdominal neuropodia are shorter than in adults (Eibye-Jacobsen, pers. comm.). Moreover, the presence of these dorsal cirri and the fact that the two groups of branchiae are well-separated from each other distinguish *A. acutifrons* from *A. baltica* (Eibye-Jacobsen, pers. comm.). According to us, the specimens collected in Chausey by Hamon (1983) and identified as *A. baltica* should be re-examined.

Spisula solida vs *Spisula ovalis*

On the CLEMAM website which is considered as a reference for valid taxonomic names of molluscs, only *Spisula solida* (L., 1758) is accepted. However, a note indicates that *Spisula ovalis* (Sowerby, 1817) is suggested as being distinct based on morphometric evidence (Glémarec, 1968). Our *Spisula* individuals may be related to *S. solida* when using the fauna of Tebble (1966), but the shell is more elongated (lower H/L ratio) than in the description. When considering the description of *Spisula ovalis* by Glémarec (1968), we undoubtedly concluded that our individuals belong to this latter species. To our knowledge, no works have focused on genetical differences between these two species. Without further research on *Spisula* phylogeny, we reasonably consider that the specimens collected in Chausey belong to the species *Spisula ovalis*.

Leptosynapta spp.

The identification of the species of this genus by several authors has been fraught with difficulties. An example can be seen in the analyses of specimens collected in Chausey by De Quatrefages (1854), initially described as *Leptosynapta duvernea* sp. nov. (= *Leptosynapta inhaerens* Müller, 1776). Allain (1973) re-examined these data and concluded that these specimens belonged to four different species: *L. bergensis*, *L. cruenta*, *L. galliennii*, *L. inhaerens*.

Species for which additional data are required

Halichondria spp.

The identification by visual observation of *Halichondria* to the species level has previously been rejected and only

considered as an additional record of *Halichondria* sp. (Ecosub, 2006). Confusions between *H. panicea* and *H. bowerbanki*, the later being the only species positively identified in the Rance basin and the surrounding areas of Saint-Malo (C. Lévi, pers. com.), are possible. Additional sampling would be necessary to perform microscopic examinations of the collected specimens in order to confirm the species.

Caryophyllia inornata (Duncan, 1878)

Identification by visual observation of *C. inornata* by Ecosub (2006) has been rejected, and not integrated in this list. It is very similar to the much more common *C. smithii*, which has also been reported in Chausey. Young specimens of *C. smithii* are highly-variable in form (Zibrowius, 1976), and may be virtually indistinguishable from *C. inornata* (Manuel, 1983). Consequently, visual identification by diving cannot be accepted, and additional data are required to confirm the potential presence of *C. inornata* in Chausey.

Trapania maculata Haefelfinger, 1960

The identification of *T. maculata* by Ecosub (2006) to the species level has been rejected and only taken into account to a genus level. *T. maculata* is a rare Mediterranean dorid nudibranch, first recorded in the UK at Portland in May 1974 (Brown & Picton, 1976). The data in the English Channel could be due to confusion with *T. pallida* (DORIS, 2008). Additional data are therefore still required to confirm the report from Chausey.

Antalis entalis

The existing data on this species in the Normand-Breton Gulf are relative to dead specimens (shells), and thus with some potential misidentifications (Marshall, 1914). The data of Locard (1886) and Lubet (1968) should therefore be verified.

Chtamalus stellatus & *Chtamalus montagui*

According to Southward (1976), only *C. montagui* should be found in the archipelago. Indeed, this was the only species found during a personal investigation in 2009 on the 'Grande Ile'. Additional data are still required to validate the reports of *C. stellatus* in the archipelago.

Callianassa subterranea (Montagu, 1808) & *Callianassa tyrrehena*

While *C. subterranea* was reported by Fauvel (1905) and Bertrand (1940) in Chausey, they did not mention *C. tyrrehena*, the only species of the genus found by recent authors in Chausey and the Normand-Breton Gulf. A

misidentification is most likely responsible for this discrepancy. Even if *C. subterranea* has been reported in the nearby region of Jersey (Ngoc-Hô, 2003), we rejected the mentions of the species in Chausey.

Liocarcinus zariquieyi (Gordon, 1968)

As with Noël et al. (1996), D'Udekem d'Acoz (1999) contests the record of Hamon (1983), and both these authors consider its listing as a potential confusion with *L. pusillus*. There are no other available data in Chausey, and the record of this species in Chausey has been rejected and not integrated in our data.

Macropodia parva van Noort & Adema, 1985

D'Udekem d'Acoz (1999) wondered about the validity of the original description of *M. parva* and its distinction from *M. rostrata*. Because of this problem we considered the observations *M. parva* of Livory (1995 & 1997) as *M. rostrata*, which is very common in Chausey.

Xantho poressa (Olivi, 1792)

This species, reported in Chausey archipelago by Lubet (1968), is mainly a Mediterranean species with a very restricted Atlantic distribution (D'Udekem d'Acoz, 1999). Noël et al. (1996) attribute Lubet's record to *Xantho incisus*, which is fairly common in the Normand-Breton Gulf. The two species are very similar (D'Udekem d'Acoz, 1999), and thus we reported the record of Lubet (1968) as *Xantho* sp.

Thracia pubescens (Pulteney, 1799)

The only other data relative to this species in the Normand-Breton Gulf are early testimonies from the end of the 19th Century in Guernsey (Duncan, 1841 *In Chambers*, 2008). Jeffreys (1865) and Locard (1886) did not take into account this record. In Chausey, additional data would be welcome: whereas adults are unmistakable, young specimens are very similar to *T. papyracea*, a species present in Chausey.

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