

Checklist of marine molluscs from the island of Sint Eustatius, Leeward Islands, West Indies

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A preliminary checklist of 183 species of shallow-water marine molluscs is reported from the Dutch Caribbean island of Sint Eustatius. Very little has previously been published about the marine malacofauna of the island; this is the first attempt towards producing a comprehensive list. The majority of the species listed here are new records and one is a range extension.

Keywords: checklist, new records, malacofauna, Lesser Antilles.

INTRODUCTION

Sint Eustatius (17°28'N, 62°59'W) is a small (21 km² in area), volcanic, West Indian island in the northern part of the Leeward Island chain (or using the Dutch nomenclature the Windward Island chain) of the Lesser Antilles (Figs 1, 2). Valk (1987) reported on the fossil and Recent terrestrial malacofauna. Ríos (2003) listed one species of polyplacophoran, Davis (2003) listed one marine gastropod, Rosenberg (2009) listed one marine bivalve, and Hewitt (2010a, 2010b, 2010c) listed 14 species of marine gastropods and bivalves. There appear to be no other published records of the marine molluscan fauna of this island.

The list presented in this paper is preliminary, representing only a small part of the possible fauna, and weighted towards the larger shelled species; shell-less molluscs and micromolluscs are underreported. Nonetheless, the list includes some uncommon species, and suggests a rich fauna.

METHODS

From 2008 to 2011, the marine malacofauna was investigated using several techniques. I searched the coast of the island on two occasions for a total of nine hours, hand-picking shells from beach drift, making in situ identifications of live intertidal molluscs, and examining material that had been found underwater by dive shop owners. Previous to my two visits, I had requested and received shells from people living on or visiting the island, primarily from the staff of the Sint Eustatius National Parks organization, STENAPA. In addition, residents and visitors allowed me to examine underwater photographs, and the dive shop staff reported on live molluscs they had recently seen (which were only accepted as reliable observations for a few larger, unmistakable species). Localities on the Atlantic coast were Zeelandia Bay, Lynch Bay and Venus Bay; on the Caribbean coast, Oranje Bay and Gallows Bay (Crooks Castle, near the port). The St. Eustatius National Marine Park surrounds the island from high water mark to the 30m depth contour line.

RESULTS

The species are listed in Table 1. An explanation of the notations in the table follows:

Condition.- d, empty shell; df, fragment(s) only; dh, hermit crabbed; ds, shell found scuba diving; dw, empty shell in poor condition; il, alive in image by R.D. Kirby and B.S. Kirby; l, observed alive; U, condition unknown.

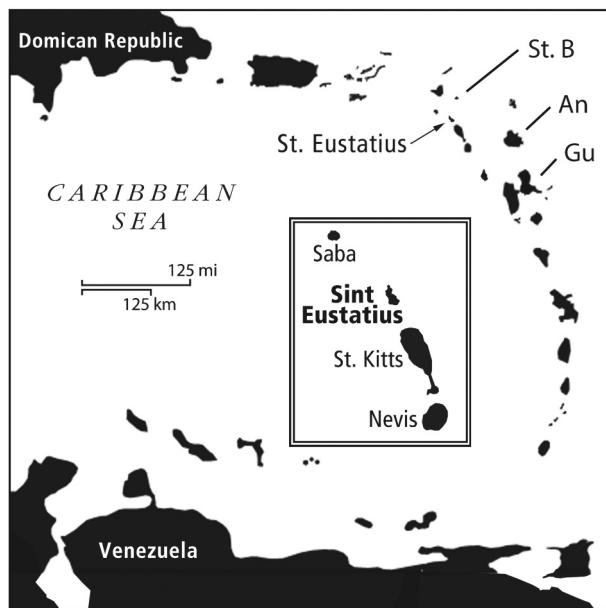


Fig. 1. Map, position of Sint Eustatius within the Lesser Antilles. St. B is St. Barthélemy; An is Antigua; Gu is Guadeloupe.

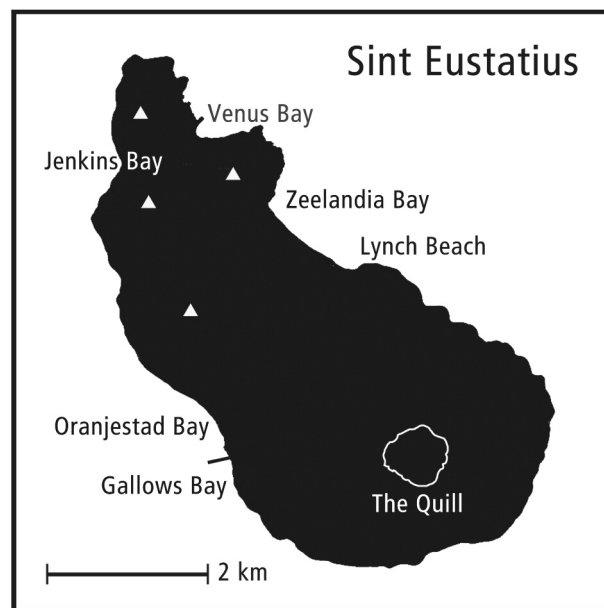


Fig. 2. Map of St. Eustatius.

Year.- indicates when the species was first recorded (and/or first observed alive). A range of years, or the notation "200?" means that the exact year is not known.

Locality (where shell was first found or where live animal was first observed or photographed) .- BB, "Baby Beach"; CC, Gallows Bay; LB, Lynch Beach; MP, locality somewhere within St. Eustatius National Marine Park; OB, Oranje Bay; U, unknown; VB, Venus Bay; ZB, Zeelandia Bay.

Source.- A, Susan Hewitt; DS, Dive Statia; GR, Golden Rock Dive; HM, Hannah Madden; JR, Junior Rangers; Ki, R.D. & B.S. Kirby; M, Rosenberg 2009; Qu, Quentin Henderson; Ríos, Ríos 2003; SC, Steve Cohen; SV, Seventh Day Adventist School.

DISCUSSION AND CONCLUSIONS

Approximately 70 species were identified using shell material and images that I was able to examine before visiting St. Eustatius. The day trip I took in 2010 yielded more than 100 additional species. The second (abbreviated) day trip in 2011 produced seven more species. A few of the species are particularly notable. In Hewitt (2010a) I recorded the occurrence of the Leeward Islands endemic *Vasum globulus* Lamarck, 1816, and Hewitt (2013) discusses the overall distribution of the species within the Lesser Antilles. In Hewitt (2010c), I reported the foam oyster *Hyotissa mcgintyi* (Harry, 1985) from St. Eustatius (as well as from the nearby island of Nevis). In June 2010, Rüdiger Bieler confirmed (personal communication) that within the

West Indies *H. mcgintyi* was previously known only from Cuba; this was a new record for the Lesser Antilles. Some other unusual species are mentioned below by locality.

Zeelandia Bay beach.- In 2010, I found one shell of the naticid *Stigmaulax sulcatus*, an uncommon species which occurs from Florida to Guadeloupe. A worn *Dolicholatirus* closely resembles a shell found in 2011 on St. Kitts (Hewitt, 2012: 72). A photograph of the St. Kitts shell was tentatively identified by Bill Lyons as "an unnamed *Dolicholatirus* sp. that ranges from the Lesser Antilles to Colombia". Also in 2010, one shell was found of the minute architectonicid *Pseudotorinia architae*. This is a range extension (Rosenberg, 2009). Bieler (1993) referred to this taxon as the "*P. archaeti* group", and described it as "a complex of very similar Indo-Pacific and Atlantic forms", the synonymy of which is only partly resolved.

In the drift in 2011, I found a worn 13 cm internal shell of a *Sepia* species. It was missing the cartilaginous headshield, and algae had grown over its ventral surface. There are no true cuttlefish in the Caribbean, and cuttlebones sold as pet supplies may be discarded anywhere. However, Abbott (1974: 571) comments that "...in rare instances the cuttlefish bone, or internal shell, has been found in Western Atlantic waters from Florida to Texas." A cuttlebone was found on the

(pages 3 to 7)

Table 1. Checklist of marine molluscs of Sint Eustatius.

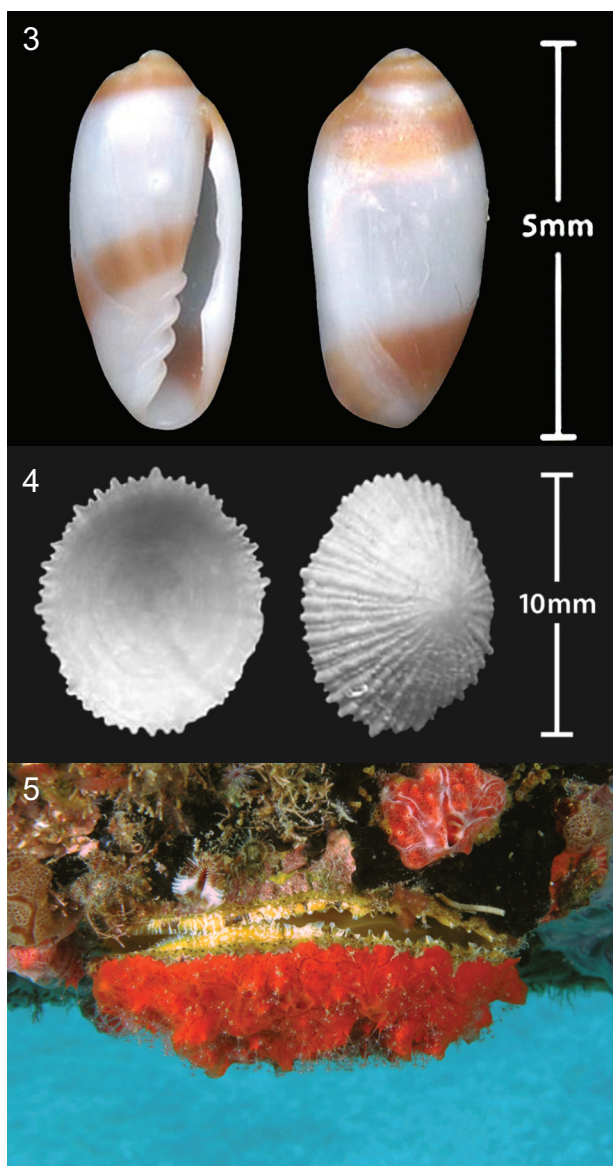
Taxon	Condition	Year	Locality	Source
GASTROPODA				
Lottiidae				
<i>Eoacmaea pustulata</i> (Heibling, 1779)	d	2010	ZB	A
<i>Lottia</i> morphotype B - vide Hewitt, 2009	d	2010	LB	JR
<i>Lottia</i> cf. <i>cubensis</i> (Reeve, 1855)	d	2010	LB	SV
<i>Lottia albicosta</i> (C.B. Adams, 1845)	l	2010	OB	A
<i>Tectura antillarum</i> (Sowerby I, 1843)	d [I]	2008 [10]	BB [OB]	Qu [A]
Fissurellidae				
<i>Diodora arcuata</i> (G. B. Sowerby II, 1862)	d	2011	LB	A
<i>Diodora listeri</i> (d'Orbigny, 1847)	d	2008	BB	Qu
<i>Diodora viridula</i> (Lamarck, 1822)	d	2010	ZB	A
<i>Fissurella angusta</i> (Gmelin, 1791)	d	2009	CC	JR
<i>Fissurella barbouri</i> Pérez Farfante, 1943	d	2010	ZB	JR
<i>Fissurella nimbose</i> (Linnaeus, 1758)	d	2010	ZB	JR
<i>Fissurella nodosa</i> (Born, 1778)	d	2010	ZB	A
<i>Fissurella punctata</i> Pérez Farfante, 1857	d	2010	ZB	A
<i>Fissurella rosea</i> (Gmelin, 1791)	d	2008	BB	Qu
<i>Hemimarginula dentigera</i> (Heilprin, 1889)	d	2011	ZB	HM
<i>Hemitoma octoradiata</i> (Gmelin, 1791)	d	2008	BB	Qu
Tegulidae				
<i>Cittarium pica</i> (Linnaeus, 1758)	l	2010	OB	A
<i>Tegula excavata</i> (Lamarck, 1822)	d	2009	CC	JR
<i>Tegula hotessieriana</i> (d'Orbigny, 1842)	d	2010	ZB	A
<i>Tegula lividomaculata</i> (C. B. Adams, 1845)	d	2011	LB	A
Calliostomatidae				
<i>Calliostoma jujubinum</i> (Gmelin, 1791)	d	2009	CC	JR
Turbinidae				
<i>Lithopoma caelatum</i> (Gmelin, 1791)	d	2009	CC	JR
<i>Lithopoma tectum</i> (Lightfoot, 1786)	d	2010	LB	A
<i>Lithopoma tuber</i> (Linnaeus, 1758)	d	2009	CC	JR
Phasianellidae				
<i>Eulithidium tessellatum</i> (Potiez & Michaud, 1838)	d	2010	ZB	A
Neritidae				
<i>Nerita peloronta</i> Linnaeus, 1758	l	2010	ZB	A
<i>Nerita tessellata</i> Gmelin, 1791	l	2009	CC	JR
<i>Nerita versicolor</i> Gmelin, 1791	l	2010	ZB	A
<i>Puperita pupa</i> (Linnaeus, 1767)	d	2011	VB	SV
<i>Smaragdia viridis</i> (Linnaeus, 1758)	d	2011	LB	HM
Cerithiidae				
<i>Cerithium eburneum</i> Bruguière, 1792	d	2010	LB	A
<i>Cerithium litteratum</i> (Born, 1778)	d	2011	LB	HM
Litiopidae				
<i>Alaba incerta</i> (d'Orbigny, 1842)	d	2010	ZB	A
<i>Litiopa melanostoma</i> Rang, 1829	d	2011	CC	A
Modulidae				
<i>Modulus modulus</i> (Linnaeus, 1758)	d	2010	ZB	A
Planaxidae				
<i>Hinea lineata</i> (da Costa, 1778)	d	2011	VB	SV
<i>Supplanaxis nucleus</i> (Bruguière, 1789)	l	2010	LB	A
Turritellidae				
<i>Torcula exoleta</i> (Linnaeus, 1758)	d	1995-2005	MP	GR
Calyptraeidae				
<i>Crepidula</i> sp. cf. <i>C. plana</i>	il	2008	MP	Ki
<i>Crepidula</i> sp. cf. <i>C. maculosa</i>	il	2008	MP	Ki
Cypraeidae				
<i>Erosaria acicularis</i> (Gmelin, 1791)	d	2009	CC	JR
<i>Macrocyprea zebra</i> (Linnaeus, 1758)	d	2010	ZB	JR
<i>Luria cinerea</i> (Gmelin, 1791)	d	2008	BB	Qu

Taxon	Condition	Year	Locality	Source
Ovulidae				
<i>Cyphoma gibbosum</i> (Linnaeus, 1758)	d (il)	2009	CC	JR
<i>Cyphoma signatum</i> Pilsbry & McGinty, 1939	l	2005–10	MP	DS
Naticidae				
<i>Naticarius canrena</i> (Linnaeus, 1758)	d	2010	LB	JR
<i>Polinices lacteus</i> (Guilding, 1834)	d	2010	ZB	A
<i>Stigmaulax sulcatus</i> (Born, 1778)	d	2010	ZB	A
Rissoidae				
<i>Zebina</i> sp.	d	2010	ZB	A
Littorinidae				
<i>Echinolittorina angustior</i> (Mörch, 1876)	l	2010	ZB	A
<i>Echinolittorina meleagris</i> (Potiez & Michaud, 1838)	l	2010	OB	A
<i>Echinolittorina tuberculata</i> (Menke, 1828)	d	2010	ZB	JR
<i>Echinolittorina zicac</i> (Gmelin, 1791)	l	2010	ZB	A
<i>Cenchritis muricatus</i> (Linnaeus, 1758)	l	2010	LB	JR
Strombidae				
<i>Lobatus costatus</i> Gmelin, 1791	l	2005	MP	DS
<i>Lobatus gallus</i> Linnaeus, 1758	l	2005	MP	DS
<i>Lobatus gigas</i> Linnaeus, 1758	il	2009	MP	Ki
<i>Strombus pugilis</i> Linnaeus, 1758	l	2005	MP	DS
<i>Lobatus raninus</i> (Gmelin, 1791)	l	2005	MP	DS
Tonnidae				
<i>Cassis flammea</i> (Linnaeus, 1758)	l	2005	MP	DS
<i>Cassis tuberosa</i> (Linnaeus, 1758)	il	2002–09	MP	Ki
<i>Cypreacassis testiculus</i> (Linnaeus, 1758)	d	2009	CC	JR
<i>Semicassis granulata</i> (Born, 1778)	d	2008	OB	SC
<i>Tonna pennata</i> (Mörch, 1853)	d	2010	ZB	JR
Bursidae				
<i>Bursa granularis</i> (Röding, 1798)	df	2011	CC	A
<i>Bursa rhodostoma</i> (G. B. Sowerby II, 1835)	d	2010	LB	A
Ranellidae				
<i>Charonia variegata</i> (Lamarck, 1816)	d	2010	LB	A
<i>Cymatium femorale</i> (Linnaeus, 1758)	d	2008	OB	SC
<i>Gutturium muricinum</i> (Röding, 1798)	d	2010	ZB	JR
<i>Monoplex aquatilis</i> (Reeve, 1844)	d	2009	CC	JR
<i>Monoplex pilearis</i> (Linnaeus, 1758)	d	2009	CC	JR
<i>Ranularia cynocephalum</i> (Lamarck, 1816)	df	2011	CC	A
Hipponicidae				
<i>Cheilea equestris</i> (Linnaeus, 1758)	d	2010	ZB	JR
<i>Hipponix antiquatus</i> (Linnaeus, 1767)	d	2008	BB	Qu
<i>Hipponix incurvus</i> (Gmelin, 1791)	d	2008	CC	JR
<i>Hipponix subrufus</i> (Lamarck, 1822)	d	2008	BB	Qu
Triviidae				
<i>Niveria quadripunctata</i> (J. E. Gray, 1827)	d	2010	LB	A
<i>Niveria suffusa</i> (J. E. Gray, 1827)	d	2010	LB	A
<i>Pusula pediculus</i> (Linnaeus, 1758)	d	2010	ZB	JR
Vermetidae				
<i>Dendropoma corrodens</i> (d'Orbigny, 1841) [on <i>Fissurella angusta</i> and <i>F. nodosa</i>]	d	2010	LB	A
<i>Dendropoma irregulare</i> (d'Orbigny, 1841)	d	2010	LB	A
<i>Thylacodes decussatus</i> (Gmelin, 1791)	d	2009	CC	JR
<i>Thylacodes riisei</i> (Mörch, 1862)	d	2009	CC	JR
Epitoniidae				
<i>Epitonium lamellosum</i> (Lamarck, 1822)	d	2010	LB	A
Buccinidae				
<i>Pisania pusio</i> (Linnaeus, 1758)	df	2009	CC	JR
<i>Gemophos tinctus</i> (Conrad, 1846)	df	2009	CC	JR
<i>Gemophos auritulus</i> (Link, 1807)	df	2010	ZB	JR
Columbellidae				
<i>Columbella mercatoria</i> (Linnaeus, 1758)	d	2009	CC	JR

Taxon	Condition	Year	Locality	Source
<i>Mitrella ocellata</i> (Gmelin, 1791)	d	2011	VB	SV
<i>Nitidella nitida</i> (Lamarck, 1822)	d	2010	ZB	A
<i>Zafra pulchella</i> (Blainville, 1829)	d	2010	ZB	A
Fascioliidae				
<i>Dolicholatus</i> sp.	dw	2010	ZB	A
<i>Fasciolaria tulipa</i> (Linnaeus, 1758)	df	2011	CC	A
<i>Leucozonia nassa</i> (Gmelin, 1791)	l	2010	CC	A
<i>Leucozonia ocellata</i> (Gmelin, 1791)	d	2009	CC	JR
<i>Polygona infundibulum</i> (Gmelin, 1791)	df	2010	ZB	A
Muricidae				
<i>Coralliophila abbreviata</i> (Lamarck, 1816)	d	2009	CC	JR
<i>Plicopurpura patula</i> (Linnaeus, 1758)	l	2010	LB	A
<i>Stramonita rustica</i> (Lamarck, 1822)	l	2010	OB	A
<i>Trachypollia nodulosa</i> (C.B. Adams, 1845)	d	2010	ZB	A
<i>Vasula deltoidea</i> (Lamarck, 1822)	dh	2010	CC	A
Costellariidae				
<i>Vexillum exiguum</i> (C.B. Adams, 1845)	d	2010	ZB	A
<i>Vexillum puella</i> (Reeve, 1845)	d	2010	LB	JR
Harpidae				
<i>Morum oniscus</i> (Linnaeus, 1767)	d	2009	CC	JR
Marginellidae				
<i>Volvarina avena</i> Kiener, 1834	d	2010	LB	A
<i>Volvarina</i> sp. cf. <i>V. ardovinii</i> Cossignani, 1997	d	2011	LB	A
Mitraeidae				
<i>Mitra barbadensis</i> (Gmelin, 1791)	df	2009	CC	JR
<i>Mitra nodulosa</i> (Gmelin, 1791)	df	2009	CC	JR
Turbinellidae				
<i>Vasum globulus</i> (Lamarck, 1816)	df	2009	CC	JR
Olividae				
<i>Americoliva reticularis</i> (Lamarck, 1791)	d	2009	CC	JR
<i>Oliva scripta</i> Lamarck, 1811	ds	2010	MP	GR
Conidae				
<i>Conus daucus</i> Hwass in Bruguière, 1792	d	2009	CC	JR
<i>Conus mus</i> Hwass in Bruguière, 1792	d	2009	CC	JR
<i>Conus regius</i> Gmelin, 1791	d	2009	CC	JR
<i>Conus spurius</i> Gmelin, 1791	d	200?	MP	GR
Terebridae				
<i>Impages cinerea</i> (Born, 1778)	dw	2010	ZB	A
Pseudomelatomidae				
<i>Pilsbryspira</i> sp.	d	2010	ZB	A
Architectonicidae				
<i>Pseudotorinia architae</i> (O. G. Costa, 1841)	d	2010	ZB	A
Bullidae				
<i>Bulla striata</i> Bruguière, 1792	d	2010	ZB	JR
Placobranchidae				
<i>Elysia crispata</i> Mörch, 1863	il	200?	MP	Ki
Trimusculidae				
<i>Trimusculus goesi</i> (Hubendick, 1946)	d	2011	VB, LB	SV, A
Ellobiidae				
<i>Melampus coffea</i> (Linnaeus, 1758)	d	2011	VB	SV
<i>Melampus monile</i> (Bruguière, 1789)	d	2010	LB	JR
<i>Pedipes mirabilis</i> (Mühlfeld, 1816)	d	2010	ZB	A
<i>Tralia ovula</i> (Bruguière, 1789)	d	2010	CC	JR
BIVALVIA				
Arcidae				
<i>Acar domingensis</i> (Lamarck, 1819)	d	2009	CC	JR
<i>Anadara notabilis</i> (Röding, 1798)	d	2010	CC	JR
<i>Arca imbricata</i> (Bruguière, 1789)	d	2009	CC	JR
<i>Arca zebra</i> (Swainson, 1833)	d	2010	ZB	JR

Taxon	Condition	Year	Locality	Source
<i>Barbatia cancellaria</i> (Lamarck, 1819)	d	2008	BB	Qu
<i>Barbatia candida</i> (Helbling, 1779)	d	2008	BB	Qu
<i>Fugleria tenera</i> (C. B. Adams, 1845)	d	2010	ZB	JR
Noetiidae				
<i>Arcopsis adamsi</i> (Dall, 1886)	d	2010	ZB	JR
Glycymerididae				
<i>Glycymeris decussata</i> (Linnaeus, 1758)	d	2010	CC	JR
<i>Glycymeris undata</i> (Linnaeus, 1758)	d	2010	CC	JR
<i>Tucetona pectinata</i> (Gmelin, 1791)	d	2009	CC	JR
Mytilidae				
<i>Brachidontes exustus</i> (Linnaeus, 1758)	d	2009	CC	JR
<i>Modiolus americanus</i> (Leach, 1815)	d	2011	ZB	A
Pteriidae				
<i>Pteria colymbus</i> Röding, 1798	d	1995–2005	MP	GR
Isognomonidae				
<i>Isognomon bicolor</i> (C. B. Adams, 1845)	d	2011	CC	A
<i>Isognomon radiatus</i> (Anton, 1838)	d	2011	CC	A
Pinnidae				
<i>Pinna carnea</i> Gmelin, 1791	d	1995–2005	MP	GR
Limidae				
<i>Ctenoides scaber</i> (Born, 1778)	d	200?	MP	GR
<i>Ctenoides mitis</i> (Lamarck, 1807)	d	2010	ZB	JR
<i>Lima caribaea</i> d'Orbigny, 1843	d	2010	ZB	JR
Gryphaeidae				
<i>Parahyotissa mcgintyi</i> Harry, 1985	d	2008	BB	Qu
Ostreidae				
<i>Dendrostroma frons</i> (Linnaeus, 1758)	d	2010	ZB	JR
Plicatulidae				
<i>Plicatula gibbosa</i> Lamarck, 1801	d	2008	BB	Qu
Pectinidae				
<i>Caribachlamys ornata</i> (Lamarck, 1819)	U	U	U	M
<i>Caribachlamys sentis</i> (Reeve, 1853)	d	2010	ZB	JR
? <i>Laevichlamys</i> sp.	il	2002–09	OB	Ki
Spondylidae				
<i>Spondylus americanus</i> Hermann, 1781	d	2010	MP	DS
<i>Spondylus tenuis</i> Schreibers, 1793	d	2008	BB	Qu
Lucinidae				
<i>Lucina pensylvanica</i> (Linnaeus, 1758)	d	2011	CC	A
<i>Cavilinga blanda</i> (Dall in Dall & Simpson 1901)	d	2010	ZB	A
<i>Codakia orbicularis</i> (Linnaeus, 1758)	d	2008	BB	Qu
<i>Ctena orbiculata</i> (Montagu, 1808)	d	2011	CC	A
Chamidae				
<i>Chama congregata</i> Conrad, 1833	d	2008	BB	Qu
<i>Chama florida</i> Lamarck, 1819	d	2009	CC	JR
<i>Chama sarda</i> Reeve, 1847	d	2009	CC	JR
<i>Chama sinuosa</i> Broderip, 1835	d	2009	CC	JR
<i>Pseudochama cristella</i> (Lamarck, 1819)	d	2010	ZB	A
Cardiidae				
<i>Acrosterigma magnum</i> (Linnaeus, 1758)	d	2010	ZB	A
<i>Laevicardium serratum</i> (Linnaeus, 1758)	d	200?	MP	GR
<i>Papyridea soleniformis</i> (Bruguière, 1789)	d	2010	ZB	A
Semelidae				
<i>Ervilia nitens</i> (Montagu, 1808)	d	2010	ZB	A
<i>Semele proficua</i> (Pulteney, 1799)	d	2011	CC	A
Veneridae				
<i>Callista maculata</i> (Linnaeus, 1758)	d	200?	MP	GR
<i>Chioneryx pygmaea</i> (Lamarck, 1818)	d	2010	ZB	JR
<i>Lirophora paphia</i> (Linnaeus, 1767)	d	2009	CC	JR
<i>Petricola lapicida</i> (Gmelin, 1791)	d	2011	ZB	A

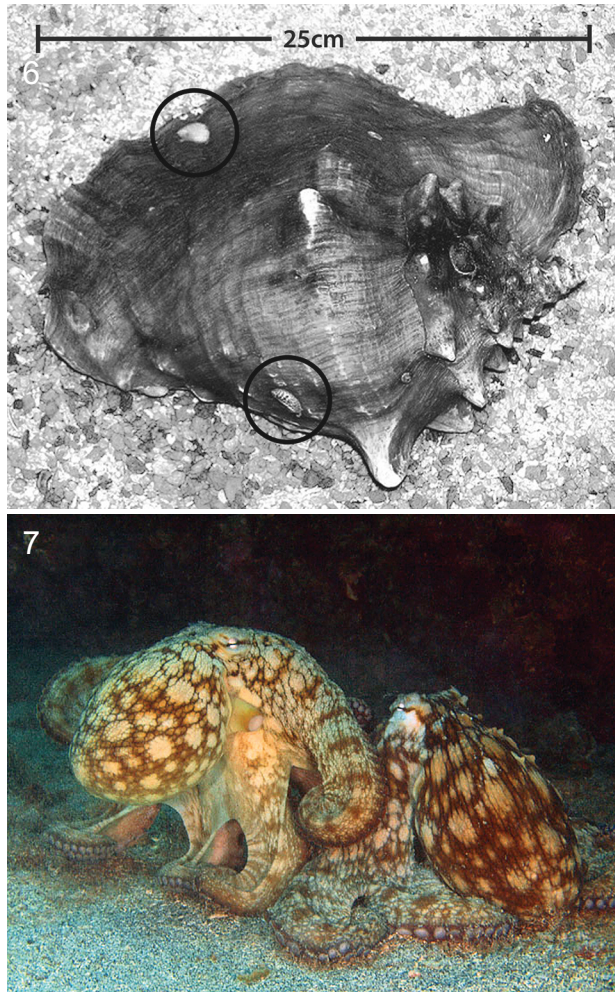
Taxon	Condition	Year	Locality	Source
<i>Puberella intapurpurea</i> (Conrad, 1849)	d	2010	LB	JR
<i>Tivela trigonella</i> (Lamarck, 1818)	d	2010	ZB	A
Tellinidae				
<i>Arcopagia fausta</i> (Pulteney, 1799)	d	2009	CC	JR
POLYPLACOPHORA				
Ischnochitonidae				
<i>Ischnochiton erythronotus</i> (C. B. Adams, 1845)	l	U	U	Ríos
Chitonidae				
<i>Acanthopleura granulata</i> (Gmelin, 1791)	l	2010	OB	A
<i>Ceratozonia squalida</i> (C. B. Adams, 1845)	l	2010	OB	A
<i>Chiton (Chiton) tuberculatus</i> Linnaeus, 1758	d	2010	ZB	A
<i>Chiton (Chiton) marmoratus</i> Gmelin, 1791	l	2010	OB	A
CEPHALOPODA				
Sepiidae				
<i>Sepia</i> sp. [extra-limital!]	d	2011	ZB	A
Spirulidae				
<i>Spirula spirula</i> (Linnaeus, 1758)	d	2011	ZB	JR
Loliginidae				
<i>Sepioteuthis sepioidea</i> (Blainville, 1823)	il	2002-09	MP	Ki
Octopodidae				
" <i>Octopus</i> " sp.	il	2002-09	MP	Ki



Figs 3-5. Marine molluscs from Sint Eustatius. **3**, two shells of *Volvarina* cf. *ardevinii*; **4**, two views of shell of *Trimusculus goesii*, 9.8 mm; **5**, Live pectinid in situ, circa 35 mm (photo by B. S. Kirby).

Atlantic coast of Nevis in the early 2000s (Jim Johnson of Nevis, personal communication, 2008). Paul Mikkelsen (Conch-L ListServe, 15.ix.2013) reported finding a cuttlebone on the beach at Avalon State Park, Fort Pierce, Florida, on 1 September 2013. Although the phenomenon has apparently not been studied, it is conceivable that cuttlebones might cross the Atlantic by riding the Canary Current south and the North Equatorial Current west (approximately 5,000 km), in the same way that internal shells of *Spirula* ride the Gulf Stream from the Tropical West Atlantic to wash up in the British Isles (approximately 7,000 km). Assuming that a cuttlebone could stay afloat for several weeks, and using an average speed for the North Equatorial Current of 0.7 knot (Bowditch, 2002: 435) it appears that these buoyant objects could be transported across the Atlantic in less than a month. If so, then the cuttlebone on Zealandia Bay beach may perhaps represent an extra-limital occurrence of *Sepia officinalis* Linnaeus, 1758.

Lynch Beach.- In 2010, four shells of *Fissurella barbouri* were found. This species seems generally to be uncommon in the Leeward Islands. In the same year, elevated *Lottia* shells with a central apex and white ribbing were found. These are tentatively identified as *Lottia cubensis*. Also found were shells of what appears to be an unnamed or forgotten *Lottia* species in



Figs 6-7. Marine molluscs from Sint Eustatius. 6, live *Lobatus gigas* with two *Crepidula* species (photo by R. D. & B. S. Kirby); 7, mating octopus species, each circa 25 cm width (photo by R. D. & B. S. Kirby).

the northern part of the Leeward Islands. The same limpet taxon from the nearby island of Nevis was illustrated as *Lottia* morphotype B in Hewitt (2009); it appears to be the case that *Lottia* species in the Caribbean Sea are numerous and poorly understood.

In 2011, I found two 4.5 mm shells of an unfamiliar *Volvarina* species (Fig. 3); in one the lip was damaged when sand grains were removed. The shells are white with two bands of orange-brown, one subsutural and the other near the anterior end. Harry G. Lee (personal communication, 19.ix.2013) suggested that this may be *V. ardovinii* Cossignani, 1997 (type locality Dominican Republic, Cossignani, 2006).

Venus Bay.- In 2011, two shells of the small white pulmonate limpet *Trimusculus goesi* were found: a fresh one at Venus Bay (Fig. 4) and a worn one at Lynch Beach. Rosenberg (2009) lists this species from Mexico and Bermuda, and in the West Indies only from three widely separated islands: Puerto Rico, St.

Barthélemy, and Curaçao.

Oranje Bay.- Fig. 5 shows a live pectinid attached to the ruins of the Old City Pier in Lower Town, Oranjestad. Some of the soft parts are visible, but the shell is completely overgrown. The edge of the mantle is yellow with many white and occasional purple blotches; the ocelli are purple. Harry G. Lee (personal communication, 21.ix.2013) suggested this may be *Lae-ovichlamys multisquamata* (Dunker, 1864), a West Indian scallop species that attaches itself to hard substrates using byssal threads.

The Marine Park (general) .- Fig. 6 shows a live *Lobatus gigas* with what appears to be two *Crepidula* species attached to the dorsal surface. The shell of *Crepidula* spec. A appears to be arched and marked with brown dashes; *Crepidula* spec. B is white and appears to be flat. According to Collin (2000) the flat, white-shelled *Crepidula* that lives in the West Indies is unnamed.

Fig. 7 shows a mating pair of octopuses in situ. Liz Shea of the Delaware Museum of Natural History commented (personal communication, 2013) that these are probably *Octopus vulgaris*, a species complex.

The St. Eustatius list currently comprises 183 taxa in 69 families: 125 gastropods, 49 bivalves, 5 chitons, and 4 cephalopods. Of these, 31 taxa were recorded alive. A total of 166 of the taxa are new records. Much of the coastline of St. Eustatius is rugged and exposed to wave action. Judging by the beach drift assemblage, species that flourish on exposed coastline, such as *Fissurella angusta* and *F. nodosa*, appear to be common, whereas species that prefer sheltered, sandy substrate (e.g. the majority of infaunal bivalves) are relatively uncommon. For comparison, Zhang (2012) has a far more complete faunal list from Antigua, a much larger island that is 134 km to the south-southeast within the Leeward Island chain, and slightly nearer to the South American continent.

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