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The macromolluscs of Mermaid (Rowley Shoals), Scott and Seringapatam Reefs, Western Australia.

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Abstract – This paper records 339 macromolluscan species comprising 261 gastropods, 70 bivalves, six cephalopods and two chiton species from the north-western Australian atolls of Mermaid Reef (Rowley Shoals), Scott and Seringapatam Reefs.

These records result from a survey undertaken by the WA Museum in September 2006, during which both qualitative and quantitative data sets were recorded. The data included a comprehensive inventory of molluscs, based on a presence/absence statistical assessment, and quantitative density records along replicated transects at outer slope and lagoonal stations. The qualitative survey results are compared with those from WA Museum surveys to the Rowley Shoals in 1982 and Scott and Seringapatam reefs in 1984, as well as from other locations of regional significance. While Mermaid Reef appeared little affected, habitat changes were apparent on Scott and Seringapatam Reefs. The shifts in some molluscan populations since the surveys in the 1980s may be related to warm water incursions, cyclonic activity and/or unregulated fishing. The populations of three gastropod species, *Cerithium echinatum*, *Conus miliaris* and *Conus musicus*, appeared to have increased, probably due to habitat change, when compared to data from the 1980s. However, the populations of giant clams (*Tridacna* spp. and *Hippopus hippopus*) and trochus (*Tectus niloticus*) on Scott and Seringapatam reefs had significantly declined, probably with the added pressure of unregulated fishing. These latter declines are supported by the findings of the senior author during a separate survey concerning a survey of the invertebrate marine resources of Scott Reef, Seringapatam Reef and Browse Island in February, 2006 (Bryce, 2006). A new Australian record for *Marchia martinetana* (Röding,1798) (Muricidae), is documented from North Scott Reef, and three new Western Australian records, for *Euplica deshayesii* (Crosse,1859) (Columbellidae), *Notodoris serenae* Gosliner and Behrens, 1997 (Aegiridae) and *Monitilora* simplex (Reeve,1850) (Lucinidae) are also documented. The records of *Pitar spoori* Lamprell and Whitehead, 1990 (Veneridae) is also significant as that species has only previously been recorded from Hibernia Reef, off north-western Australia.

INTRODUCTION

The Western Australian Museum (WA Museum) has now undertaken three marine macromolluscan surveys of oceanic, shelf-edge atolls off the North West Shelf of northwestern Australia. The first was to the Rowley Shoals, visiting Clerke and Mermaid Reefs in 1982, the second to North and South Scott Reefs and Seringapatam Reef in 1984 - the results for these two surveys being published in 1986 (Wells and Slack-Smith *in* Berry, 1986). A third survey to Ashmore Reef and Cartier Island was completed in 1986 (Wells *in* Berry, 1993).

This paper inventories the macromolluscs (Table 1) recorded during a WA Museum marine biodiversity survey undertaken in September 2006 at Mermaid Reef (Rowley Shoals), North and South Scott Reefs and Seringapatam Reef. Comparisons are made with the results from the WA Museum's 1986 report.

Since 1986 several surveys of the offshore reefs and atolls of that region have also been carried out by the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Skewes, 1999a, 1999b) and the Australian Institute of Marine Sciences (AIMS) (Rees, 2003; Smith, 2005). The aim of those surveys was to examine the marine resources of the reefs, including species of giant clams belonging to the genera *Tridacna* and *Hippopus,* and the trochid gastropod,

Above: *Tectus niloticus* Linnaeus, 1767. Species numbers were very poor due to unsustainable fishing practices. (Photo: Clay Bryce)

Tectus niloticus. In February 2006 the senior author surveyed the marine invertebrate resource species of holothurians, giant clams and trochus of Scott Reef, Seringapatam Reef and Browse Island (Bryce, 2006).

METHODOLOGY

Only macromolluscan species are included in this report. Macromolluscs are defined as species with adult size greater than or equal to one centimetre. Only those species taken/recorded during this survey are included. Data from molluscan collections, recorded over time during collecting trips by this and other museums, have not been included.

The previous molluscan surveys undertaken in 1982 and 1984 were qualitative in nature and recorded observed species at each station. The methodology adopted for this 2006 survey incorporated both qualitative and quantitative aspects. The former recorded species presence at all stations while the latter recorded the density of molluscs along replicated transects for lagoon and outer reef slope stations. Intertidal reef platform (intertidal platform) and channel stations were not sampled quantitatively. All stations were sampled over one hour and during daylight hours for logistical and safety reasons.

Transect stations: Outer Reef slope and lagoonal stations.

Replicate transects (each one metre wide and five metres apart) were established at outer slope and lagoonal stations. Transects were searched by two divers who recorded the presence and abundance of molluscan species. However, species from the families Vermetidae and Hipponicidae were not counted because of time constraints.

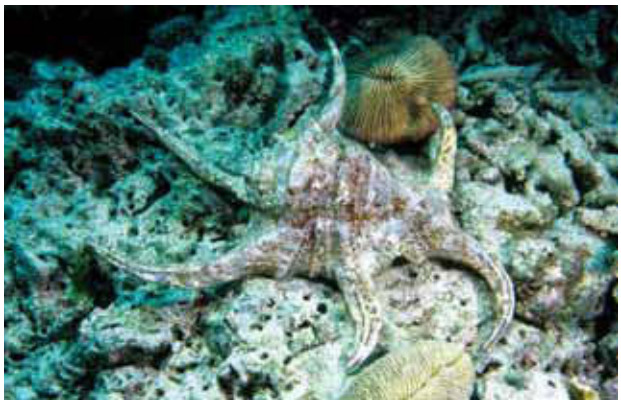
Transects ran from the deepest (maximum of 20 m) to the shallowest points of each station and followed a preset compass bearing. While this provided the greatest degree of habitat change it also resulted in transects of differing lengths. To compensate, molluscan density data were standardised to 50 m^2.

Because of the hidden nature of most molluscs, rocks and coral slabs, when abundant, were turned at five metre depth intervals along the transects. Where the rocks and slabs on the transects were few, all were turned and investigated. Small, scattered sand patches were raked for infaunal molluscan species and larger sand plains were sub-sampled by raking an area of 1 m^2 at every alternate metre along the transect lines. Short handled rakes, 500 cm wide, which penetrated the substrate to a maximum depth of 5 cm, were used for this purpose.

During the transect-swims, extra qualitative, off-transect searches were undertaken to increase the coverage of mollusc species recorded for the station. This was accomplished in two ways. Firstly, by the diver periodically halting his progress along the transect, marking his position and then exploring mollusc-rich habitats adjacent to that point on the transect. Secondly, by investigation of areas adjacent to the transects once the transect-swim had been completed. This ensured that the molluscan fauna from all depths and habitats along and adjacent to the transects was surveyed within the allotted one hour dive time.

Progressing along each transect, each diver manually recorded the species and numbers of all macromolluscs encountered. Unidentified or noteworthy specimens were collected and later identified and retained as registered vouchers in the collections of the WA Museum.

This method proved efficient. By swimming the compass bearing, the time taken to lay and retrieve a transect-tape was saved. This time saving impacted favourably on maximising in-water



Above: *Lambis chiragra* (Linnaeus, 1758). A common reef species collected by fishers for the international shell trade. (Photo: Clay Bryce)

data collecting time and limiting the overall diver nitrogen loads.

Non-quantitative stations: Intertidal reef platform and channel drift stations.

Intertidal platform stations presented a particular problem for recording molluscan densities. Effective sampling of the very wide intertidal reef platforms, often over one kilometre wide, was difficult within the workable period of a low tide cycle. Intertidal platform stations were treated as biodiversity sites and no attempt was made to quantify the species.

Faunal surveys of the stations in the channels, where excessive water flow precluded detailed searching, could be accomplished only by drift diving and so were also limited to qualitative assessments.

HABITAT DIVISIONS

References to habitats in this paper are double tiered. The first habitat tier describes the broad-scale topographical features found on many atolls, such as the lagoon, intertidal reef platform and the outer reef slope. The second tier refers to those habitat divisions within each station that are relevant to molluscan biology and life history. Survey stations, particularly those around the outer reef slope and in the atoll lagoons, generally encompassed several intergrading habitats e.g. a subtidal coral reef merging through broken coral rubble with sandy pockets to an open sandy plain.

Second tier habitat divisions adopted here are:

Intertidal Hard Substrate (IH):

This is an intertidal zone consisting mainly of coral rubble and reef pavement. These hard substrates may be covered with a thin coating of sediment and algal turf.

Above: *Lopha cristigalli* (Linnaeus, 1758). This species, with *Hyotissa hyotis* (Linnaeus, 1758) and *Hyotissa numisma* (Lamarck, 1819), had suffered severe population loss due to the destruction of coral habitat from a combination of coral bleaching and cyclonic activity. (Photo: Clay Bryce)

Above: *Hyotissa hyotis* (Linnaeus, 1758) (Photo: Clay Bryce)

Subtidal Hard Substrate (SH):

As above, but situated below low-tide level at outer slope and lagoon stations.

Sediment (S):

Intertidal and subtidal sand habitats. In such habitats, molluscan species may be infaunal or epifaunal.

Pelagic (P):

This habitat is represented by the water column from the sea surface to the substrate.

Associated with another organism:

This habitat type applies to those molluscs whose survival strategy involves an intimate and obligatory association with another life form.

Epiphytic (EP):

Plant-related associations, in which a species of seagrass or alga is the obligatory substrate

Epizooic (EZ)

Faunal related associations where an animal forms the obligatory substrate, such as coral, gorgonians and another species of m ollusc.

RESULTS AND DISCUSSION:

The molluscan species recorded during the 2006 survey are listed in Table 1 with WA Museum registration numbers being given for significant species. The taxonomic order adopted follows Beesley *et al*., 1998**,** with some subsequent taxonomic amendments**.** Station numbers, relevant habitat divisions and comparative records from the 1986 survey report (Wells and Slack-Smith 1986) are also included whether or not the species were recorded during this survey.

During the 1982 survey, 389 species were

Table 1 Molluscan species occurrence per station for the macromolluscs of Mermaid (Rowley Shoals), Scott (North and South) and Seringapatam reefs, Western Australia.
Habitat key: IH=intertidal hard substrate; SH= subtidal hard substrate; S= sand; EZ = associated with animal, EP = associated with plant
1986 Records: C= Clerke, M= Mermaid, SS= Scott South, SN= Scott North, SE= Seringapatam

Taxa	1986 Records	ATOLL RECORDS - 2006				
		Mermaid	Scott South	Scott North	Seringapatam	Habitat
Polyplacophora						
CHITONIDAE						
Lucilina lamellosa (Quoy and Gaimard, 1835) (s31174)		1		32,39		IH
Chiton sp.	SS					
CRYPTOPLACIDAE						
Cryptoplax occulatus (Burrow, 1815) (s31196)				36		IH
Cryptoplax sp.	C					
Gastropoda						
PATELLIDAE						
Scutellastra flexuosa (Quoy and Gaimard, 1834)	SS,SN					IH
HALIOTIDAE						
Haliotis asinina Linnaeus, 1758	C,M	8				IH,SH
Haliotis crebisculpta Sowerby, 1914 (s31059)	SN	5				IH
Haliotis ovina (Gmelin, 1791) (s31048)	C,M,SS,SE	7,14	18,20	36		SH
Haliotis planata Sowerby, 1833	C		18,20			IH
Haliotis cf. *varia* Linnaeus, 1758		14		36,38		IH,SH
Haliotis cf. *pustulata* Reeve, 1846 (s31189)				36		SH
TURBINIDAE						
Astralium rhodostoma (Lamarck, 1822)	C	7,8,15	25,26,29		45	SH
Turbo argyrostomus/chrysostomus	C,M,SS,SN,SE	2,3,4,5,9,10,15,16	17.19,20,21,22,23,24,26,28,30	31,34,35,36,37,39,40	41,44	IH,SH
Turbo argyrostomus Linnaeus, 1758 (s31029)	C	4	30	31,33, 35	41,44	IH
Turbo chrysostomus Linnaeus, 1758 (s31218)	C	3		31,33		IH SH
Turbo cf. *haynesi* Preston, 1914 (s31181)				33		IH
Turbo petholatus Linnaeus, 1758	C,SN	4,12,13	17,18	36		IH SH
Turbo cf. *radiatus* (juvenile) Gmelin, 1791	C,M					IH
TROCHIDAE						
Angaria delphinus (Linnaeus, 1758)	SS,SN,SE		21			IH
Clanculus atropurpureus (Gould, 1849)	C,M					SH
Clanculus margaritarius (Philippi, RA, 1846) (s31083)		13	27			SH
Clanculus sp. (juvenile)	SS					
Euchelus instrictus (Gmelin, 1791)	SS					SH

Stomatella varia A..Adams, 1850	SS					SH
Stomatella impertusa Burrows, 1815 (s31090)		4,16				SH
Stomatia phymotis (Helbling, 1779)	C,M					SH
Tectus niloticus (Linnaeus, 1767)	C,M,SS,SE	1,2,3,4,7,9,16	17,18,19,21,22,30	33		IH.SH
Tectus virgatus Gmelin, 1791(s31096)		15,16	30	31		SH
Tectus pyramis (Born, 1778)	C,M,SS,SN,SE	1,2,3,4,6,9,13,14,15,16	17,18,19,20,22,23,28,29,30	37,38,39,40	41,45	IH,SH
Tectus cf. *triserialis* (Lamarck, 1822)	C					SH
Trochus maculatus Linnaeus, 1758	C,M,SS,SN,SE	4,15	21,24,27	31,37		IH
Trochus histrio Reeve, 1842	C					SH
Trochus cf. *histrio* Reeve, 1842 (s31000)	M,SS	1,4,7,8,14,15	20	38	41	IH,SH
Trochus triserialis (Lamarck, 1822)(s31009)	M	1, 7,9,12,14,15,16	18,29,30	38,39		SH
NERITIDAE						
Nerita albicilla Linnaeus, 1758	C,SS,SN,SE					IH
Nerita plicata Linnaeus, 1758	C,SS,SN,SE					IH
Nerita polita Linnaeus, 1758	C,SN,SE					IH
CERITHIIDAE						
Cerithium alveolus Hombron and Jacquinot, 1854	C					S
Cerithium atromarginatum Dautzenberg and Bouge, 1933	C,SS					S
Cerithium citrinum Sowerby, 1855 (s31168)				31	41,42	S
Cerithium columna Sowerby, 1831	C,SS,SN,SE					S
Cerithium echinatum Lamarck, 1822 (s31013)	C	2,3,4,5,13,15,16	17,19,20,21,22,23,24,27,28,30	31,34,36	41,44,45	SH,S
Cerithium egenum Gould, 1849	C					S
Cerithium lifuense Melvill and Standen, 1895 (s31192)				36		S
Cerithium nesioticum Pilsbry and Vanatta, 1905 (s31121)	C,M,SS		20,22		41	S
Cerithium nodulosum Bruguiere, 1792	C,SS,SN,SE		17,18,20,21,22,24,27,	31	41	IH,SH
Cerithium salebrosum Sowerby, 1855 (s31076)	SN	6,12				S
Cerithiium torresi Smith, 1884 (s31077)		12				S
Cerithium trailli (Sowerby, 1855)	SN					S
Cerithium zonatum (Wood, 1828)				40		S
Cerithium munitum Sowerby, 1855 (s31147)			26			S
Rhinoclavis articulata (Adams and Reeve, 1850)	C,SS,SN					S
Rhinoclavis aspera (Linnaeus, 1758)	C,M,SS,SN	7,11,12,13,14	18,21,24,25	31,34,35,36	45	S
Rhinoclavis brettinghami Cernohorsky, 1974		13				S
Rhinoclavis fasciatus (Bruguiere, 1792)	C,SS,SN				45	S
Rhinoclavis sinensis (Gmelin, 1791)	C,M,SS,SN,SE		19,20,21,24,27,28	33,34,37	41,44	S
Rhinoclavis vertagus (Linnaeus, 1767)	C					S

Taxa	1986 Records	ATOLL RECORDS - 2006				
		Mermaid	Scott South	Scott North	Seringapatam	Habitat
PLESIOTROCHIDAE						
Plesiotrochus sp.	SE					IH, SH
MODULIDAE						
Modulus tectum (Gmelin, 1791)	SN		25,28	31		SH
LITTORINIDAE						
Littoraria undulata Gray, 1839	C					IH
STROMBIDAE						
Lambis chiragra (Linnaeus, 1758)	C,M,SS,SN,SE	3,7,10	17,18,20,21,24,27	31,33,37	44	IH,SH
Lambis lambis (Linnaeus, 1758)	SS	7,8, 9,12,16	21,24,27,29	31,33,35,39,40		S
Lambis scorpius (Linnaeus, 1758)			17			SH
Lambis truncata (Humphrey, 1786)	C,SN	1,14	28	36	45	S
Strombus dentatus Linnaeus, 1758	SS					S
Strombus fragilis (Röding , 1798)(s31175)				32		S
Strombus gibberulus Linnaeus, 1758	C,SN,SS	6,7,8,9,14	24	35		S
Strombus latissimus Linnaeus, 1758	SS			31		S
Strombus lentiginosus Linnaeus, 1758	C,SS,SN,SE	7,8,15	17,18,21,24,27,30	31,33,35	41	S
Strombus luhuanus Linnaeus, 1758	SS,SN,SE		21,29	35		S
Strombus microurceus Kira, 1959 (s31127)			21		41	S
Strombus mutabilis Swainson, 1821	C,SS,SN		21,24,25,27	35	44	S
HIPPONICIDAE						
Hipponix conicus (Schumacher, 1817)	C,M,SS,SE					EZ
VANIKORIDAE						
Vanikoro cancellata (Lamarck, 1822) (s31061)	SE	4				SH
VERMETIDAE						
Vermetid spp.		1 to 16	17 to 30	31 to 40	41 to 45	IH,SH
CYPRAEIDAE						
Cypraea annulus Linnaeus, 1758	C,SS,SN			39		IH
Cypraea arabica Linnaeus, 1758	SS,SN,SE	3	24,27	33		IH
Cypraea asellus Linnaeus, 1758	M	3	19,24,27	35,40	41	SH
Cypraea caputserpentis Linnaeus, 1758	C,M,SS,SN,SE	7	20,21	33,35,37	44	IH
Cypraea carneola Linnaeus, 1758	C,M,SS	10	19,20,21,22,23,24,26,30	36,38,39,40	41	SH
Cypraea caurica Linnaeus, 1758			27			SH
Cypraea chinensis Gmelin, 1791	SE		25			SH
Cypraea cicercula Linnaeus, 1758 (s31093)		7,15				SH
Cypraea cylindrica Born, 1778			23,24,25	37		SH

Cypraea depressa Gray, 1824	M,SS,SE			33		IH
Cypraea erosa Linnaeus, 1758	C,SS,SN,SE	4,7,12	20,21,22,24,27	32,33,35,37,38,39	41	SH
Cypraea flaveola Linnaeus, 1758	SS,SN,SE		17,19,20,22,23,24,27,30	31,36	41	SH
Cypraea cf. *globulus* Linnaeus, 1758		15	19			SH
Cypraea helvola Linnaeus, 1758	C	13	29			SH
Cypraea hirundo Linnaeus, 1758	C,SE					SH
Cypraea histrio Linnaeus, 1758	C,SS,SN	3,7,8,12	21,28	33		IH
Cypraea isabella Linnaeus, 1758	C,M,SS,SN,SE	7,13,15	19,20,21,24,25,26,30	31,33,37	41	SH
Cypraea kieneri Hidalgo, 1906	SN					SH
Cypraea limacina Lamarck, 1810		6				SH
Cypraea lynx Linnaeus, 1758	C,M,SN,SE		23,27	31,33,37,38		SH
Cypraea mappa Linnaeus, 1758			18			SH
Cypraea moneta Linnaeus, 1758	C,M,SS,SN,SE	1,3,8,12,16	19,21,24,27	33,35	44	IH
Cypraea nucleus Linnaeus, 1758 (s31113)	C		19	31,33	45	SH
Cypraea poraria Linnaeus, 1758	M	13	17,18,19,24	40		SH
Cypraea cf. *scurra* Gmelin, 1791				37		SH
Cypraea staphylaea Linnaeus, 1758	SS,SN,SE					SH
Cypraea stolida Linnaeus, 1758 (s31114)			19			SH
Cypraea talpa Linnaeus, 1758	SS	15,16	30	38		SH
Cypraea teres Gmelin, 1791		16	19,20			SH
Cypraea testudinaria Linnaeus, 1758	SE					SH
Cypraea tigris Linnaeus, 1758	C,M,SS,SN	7,9,10,11,14	20,22,23,25,28,29	33,35,37	43,44	SH
Cypraea ursellus Gmelin, 1791			27		44	SH
Cypraea vitellus Linnaeus, 1758	C,M,SS,SE	7	28			SH
Cypraea ziczac Linnaeus, 1758					42	SH
OVULIDAE						
Calpurneus lacteus (Lamarck, 1810)	M					EZ
Phenacovolva sp.	SS					EZ
Prosimnia semperi (Weinkauff, 1881) (s31204)				40		EZ
TRIVIIDAE						
Trivia oryza (Lamarck, 1810) (s31055)	C	7	22			EZ
VELUTINIDAE						
Chelynotus tonganus (Quoy and Gaimard, 1832)	C,M					SH
NATICIDAE						
Natica bougei Sowerby, 1908	SS					S
Notocochlis gualteriana (Recluz, 1844)	C,SS					S
Natica robillardi Sowerby, 1843	C					S

Taxa	1986 Records	ATOLL RECORDS - 2006				
		Mermaid	Scott South	Scott North	Seringapatam	Habitat
Polinices melanostomus (Gmelin, 1791)	C,SS		24			S
Polinices powisiana (Recluz, 1844)	SE					S
Polinices mammilla (Linnaeus, 1758)	C,SS,SN	6,9,11	24	33,37,38,39	44	S
Polinices simiae (Deshayes, 1838)			27			S
BURSIDAE						
Bursa bufonia Gmelin, 1791	C,SS,SN,SE			33,37,39		IH,SH
Bursa cruentata (Sowerby, 1841) (s31104)	C,M,SS,SN		17	33,37	41,44	IH,SH
Bursa granularis (Röding, 1798)	C		24	33,39		IH,SH
Bursa lamarckii (Deshayes, 1853) (s31070)		10,11,15	20,22,24	31,38	44,45	IH,SH
Bursa rhodostoma (Beck in G. B. Sowerby II, 1835) (s31033)		4	20,21,22	33		IH,SH
Bursa sp. (s31169)				31	42	SH
Bursa granularis (Röding, 1798)	SS,SN,SE					SH
Tutufa bubo (Linnaeus, 1758)	SS,SE			33,37		IH,SH
Tutufa rubeta (Linnaeus, 1758)	SN	11		33,34		SH
CASSIDAE						
Casmaria erinaceus (Linnaeus, 1758) (s31081)	C,M,SS,SN,SE	13,15	21,23,24,27	33,35,38		S
Cassis cornuta (Linnaeus, 1758)	SS,SN					S
Cypraecassis rufa (Linnaeus, 1758)	SS					S
PERSONIDAE						
Distorsio anus (Linnaeus, 1758)	M,SS	13	27		41	SH
RANELLIDAE						
Charonia tritonis (Linnaeus, 1758)	SS	10,12				SH
Cymatium aquatile (Reeve, 1844)	C,M,SS	2,4	23	31,39	41,43,44	SH
Cymatium clandestinum (Lamarck, 1816)	C,SS					SH
Cymatium gemmatum (Reeve, 1844)	C,M,SS,SE	13				SH
Cymatium hepaticum (Röding, 1798)	C,SE		17			SH
Cymatium mundum (Gould, 1849) (s31178)		6		33,37		SH
Cymatium muricinum (Röding, 1798) (s31126)	C,SS		21,24		44	SH
Cymatium rubecula (Linnaeus, 1758)	C,SN					SH
Gyrineum lacunatum (Mighels, 1845) (s31227)		13		31		SH
TONNIDAE						
Malea pomum (Linnaeus, 1758)	C,SS,SN		21,27			S
Tonna cepa (Röding, 1798)			24			S
Tonna perdix (Linnaeus, 1758)	SS	13	26,29	35		S

MURICIDAE						
Chicoreus brunneus (Link, 1807) (s31137)	SS,SN		23,30	31,34,36,38,39,40		SH
Chicoreus microphyllus (Lamarck, 1822)			18,19,20,27			SH
Coralliophila costularis (Lamarck, 1816)	C					EZ
Coralliophila cf. *craticulatus* (Linnaeus, 1758)	C					EZ
Coralliophila erosa Röding, 1798)	C					EZ
Coralliophila neritoidea (Lamarck, 1816) (s31032)	C,M,SS,SN,SE	4,8,9,10,11,12,14,15,16	17,18,19,20,22,25,26,27,28,29,30	31,32,34,35,36,38	41,42,45	EZ
Coralliophila stearnsii Pilsbry, 1895	SS				42	EZ
Drupa grossularia (Röding, 1798)	SS,SN,SE		19,20,26	36,37,40	41,44,45	IH
Drupa morum (Röding, 1798)	C,SS,SN,SE		30	33,37	44	SH
Drupa ricinus (Linnaeus, 1758)	C,M,SS,SN	2,3,5,15,16	17,18,19,20,22,27,28,30	31,33,34,37	44	IH
Drupa rubusidaeus Röding, 1798	C,SS,SN,SE	1,3,4,5,15,16	18,20,28,30	31,34,37,38,39,40	41,44	IH,SH
Drupella cornus (Röding, 1798)	C,M,SS,SN,SE	1,2,3,4,5,6,7,8,9,10,12,14,15,16	17,18,19,20,22,23,25,26,28,29,30	31,32,33,34,36,38,39,40	41,42,44,45	EZ
Drupella rugosa (Born, 1778)			26			SH
Maculotriton serriale (Deshayes, 1834) (s31213)	C,SS				45	SH
Marchia martinetana (Röding, 1798) (s31184)				34		SH
cf. *Morula* sp. (s31221)				36		SH
Morula biconica Blainville, 1832 (s31031)	M,SS,SN	4	18,19,20,22,30	31,32,34,36,39,40	41,45	IH,SH
Morula dumosa (Conrad, 1837) (s31108)			17,22			SH
Morula granulata (Duclos,1832)	C,SS,SN,SE	15,16		33,37	44	IH,SH
Morula margariticola (Broderip, 1832)(s31047)		7,9,10,12,14,15		38		SH
Morula nodicostata (Pease, 1868)	C,SS,SE					IH,SH
Morula spinosa (H. and A. Adams, 1835)	C,M,SS,SE	10,15,16	19,20,21,23,29	38,39	43	IH,SH
Morula uva (Röding, 1798) (s31004)	C,M,SS,SN	1,3,4,5,15,16				IH,SH
Morula sp.	M					
Muricodrupa fiscella (Gmelin, 1791)	C,SS,SN,SE					IH,SH
Muricodrupa jacobsoni Emerson and D'Attilio, 1981 (s31038)		4,7,13				SH
Muricodrupa stellaris (Hombron and Jaquinot, 1853)	C,M					SH
Nassa serta (Bruguiere, 1789) (s31030)	SS,SN	4	26	33		IH,SH
Pascula ochrostoma (Blainville, 1832) (s31177)				32		SH
Quoyula monodonta (Broderip, 1833) (s31010)		2	26,28	38		EZ
Rapa rapa (Linnaeus, 1758)	C					EZ
Thais aculeata (Deshayes, 1844)	SS				44	IH
Thais armigera (Link, 1807)	SS,SN,SE		20			IH, SH
Thais tuberosa (Röding,1798)	C,SS,SN,SE				44	IH
Muricid sp.	C					

Taxa	1986 Records	ATOLL RECORDS - 2006				
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TURBINELLIDAE						
Vasum ceramicum (Linnaeus, 1758)	C,M,SS,SN,SE	16	21	31,33,34		IH,SH
Vasum turbinellum (Linnaeus, 1758)	C,M,SS,SN,SE	1,2,3,4,5,10,11,15,16	17,19,20,21,22,26,28,30	31,32,33,34,36,37,38,39,40	41,44,45	IH,SH
BUCCINIDAE						
Cantharus pulcher (Reeve, 1846) (s31119)			20			SH
Cantharus undosus (Linnaeus, 1758) (s31161)	C,M,SS,SN,SE		30	33,39		SH
Cantharus wagneri (Anton, 1839) (s31156)			29	36		SH
Colubraria muricata (Lightfoot, 1786) (s31063)		9,10,16			41	S
Colubraria sp.	SS					S
Engina alveolata (Kiener, 1836) (s31202)	C			32,39		SH
Engina bonasia (von Martens, 1880) (s31226)		13				SH
Engina curtisiana (Smith, 1884) (s31207)					41	SH
Engina lineata (Reeve, 1846)	C,M,SS,SN,SE			38		SH
Engina mendicaria (Linnaeus, 1758)	SS,SE		24			SH
Engina zatricum Melvill, 1893	C,M					SH
Nassaria sp.	SS					
Pisania ignea (Gmelin, 1791)					42	SH
Pisania iostomus (Broderip, 1833) (s31225)		13				SH
COLUMBELLIDAE						
Euplica turturina (Lamarck, 1822) (s31091)	SS,SN	15,16	17,18,19,20,22,25,30	31,36,39	41,45	SH
Euplica varians Sowerby, 1832	C,M,SS,SN					EP
Euplica deshayesii (Crosse, 1859) #					43	EP
Mitrella albina (Kiener, 1841) (s31117)		13	19		41	EP
Pyrene punctata (Bruguiere, 1789) (s31124)	SS,SN		20			IH,SH
Pardalina testudinaria (Link, 1807)	M					SH
NASSARIIDAE						
Hebra horrida (Dunker, 1847)	C					S
Nassarius albescens (Dunker, 1846)	C,M,SS	14	24	39	42	S
Nassarius gaudiosus (Hinds, 1844)	M,SS					S
Nassarius granifer (Kiener, 1834)	C	11,14				S
Nassarius papillosus (Linnaeus, 1758)	C	13	19,20	31		S
FASCIOLARIIDAE						
Fusinus undatus Gmelin, 1791	SS					SH
Latirolagena smaragdula (Linnaeus,1758)	C,M,SS,SN,SE	3,10,15	17,18,19,20,23,30	33,37	44	IH
Latirus amplustris (Dillwyn, 1817) (s31035)		2,4				SH

Latirus craticulatus (Linnaeus, 1758)	C,SS	16				SH
Latirus nodatus (Gmelin, 1791) (s31005)	C,M,SS	1,2,4,8,9,11,15,16	19,20,21,22	34,36,38	44,45	SH
Latirus polygonus (Gmelin, 1791) (s31021)	C	3,5	20			SH
Latirus turritus (Gmelin, 1790)	C,SS,SN	2,5,9,15,16	17,19,20,22,30	32,34,36,38		SH
Latirus sp.	C					SH
Peristernia fastigium (Reeve, 1847) (s31012)	M,SS,SN	2,4,5,10,12,15,16	17,18,19,20,21,22	36	41	SH
Peristernia incarnata Kiener, 1840		13				SH
Peristernia nassatula (Lamarck, 1822) (s31011)	C,M,SS,SN,SE	2,3,4,5,8,10,15,16	19,20,22,24,27	33,36,37,40,	44,45	SH
Peristernia ustulata (Reeve, 1847)	C,SS					SH
Pleuroploca filamentosa (Röding , 1798)	C,SN,SE	13	20	36		SH
OLIVIDAE						
Oliva annulata (Gmelin, 1791)	C,SS,SN,SE	13	19,21,26,27,28		41	S
Oliva caerulea (Röding , 1798)	SS,SN					S
Oliva cf. *panniculata* Duclos, 1835	SS					S
Oliva tessellata Lamarck, 1811	SS					S
Oliva textilina Lamarck, 1811	SS					S
HARPIDAE						
Harpa amouretta Roiling, 1798 (s31134)	SE		22	38	41	S
MITRIDAE						
Cancilla filaris (Linnaeus, 1758) (s31105)	C	11,14	17		42	S
Imbricaria olivaeformis (Swainson, 1821)	SS					S
Imbricaria punctata (Swainson, 1821)	C,SS					S
Mitra acuminata Swainson, 1824 (s31084)	C,M,SS,SN,SE	13		33,37		SH
Mitra ambigua Swainson, 1829			25, 27			SH
Mitra aurora floridula Sowerby, 1874 (s31153)			26			S
Mitra coffea Schubert and Wagner, 1829 (s31154)	M		26			S
Mitra chrysalis Reeve, 1844	SE					S
Mitra chrysostoma Broderip, 1836 (s31123)	SS	20	29	36		SH
Mitra cucumerina Lamarck, 1811	SN					S
Mitra decurtata Reeve, 1844	SS					S
Mitra eremitarum Roiling, 1798	M		20			S
Mitra ferruginea Lamarck, 1811 (s31082)		13				S
Mitra imperialis Roiling, 1798	SS					S
Mitra cf. *luctuosa* (Adams, 1853) (s31220)		13				S
Mitra litterata Lamarck, 1811	C,SS					S
Mitra mitra (Linnaeus, 1758)	C,SS,SN,SE		25,27			S
Mitra paupercula (Linnaeus, 1758)	C,SS,SN,SE					S

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		Mermaid	Scott South	Scott North	Seringapatam	Habitat
Mitra retusa Lamarck, 1811	SS					S
Mitra cf. *rubritincta* Reeve, 1844	SS					S
Mitra stictica (Link, 1807)	SN			37		S
Mitra vexillum Reeve 1844 (s31138)			23, 29, 30			S
Neocancilla papilio (Link, 1807) (s31185)	C,SS,SN		24	35		S
Pterygia dactylus (Linnaeus, 1767)	SE					S
Pterygia nucea (Gmelin, 1791)	SS					S
COSTELLARIIDAE						
Vexillum cadaverosum, Reeve, 1844	SS			38		S
Vexillum consanguineum (Reeve, 1845) (s31160)	SN	2	30	36		S
Vexillum corallinum (Reeve, 1845) (s31146)			25			S
Vexillum crocatum (Lamarck, 1811) (s31170)		4		31		S
Vexillum deshayesi Reeve, 1844	SN					S
Vexillum granosum Gmelin, 1790	SN	11				S
Vexillum infaustum (Reeve, 1845) (S31206)					41	S
Vexillum lucidum (Reeve, 1845) (s31171)				31		S
Vexillum cf. *roseum* Broderip, 1836	SN					S
Vexillum sanguisugum Linnaeus, 1758	SS		30	31		S
Vexillum semicostatum Anton, 1839				36	42	S
Vexillum cf. *semifasciatum* Lamarck, 1811 (juvenile)	SN					S
Vexillum speciosum (Reeve, 1844) (s31116)	SS		19		45	S
Vexillum stainforthi Reeve, 1841 (s31209)					42	S
Vexillum cf. *turrigerum* (Reeve, 1845)	C,SN					S
Vexillum unifascialis (Lamarck, 1811) (s31145)		13	25			S
Vexillum zelotypum (Reeve, 1845)	SN					S
TURRIDAE						
cf. *Eucithara funiculata* (Reeve, 1846)	SN					S
cf. *Eucyclotoma albomacula* Kay, 1979	M					S
Lienardia rubida (Hinds, 1844)	C,SN					S
Pseudodaphnella pulchella (Pease, 1860)	C,SN					S
cf. *Turris* sp. 1	C,SS					S
TEREBRIDAE						
Hastula albula Menke, 1843	SS					S
Hastula lanceata (Linnaeus, 1767)				34		S
Terebra affinis Gray, 1834	C,SS,SN		21,24,27	31	42	S

Terebra areolata (Link, 1807)	SS					S
Terebra crenulata (Linnaeus, 1758)	C,SS,SN	6,9				S
Terebra dimidiata (Linnaeus, 1758)	C		24			S
Terebra felina (Dillwyn, 1817)	C,SS,SN	10	19,24,27	37		S
Terebra guttata (Röding , 1798)	SS					S
Terebra maculata (Linnaeus, 1758)	C,SS,SN	6,11	18,21,23,24,27	35	45	S
Terebra nebulosa (Sowerby, 1825)	C,SS		27			S
Terebra undulata Gray, 1934	SN		24			S
Terebra subulata (Linnaeus, 1767)					45	S
CONIDAE						
Conus arenatus Hwass in Bruguiere, 1792	SS,SN,SE					SH
Conus capitaneus Linnaeus, 1758	SS,SN			35,36,38	43,44	S,IH
Conus catus Hwass in Bruguiere, 1792	C,M,SS,SN,SE		20	33		S,IH
Conus ceylanensis Hwass in Bruguiere,1792	C,M	5				S,IH
Conus chaldeus (Röding , 1798)	M,SS,SN,SE			37	44	S,IH
Conus coronatus Gmelin, 1791	C,M,SS,SN,SE					S,IH
Conus distans Hwass in Brugiuere, 1792 (s31094)	C,M,SS,SN,SE	3,5,15	19,22,24	33,37,40	44	S,IH,SH
Conus ebraeus Linnaeus, 1758	C,SS,SN,SE					S,IH
Conus eburneus Hwass in Bruguiere, 1792	C,SS,SE		27	34		S,IH
Conus flavidus Lamarck, 1810 (s31094)	C,M,SE			33		S,IH
Conus glans Hwass in Bruguiere, 1792	C,M		20,27			S,SH
Conus imperialis Linnaeus, 1758 (s31115)	C,SS,SN,SE	5,15	19,21,24	31,33,35		S,IH,SH
Conus legatus Lamarck, 1810 (s31131)	SN		22	36	41	SH
Conus leopardus (Röding , 1798)	C,SN	9	25			S
Conus litoglyphus Hwass in Bruguiere,1792	SN		21,27,30	33		S
Conus litteratus Linnaeus, 1758	SS		25			S
Conus lividus Hwass in Bruguiere, 1792	C,M,SS,SN,SE		17,18,19,20,21,24,25,27	33,37	44	S,IH
Conus magnificus Reeve, 1843 (s31085)		13				S
Conus marmoreus Linnaeus, 1758	SS,SN,SE	3,9,10	19,21,24			S
Conus miles Linnaeus, 1758	C,M,SS,SN	2,3,4,5,6,10,15,16	17,20,22,23,25,26,28,29,30	31,33,34,36,37,39,40	41,44,45	S
Conus miliaris Hwass in Bruguiere, 1792 (s31007)	SN	1,2,3,4,10,16	17,19,20,?21,22,24,27,30	33,34,36,37,38,39	41,44	S
cf. *Conus miliaris* Hwass in Bruguiere, 1792 (s31023)		9	20,22	38,40	41	S
Conus musicus Hwass in Bruguiere, 1792 (s31034)	SS	4,5,7,10,15	17,19,20,22,23,25,26,28,29,30	31,36,37,38,39,40	41,44,45	S
Conus omaria Hwass in Bruguiere, 1792	C					SH
Conus planorbis Born, 1778 (s31212)					44	S,IH
Conus pulicarius Hwass in Bruguiere, 1792	C,SS,SN,SE	6,11,14	21,24,27	33,34,35	42	S
Conus quercinus Solander, 1786	SS,SN		27			S,IH

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Conus rattus Hwass in Bruguiere, 1792	C,M,SS,SE	7,12,14,16	17,20,26	39	41	S,IH
Conus sanguinolentus Quoy and Gaimard, 1834		10,14	20,22,30	31,33,37,40	41,44	S,IH
Conus sponsalis Hwass in Bruguiere, 1792 (s31214)	C,SS,SN,SE	1,3	20,22,25,30	32, 33	44,45	S,IH
Conus striatus Linnaeus, 1758	SS,SN,SE					S,IH
Conus sugillatus Reeve, 1844	SS,SE					S,IH
Conus tessulatus Born, 1780	SN	13	24,28	35	45	S,IH
Conus vexillum Gmelin, 1791	SS,SN					S,IH
Conus vitulinus Hwass in Bruguiere, 1792 (s31199)	C,M,SS,SN			32,38		S,IH
ARCHITECTONICIDAE						
Philippia radiata (Röding , 1798) (s31069)	C	11				S
PYRAMIDELLIDAE						
cf. *Otopleura mitralis* A. Adams, 1855	C					S
cf *Otopleura* sp. 1	C					S
AGLAJIDAE						
Chelidonura amoena Bergh, 1905	SN	1	27			EZ
Philinopsis pilsbryi (Eliot, 1900) (s31058)		7,12				SH
Philinopsis reticulata (Eliot, 1903) (s31142)			24			S
Aglajid sp. 1	SS					S
Aglajid sp. 2	C					S
Aglajid sp. 3	C					S
HAMINOEIDAE						
Atys cylindricus (Helbling, 1779)			26			S
BULLIDAE						
Bulla ampulla Linnaeus, 1758	C,SN		21,27			S
PLAKOBRANCHIDAE						
Plakobranchus ocellatus van Hasselt, 1824			21		42,44	EP
PLAKOBRANCHIDAE						
Elysia sp.	SS					EP
Thuridilla bayeri (Marcus, 1965)		1	21,27,29			EP
POLBRANCHIIDAE						
Polybranchia cf. *westralis* Jensen, 1993 (s31208)					41	EP
APLYSIIDAE						
Dolabella auricularia (Lightfoot, 1786)			27			IH,SH
PLEUROBRANCHIDAE						
Berthellina citrina (Ruppell and Leuckart, 1828)			20,29			IH, SH

Pleurobranchus forskalii (Ruppell and Leuckart, 1828)			26			SH
POLYCERIDAE						
Nembrotha kubaryana Bergh, 1877			22			EZ
Nembrotha cristata Bergh, 1877			23		45	EZ
Thecacera pacifica Bergh, 1883			20	34		S
GYMNODORIDIDAE						
Gymnodoris citrina (Bergh, 1875)			21,25			IH,SH
AEGIRIDAE						
Notodoris serenae Gosliner and Behrens, 1997 (s31151)			26			EZ
DISCODORIDIDAE						
Atagema spongiosa (Kelaart, 1858)			27			EZ
Atagema intecta (Kelaart, 1858b)			27			EZ
Discodoris boholensis Bergh, 1877 (s31022)		3	27			SH
Halgerda tessellata (Bergh, 1880)			27			SH
Jorunna pantherina (Angas, 1864) (s31152)			25			EZ
Jorunna rubescens Bergh, 1876			27			EZ
CHROMODORIDIDAE						
Ardeadoris egretta Rudman, 1984 (s31075)		11				SH
Chromodoris coi (Risbec, 1956)			29		42	SH
Chromodoris elisabethina Bergh, 1877		2,3,5,10,11,14,15,16	19,22			SH
Chromodoris lineolata (Hasselt, 1824)	C					IH, SH
Chromodoris cf. *quadricolor* (Ruppell and Leuckart, 1831)	M					SH
Chromodoris sp.	SS					SH
Glossodoris atromarginata (Cuvier, 1804)					42	SH
Glossodoris sp.	SE					SH
DENDRODORIDIDAE						
Dendrodoris tuberculosa (Quoy and Gaimard, 1832)		2,4				SH
Dendrodoris nigra (Stimpson, 1855)				31	42	SH
PHYLLIDIIDAE						
Phyllidia elegans Bergh, 1869	C,SS,SN,SE	5,14,15,16	19,20,27,28	31		SH
Phyllidia coelestis Bergh, 1905	SS,SN		17,19,20,22,28,30	34,36		SH
Phyllidia varicosa Lamarck, 1801	SS	8	21,27	38		SH
Phyllidiella lizae Brunckhorst, 1993	SS					SH
Phyllidiella nigra (van Hasselt, 1824) (s31074)		9				SH
Phyllidiella pustulosa (Cuvier, 1804)	SS,SE	2,4	17,25,27,28,30	31,32,33,36,39	41,43,45	SH
Phyllidiella rudmani Brunckhorst, 1993 (s31067)		10				SH
Phyllidiopsis krempfi Pruvot-Fol, 1957					45	SH

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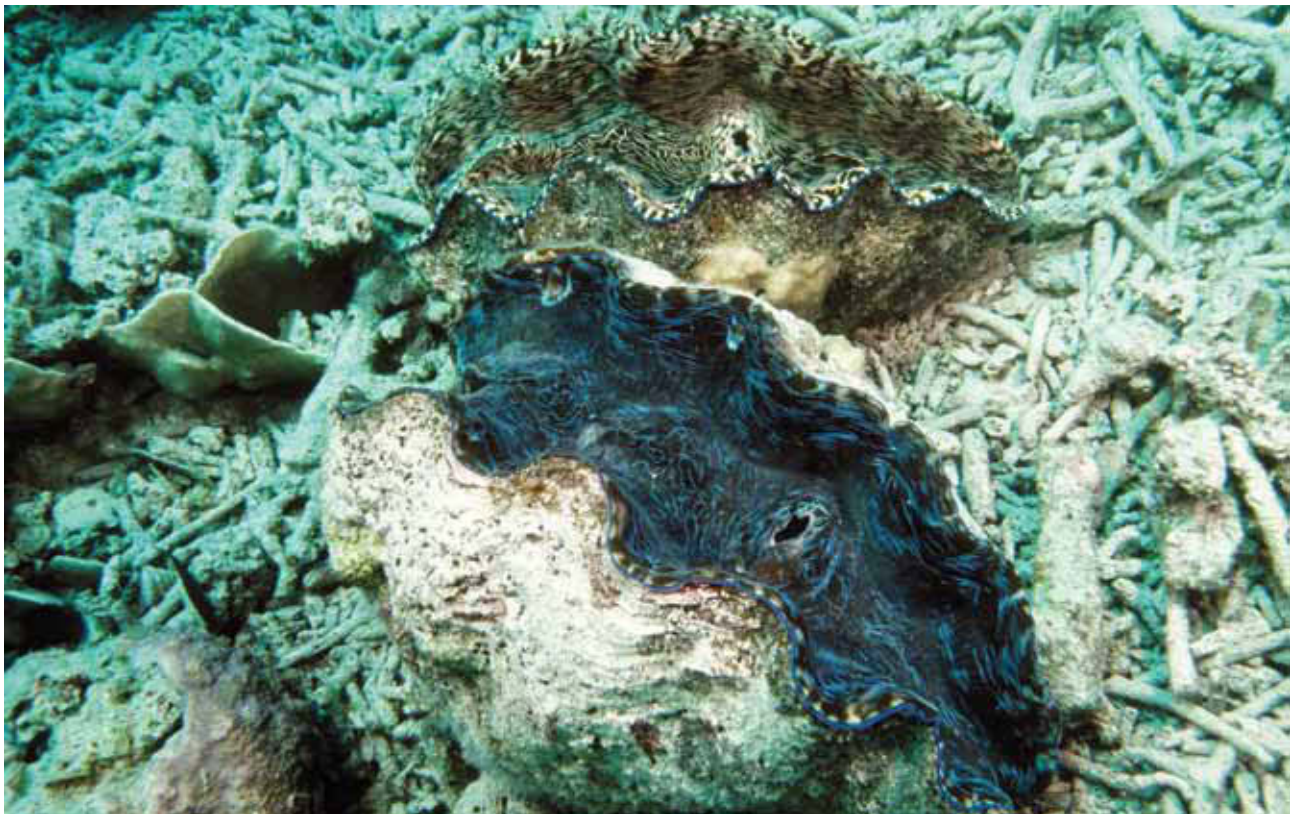
Phyllidiopsis striata Bergh, 1888 (s31066)	SS,SN	10,12,16	28			SH
Reticulidia fungia Brunckhorst and Gosliner in Brunckhorst, 1993				36		SH
TETHYDIDAE						
Melibe bucephala Bergh, 1902 (s31224)					42	SH
AEOLIDINA						
Aeolidia sp. 1	SS					EZ
FACELINIDAE						
Phidiana indica (Bergh, 1896)				34		SH
Pteraeolidia ianthina (Angas,1864)		13,15	18,20		42	SH
ONCHIDIIDAE						
Onchidium sp.	C,M,SS	3	24,27	33,37		S
Bivalvia						
MYTILIDAE						
Botula cf. *fusca* (Gmelin, 1791)	C					
Botula cf. *silicula* (Lamarck, 1819) (s31198)				38		SH
Lithophaga cf. *nasuta* (Philippi, 1846)	C,M,SN					EZ
Modiolus auriculatus Krauss, 1848	C					
Septifer bilocularis (Linnaeus, 1758)	SS,SN	13	23,25,28,29,30	31,32,33,34,36,38,39,40	43,45	SH
ARCIDAE						
Anadara antiquata (Linnaeus, 1758)	SN					S
Arca avellana Lamarck, 1819	C,M					
Arca avellana/ventricosa Lamarck, 1819 complex (s31042)		1,2,3,5,6,7,8,9,11,12,14,15,16	18,19,20,23,24,26,28,29,30	31,32,33,34,36,38,39	42,45	SH
Arca ventricosa Lamarck, 1819	C,M,SS,SN,SE	6				SH
Barbatia amygdalumtostum (Röding, 1798) (s31143)	C,M,SS,SN,SE	9	22,23,24,25,26,27,28	38		SH
Barbatia aff. *coma* (Reeve, 1844) (s31194)				31,32,33,34,36,38,39,40		SH
Barbatia foliata Forsskal, 1775 (s31109)		5,9,11,12,14	18,19,22,28,29	31,34,36		SH
Barbatia plicata (Dillwyn, 1817) (s31014)	C,SS,SN,SE	2,12,15,16	20,22,25	31,34,36,40	41	SH
Barbatia tenella (Reeve, 1843)	M,C					
Barbatia sp.	M,C					
GLYCYMERIDIDAE						
Tucetona pectunculus (Linnaeus, 1758) (s31079)	C,M,SS,SN,SE	7,12	21,24,25,27	35		S
PTERIIDAE						
Electroma alacorvi (Dillwyn, 1817)	C,M					AA,SH
Electroma ovata (Quoy and Gaimard,1834) (S31182)	SS,SN			34		SH

Pinctada albina (Lamarck, 1819)	C,M					SH
Pinctada maculata (Gould, 1850)	SS,SN					SH
Pinctada margaritifera (Linnaeus, 1758)	C,M,SS,SN	6,8,9,11,12	17	32		SH
Pteria chinensis (Leach, 1814)	SS					AA,SH
Pteria producta (Reeve, 1857)		2				AA,SH
Pteria penguin (Röding, 1798)		10	26,27,29	34,35,38		AA,SH
Pteria sp.	C					
ISOGNOMONIDAE						
Isognomon isognomum (Linnaeus, 1758) (s31149)	C	12	26		43	SH
Isognomon legumen (Gmelin, 1791)	C,SS,SE					SH
Isognomon perna (Linnaeus, 1758)	C,M,SS,SN,SE					SH
PINNIDAE						
Atrina pectinata (Linnaeus, 1767)	BEACHDR					S
Atrina vexillum (Born, 1778) (s31089)	SN	6				S
Pinna muricata Linnaeus, 1758 (s31088)		14,15				S
Pinna bicolor Gmelin, 1791 (s31173)				31,32,34,36,39		S
Streptopinna saccata (Linnaeus, 1758) (s31092)	C,SS	9,11,15	18,19,20,22,23,25,26,27,28,29	31,34,36,39	41,43,45	SH
Ctenoides annulatus						
LIMIDAE						
Ctenoides annulatus (Lamarck, 1819) (S31148)	M	5	23, 26,30			S
Limaria fragilis (Gmelin, 1791)	C,M,SS,SN,SE	6,15	22,26	31,36	45	S,SH
Lima sp.	SS					
GRYPHAEIDAE						
Hyotissa hyotis (Linnaeus, 1758)	C,M,SS	7,9,11,12	23,29	32,34,38	43	SH
Hyotissa numisma (Lamarck, 1819)	C,M,SS,SN,SE					SH
OSTREIDAE						
Lopha cristigalli (Linnaeus, 1758)	M	8,12	23,26,29	32,39	43	SH
Dendostrea sp.	C,M					
PLICATULIDAE						
Plicatula australis (Lamarck, 1819) (s31026)	C,M	3, 7				AA?, SH
PECTINIDAE						SH
Chlamys cf. *cookei* Dall, Bartsch and Rehder, 1938	C					
Chlamys funebris (Reeve, 1853)	C					
Chlamys cf. *pacifica* Broderip, 1835	SS,SN,SE					SH
Decatopecten radula griggi (Webb, 1957) (s31049)	SN	7			42	SH
Excellichlamys histrionica (Gmelin, 1791)	SS	15,16		34		SH
Gloripallium pallium (Linnaeus, 1758)	C,SS,SN		18,23			SH

Taxa	1986 Records	ATOLL RECORDS - 2006				
		Mermaid	Scott South	Scott North	Seringapatam	Habitat
Gloripallium speciosum Reeve, 1833 (s31037)	C	4,10,13,16	18			SH
Laevichlamys squamosa (Gmelin, 1791)	C,M,SS,SN					SH
Laevichlamys cuneata Reeve, 1833 (s31203)		1,5,13,15,16	17,18,19,20,23,25,26,30	31,32,34,36,39	41	SH
Pedum spondyloideum (Gmelin, 1791)	C	1,2,5,7,9,10,11,14,15,16	18,19,25,26,29,30	31,32,34,35,36,38	42,43,45	AA,SH
Semipallium dianae (Crandall, 1979) (s31222)		5,10,15				
Semipallium tigris (Lamarck, 1819)	C					
Semipallium sp. 1	C					
Semipallium sp. 2	C					
SPONDYLIDAE						
Spondylus ducalis (Röding , 1798)	C,M					SH
Spondylus pacificus Reeve, 1856	M					SH
Spondylus varius Sowerby, 1827			29,30			SH
Spondylus spp. (s31016)	SS,SN	1,2,3,6,7,8,9,11,12,14,15,16	18,19,21,23,24,25,26,27,28,29	31,33,34,36,38,39	43,44	SH
ANOMIIDAE						
Anomia sp. (juvenile)	M					
CHAMIDAE						
Chama cf. *iostoma* Conrad, 1837	C,M,SN					SH
Chama lazarus (Linnaeus, 1758) (s31101)	M	12				SH
Chama pacifica Broderip, 1835	C,M					SH
Chama plinthota Cox, 1927 (s31001)		1				
Chama spp.		1,2,3,5,6,7,9,10,11,12,14,15	18,19,23,26,27,28,29,30	31,33,34,36,39,40	41,43,44,45	SH
LUCINIDAE						
Codakia cf. *paytenorum* (Iredale, 1937) (s31128)			21			S
Codakia punctata (Linnaeus, 1758) (s31186)	C,SS,SN	11	24,27	35		S
Ctena bella (Conrad, 1837)	C					
Linga sp.	C					
Fimbria fimbriata (Linnaeus, 1758)	C,SS,SN					
Monitilora simplex (Reeve, 1850) (s31129) #			21			S
Wallucina gordoni (Smith, 1886)	C					
Wallucina sp.	C					
CARDITIDAE						
Beguina semiorbiculata (Linnaeus, 1758) (s31110)	SS,SN		18,19,23,25,26,28,29	31,32,34,36,38,39	43,45	SH
Cardita variegata (Bruiguiere, 1792)	C,M,SS		24,25,26,29	36,39,40	45	SH
CARDIIDAE						
Acrosterigma alternatum (Sowerby, 1841) (s31046)		6,7,9,12,14,15				S

Acrosterigma mendanaense (Sowerby, 1896) (s31068)		10				S
Acrosterigma orbitum (Broderip and Sowerby, 1833) (s31125)	C,SS,SN	1,10,11,12,16	18,20,28,29	31,32,36		S
Acrosterigma sp.	C					
Corculum cardissum (Linnaeus, 1758)	C,M					S
Fragum fragum (Linnaeus, 1758)	C,SS,SN,SE	6,14		35	42,44,45	S
TRIDACNIDAE						
Hippopus hippopus (Linnaeus, 1758)	C,M,SS,SN,SE	8,14	21,24,27		42	IH
Tridacna crocea Lamarck, 1819	C,M,SS,SN,SE	1,2,3,4,5,6,7,8,9,10,11,12,14, 15,16	18,19,21,22,23,24,25,26,27,2 8,29,30	31,32,33,34,35,36,37,38,39,40	41,42,43,44,45	IH,SH
Tridacna derasa (Röding, 1798)		1,6,7,8,12,14	21	34	42	SH
Tridacna gigas (Linnaeus, 1758)	C,SN	6,7,9,14				SH
Tridacna maxima (Röding, 1798)	C,M,SS,SN,SE	1,2,3,4,5,6,7,8,9,10,11,12,14, 15,16	18,19,20,21,22,23,25,26,27,2 8,29,30	31,32,34,35,36,37,38,39	41,42,43,44,45	IH,SH
Tridacna squamosa Lamarck, 1819	C,M,SS,SN	1,6,7,8,9,12	22,25,26,28	32,33,38,39,40	43	IH,SH
MESODESMATIDAE						
Atactodea stricta (Gmelin, 1791)	C					
TELLINIDAE						
Exotica obliquaria (Deshayes, 1854)	C					
Exotica rhomboides (Quoy and Gaimard, 1833)	C					
Quadrans gargadia (Linnaeus, 1758) (s31188)	C			35		S
Tellina crassiplicata Sowerby, 1758	C,M					S
Tellina cf. *crucigera* Lamarck, 1818 (s31044)		6				S
Tellina cf. *exculta* Gould, 1850 (s31193)				35,36		S
Tellina linguafelis (Linnaeus, 1758) (s31150)	M		26			S
Tellina perna Spengler, 1798	SS					S
Tellina remies Linnaeus, 1758 (s31155)	SS		27	38		S
Tellina robusta Sowerby, 1867	C					
Tellina scobinata Linnaeus, 1758 (s31056)	C,M,SS,SE	7,9,11,14	18,21,24,27	32,35,36		S
Tellina semitorta Sowerby, 1867	C					
Tellina staurella (Lamarck, 1818) (s31172)				31		S
Tellina virgata Linnaeus, 1758	SS					S
Tellina sp. (s31144)			24			S
SEMELIDAE						
Semele sp. (s31028)		3				SH
Semele sp.	C					
TRAPEZIDAE						
Trapezium oblongum (Linnaeus, 1758) (s31072)	C,M	11,13,16	20	31		SH

Taxa	1986 Records	ATOLL RECORDS - 2006				
		Mermaid	Scott South	Scott North	Seringapatam	Habitat
Trapezium obesa (Reeve, 1843) (s31167)				31,39	41	SH
VENERIDAE						
Antigona clathrata (Deshayes, 1854) (s31080)		12	19,21,22		45	S
Antigona reticulata (Linnaeus, 1758) (s31027)	C,M	3,10	24	36,40		S
Antigona resticulata (Sowerby, 1853) (s31053)	C,SS,SN	7,9,11,12,14,15	29	35,39		S
Dosinia sp.	SS					S
Globivenus toreuma (Gould, 1846) (s31098)	C	4,16	17,19,20,23,28	33,39	41	S
Lioconcha ornata (Dillwyn, 1817) (s31111)	SS,SN		18			S
Lioconcha castrensis (Linnaeus, 1758) (s31071)		6,9,11,12	21,24,25,29	31,34,36		S
Lioconcha cf. *tigrina* (Lamarck, 1816) (s31187)	SS,SN			35		S
Pitar cf. *prora* (Conrad, 1837)	SN					S
Pitar spoori Lamprell and Whitehead, 1990 (s31073) #		11,12	30			S
Pitar sp.	SN					S
Tapes literatus (Linnaeus, 1758) (s31201)				38		S
Tapes platyptycha (Linnaeus, 1758) (s31057)		8,12				S
Timoclea sp. 1	C					
Timoclea sp. 3	C					
GASTROCHAENIDAE						
Gastrochaena cf. *cuneiformis* (Spengler, 1783)	C					
Cephalopoda						
NAUTILIDAE						
Nautilus pompilius Linnaeus, 1758	C,SS,SE					
SPIRULIDAE						
Spirula spirula (Linnaeus, 1758)	SN					
SEPIIDAE						
Sepia latimanus Quoy and Gaimard,1832	C,SS	8	18			SH
Sepia pharaonis Ehrenberg, 1831	SS		24			Beach
LOLIGINIDAE						
Sepioteuthis cf. *lessoniana* Férussac, 1831				32		SH
Photololigo sp. (s31223)				open water		
OCTOPODIDAE						
Octopus cf. *cyaneas* Gray 1929 (not collected)		3				IH,SH
Octopus cyaneas Gray 1929		7,14	19,21	31	43	IH,SH
Octopus sp.	C,SS					
Octopus sp. (juvenile) (s31097)		16				SH
Octopus sp. (s31210)					44	SH
Octopus sp. (s31211)					44	SH



Above: *Tridacna derasa* (Röding, 1798) (Photo: Clay Bryce)

recorded comprising 280 gastropods, 101 bivalves, six cephalopds and two chitons. Molluscs identified during the 2006 survey totalled 339 species, comprising 261 gastropod, 70 bivalve, six cephalopod and two chiton species. Table 2 provides a summary of the total number of species recorded from each reef surveyed, arranged from south to north, together with the percentage of total species for each reef as represented by the various habitat divisions. Many species occurred in more than one habitat division and so were counted for each.

As indicated in Table 2, Subtidal-Hard (SH) and Sediment (S) are the two habitat types for which higher species percentages were consistently recorded. The percentages of species from those sites, when considered as totals from all reefs surveyed, far exceed those from the third dominant division, the Intertidal Hard (IH), and the remaining habitat divisions. These differences may be attributed to the greater number of habitat niches available to molluscs within the subtidal breakaway zones of the outer and inner reef slopes, which include the majority of SH and S sites. The difference in environmental conditions between the outer slope, with its vigorous wave action, and the inner reef edge, with a relatively quieter, cross-platform water flow, provides greater opportunities for habitat niche variability and nutrient retention.

In comparison, IH sites on the intertidal platforms are subjected to a water flow gradient across their width, diminishing from the wave-pounded outer slope to the relatively calm waters of the lagoon. Intertidal platforms are also topographically flat providing little protection for biota in the form of tide pools and coral slab debris. There is little sediment to be found on the platforms except in isolated back-reef areas. However, a limited molluscan fauna exists where there is a sufficient depth of sediment. Desiccation from low tide exposure, wide temperature fluctuations and increased predation of collectable species by Indonesian fishers also has an impact on diversity and abundance (pers. obs. C. Bryce).

Table 3 displays the average species count per station and the average species count at each major topographical reef feature (outer slope, intertidal platform and lagoon), with the number of stations in brackets. The molluscan faunas of South Scott and North Scott Reefs appear to be the most diverse with greater average species counts per station and across the three topographical reef features. In general, average species counts were higher at all reefs on the outer slope than at lagoon or intertidal platform habitats. A comparison of the combined outer slope and lagoon figures (equating to SH and S in Table 2) compared with the intertidal count (IH); indicate a similar outcome, as expressed with Table 2.

Analysis using Multi-Dimensional Scaling (MDS)

Table 2 Percentage of total molluscan species for each habitat division for the 2006 survey.

Reef	Total Species	Habitat Divisions					
		IH	SH	S	EP	EZ	P
		% Species					
Mermaid	185	22.99	60.96	34.23	1.07	4.81	0.00
South Scott	221	21.72	52.94	38.91	1.36	5.88	0.45
North Scott	183	29.35	54.35	41.30	0.00	3.17	0.54
Seringapatam	120	28.10	56.20	35.54	3.31	4.13	0.00

Table 3 Reefs surveyed in 2006, with average species and number of stations (x).

Reef	Average species per station	Average species for outer reef slope	Average species for intertidal platform	Average species for lagoon
Mermaid	34 (16)	37 (5)	37 (1)	33 (8)
South Scott	47 (14)	49 (6)	59 (3)	38 (5)
North Scott	43 (10)	51 (3)	44 (3)	39 (3)
Seringapatam	36 (5)	45 (2)	46 (1)	23 (2)

of the molluscan biodiversity presence /absence data is presented in Figures 1 and 2 using the Bray Curtis Similarity Matrix. The data for the intertidal platform and channel stations were omitted to maintain a consistent sampling strategy for all stations.

The breakdowns of data in the MDS plot (Figure 1) supported by the dendrogram (Figure 2), clearly differentiate Mermaid Reef, 400 km to the south, from South and North Scott and Seringapatam Reefs.

At a finer scale the data for the lagoons and outer slopes, for all reefs, show a meaningful separation. There is also an organised spread of sampling points related to the prevailing environment from very exposed to very protected stations, progressing outward from the centre of the plot (Figure 1). To the left, the sampling points align with increasingly-exposed, high-energy environments (Stations 17 and 41) and to the right they align with increasingly protected, low energy, lagoonal sites (Stations 6, 7 and 43).

From the dendrogram (Figure 2), outlier stations are evident at Stations 1, 18 and 43. Station 1 at the eastern side of Mermaid Reef lagoon revealed a similarity with Stations 32 and 38 from North Scott lagoon, even though the distance between the two reefs is more than 400 kms. Examination of Table 1 revealed the inclusion of several common outer reef platform species, such as *Drupa rubusidaeus*, *Vasum turbinellum*, *Conus miliaris*, and *Conus sponsalis* at Station 1 to be a contributing factor. All four species are common on the outer reef platform. A comparison of the remaining Mermaid lagoonal reef-edge stations (Stations 6, 7, 8 and 11) indicated that the difference in intertidal platform width has an influence. At Station 1 the intertidal platform was narrow with a more uniform habitat across its entire width, which is favoured by these commonly-occurring species. This is not the case for the stations on the considerably wider western lagoon edge (Stations 6, 7 and 8), where deposited coralline sands dominate the inner half of the intertidal platform providing poor habitat for these same species. Station 11, although on the same narrow platform as Station 1, is subjected to a constant dusting of silt due to its proximity to the channel (pers. obs. C. Bryce).

Station 18 at South Scott Reef (Figures 1 and 2), appears to be intermediate between those of the lagoon and outer reef stations of Mermaid Reef. Work being undertaken by AIMS has revealed that the water influencing Station 18, between the western horn of South Scott Reef and Sandy Islet, is constantly mixed with oceanic water (Gilmore – AIMS pers. comm.) This water mixing, combined with that location's habitat complexity, may have buffered the molluscan communities from the effects of elevated water temperatures, which had affected so much of South Scott Reef in 1998 and 2003. Mermaid Reef had also been affected at those times but to a lesser extent (Rees *et al.*, 2003; Gilmore *et al.*, 2007).

Figures 3 and 4 indicate the more common species of bivalves and gastropods respectively, expressed as the average number of individuals/50 m^2.

Considerable variation is evident between the

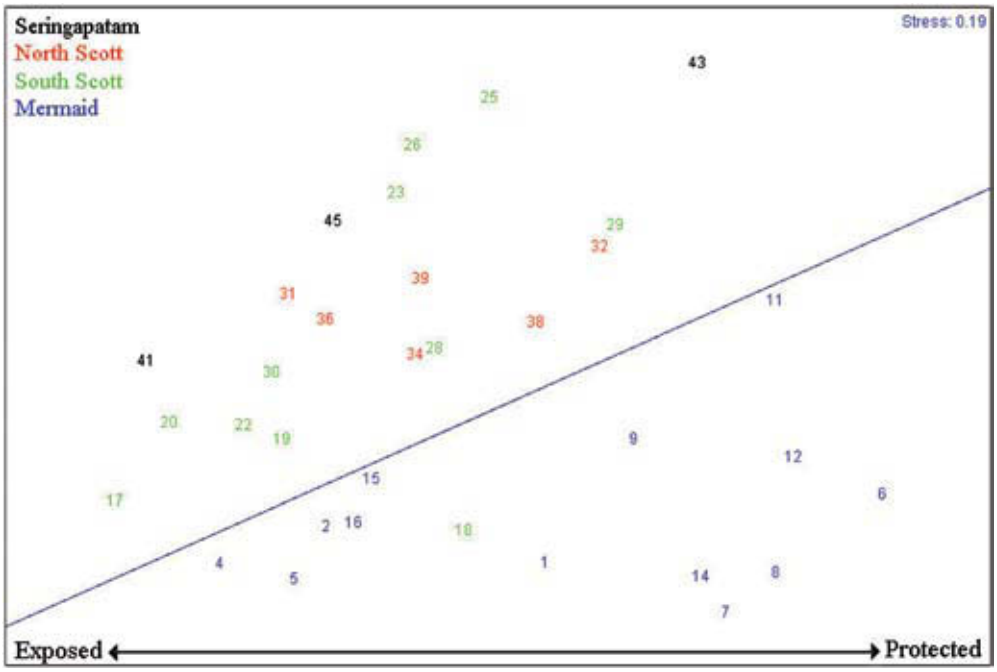


Figure 1 Multi-dimensional scaling ordination of molluscan presence /absence data for surveyed lagoon and outer slope stations.

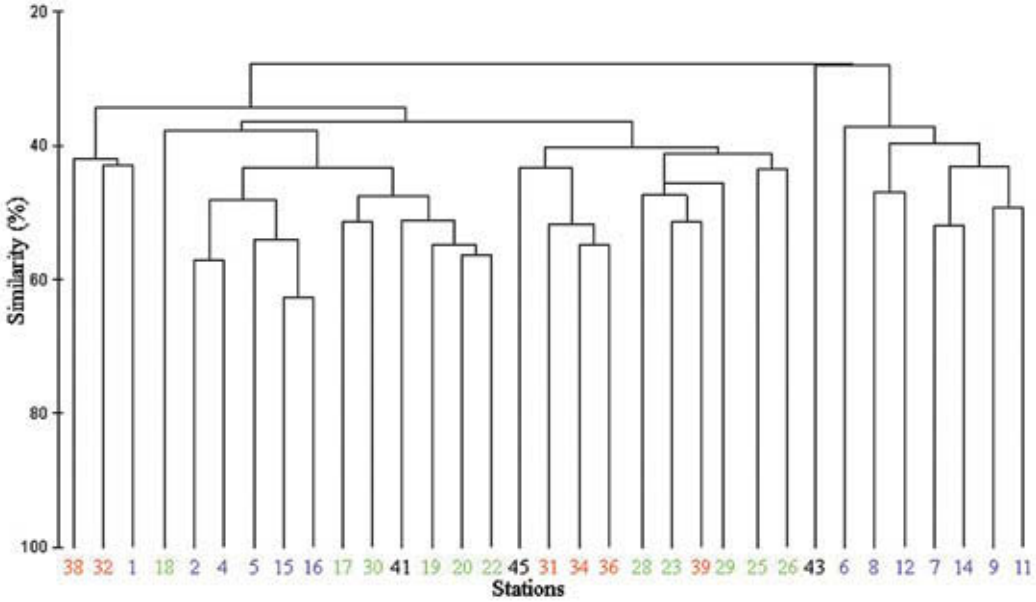


Figure 2 Dendrogram showing station similarity of molluscan presence/absence for lagoon and outer slope stations.

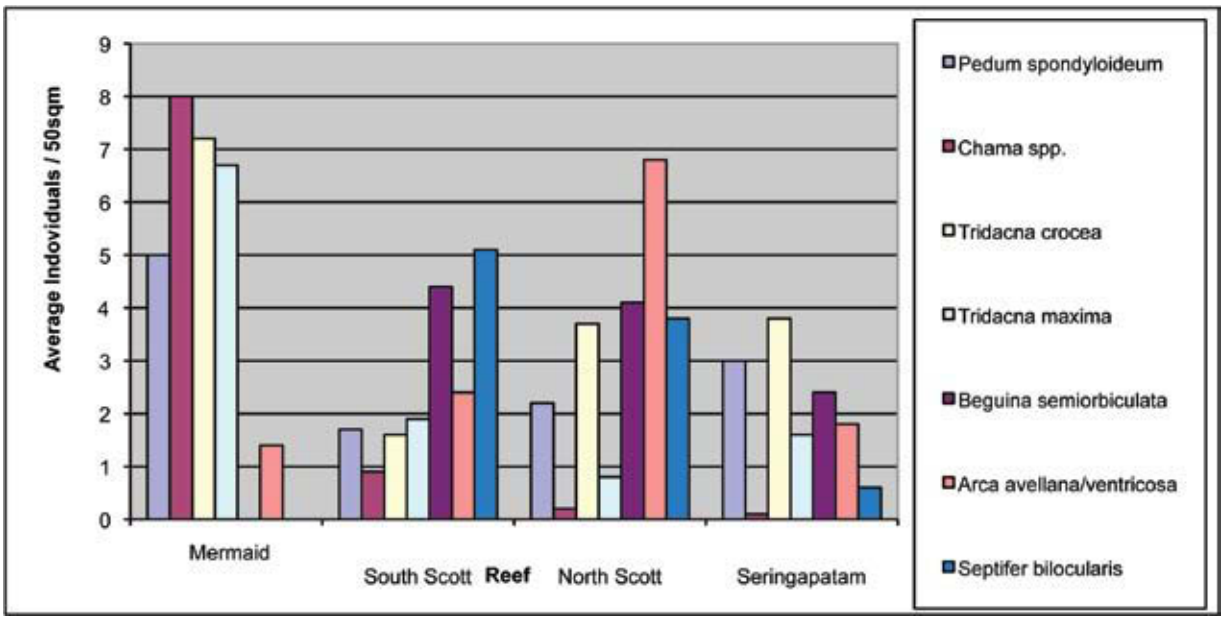


Figure 3 Average bivalve individuals / 50 m2

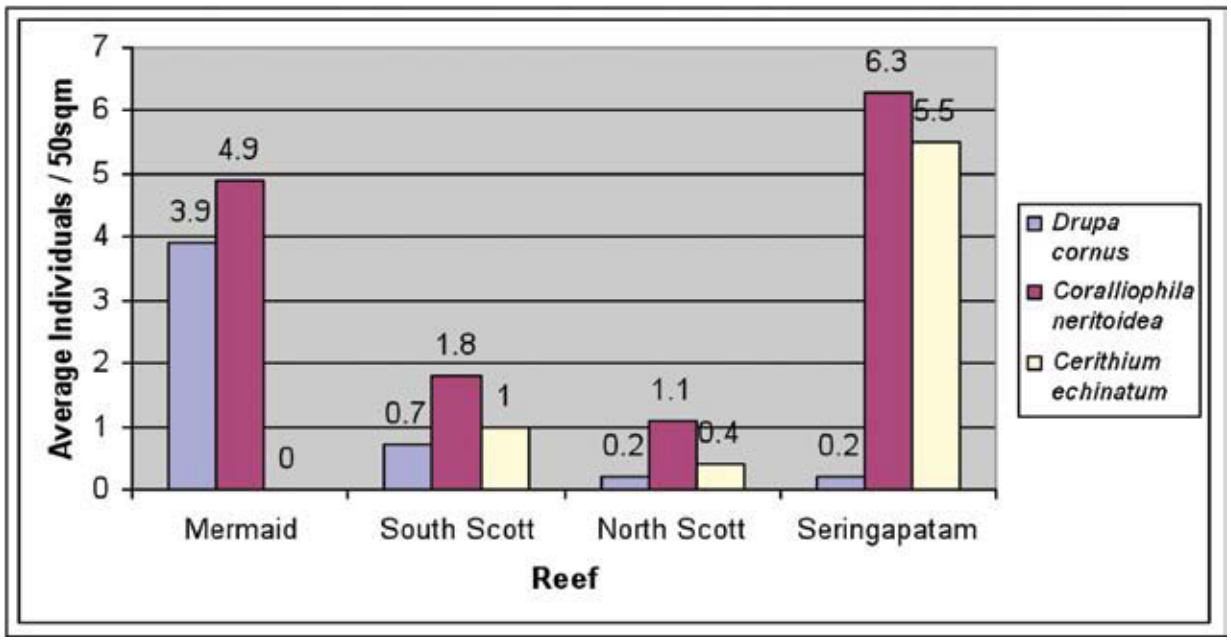


Figure 4 Average gastropod individuals / 50 sq. metres

density and makeup of the molluscan assemblages for North and South Scott Reefs and Seringapatam Reefs, when compared with those of Mermaid Reef. Of particular note is the lower numbers of the giant clam species, *Tridacna maxima* and *Tridacna crocea*, at North and South Scott Reefs and Seringapatam Reef. The densities of the other giant clam species, *Tridacna gigas, Tridacna squamosa* and *Tridacna derasa*, were too low for a meaningful comparison between reefs. These findings are consistent with the results reported by the senior author from a survey of the invertebrate marine resources of the shallow water habitats of North and South Scott Reefs undertaken in the first half of 2006 (Bryce, 2006).

The density of the coral nestling pectinid, *Pedum spondyloideum*, is also lower at Scott and Seringapatam Reefs compared with that at Mermaid Reef. The low numbers in this species at the more northerly reefs may be attributed to the decline in coral abundance due to bleaching and cyclonic activity (Rees *et al.*, 2003; Gilmore *et al.*, 2007).

The high densities of the bivalves, *Beguina semiorbiculata*, *Septifer bilocularis* and the *Arca avellana / ventricosa* species complex at North

Above: *Lambis lambis* (Linnaeus, 1758) (Photo: Clay Bryce)

Scott Reef, and to a lesser extent at South Scott and Seringapatam Reefs, is intriguing. At some survey stations, high numbers of these species are associated with isolated massive coral colonies and it would appear that North Scott Reef has a greater number of such stations. Just as intriguing is the situation with *Septifer bilocularis* on Mermaid Reef. While this mussel species is common on the mainland coast and the more northern atolls, it was recorded from only a single station on Mermaid Reef and not from any of the replicated, quantitative transects. This situation could perhaps be due to the isolation of Mermaid Reef from the more "clumped" northern reefs closer to Indonesia, and hence from the northern larval-carrying currents. However, further work needs to be undertaken to fully comprehend the geographical distribution of this and other molluscan species. Some caution has had to be exercised with regard to both the qualitative and the quantitative data from Seringapatam as the reef was under-sampled, during this and all other surveys undertaken so far.

The most common gastropods encountered at Mermaid Reef were *Coralliophila neritoidea* and *Drupella cornus* (Figure 4). Both of these corallivorous species are dependant on live coral for survival. Neither species could be considered to be in plague proportions on this reef at this time. However, at North and South Scott Reefs and to a lesser extent at Seringapatam Reef, the low numbers may reflect the damage to coral stock from coral bleaching and subsequent cyclonic activity as described by Rees *et al.* (2003) and Gilmore *et al.* (2007).

Cerithium echinatum was moderately abundant at Scott (North and South) and Seringapatam Reefs during the 2006 survey, being recorded from 50% of transects. There were no records of the species from the quantitative transects at Mermaid Reef although the species was recorded, in low numbers, from 44% of the survey stations (Table1). The species does not appear to have been common during the 1980s. The WA Museum's 1986 survey report records the species from only a single station at Mermaid Reef and not at all on North or South Scott Reefs or Seringapatam Reef. However, Wilson (1985) recorded two specimens from Seringapatam Reef in 1978. Representatives of the family Cerithiidae, to which this species belongs, are generally gregarious detrital feeders consuming microalgae, bacteria and detrital matter (Wilson, 1993). With the decline of holothurians on

Table 4 Number of stations sampled for Molluscs - 1986 publication and 2006 survey.

	Clerke	Mermaid	Sth. Scott	Nth. Scott	Sering.	Totals
1986 publication	20	2	12	11	2	47
2006 survey		16	14	10	5	45

Scott Reef (Bryce, 2006) it could be assumed that nutrient levels in the sediment have increased. With that in mind, it would seem possible that the rise in numbers of *Cerithium echinatum* may be related to such a nutrient increase. It should be noted that holothurian numbers and diversity on Mermaid Reef are far greater than on the northern atolls (Bryce and Marsh, this volume) and would, presumably, have some effect on controlling sediment nutrient levels and so might account for the lesser numbers of this gastropod species at Mermaid Reef.

The density spike for *Cerithium echinatum* on Seringapatam Reef (Figure 4) is unexplained. Two of the three Seringapatam stations recorded very high numbers giving an average density of 5.5 individuals per 50 m^2. If more stations had been sampled, this average figure may have been reduced to levels more comparable with the other stations. It seems possible that the density of *Cerithium echinatum* may be increasing on all atolls, particularly on the northern reefs, until a new ecological balance is reached. Obviously, further work would be needed to clarify the matter.

There is also an apparent increase in abundance of *Conus musicus* and *C. miles*. Both species are vermivorous, preferring sandy pockets on intertidal and shallow subtidal reefs (Röckel, *et al*., 1995). In the WA Museum's 1986 published results, the former species was found at three stations, all from around Sandy Islet on South Scott Reef but the latter was recorded only from a single site on North Scott Reef (Wells and Slack-Smith, 1986). During the 2006 survey, both species were more widely encountered (Table 1) and, as with *Cerithium echinatum,* this may signify a population increase has occurred, perhaps due to habitat changes associated with a possible increase in levels of nutrient in the sediment.

Comparative results – 1986 report and 2006 survey.

Table 4 lists the number of stations surveyed at each reef for the 2006 survey compared with the previous WA Museum survey results, so providing an estimate of the differences in effort and collection opportunity across the reefs. The numbers of survey stations providing the 1986 and 2006 data sets are comparable, being 47 and 45 respectively.

By combining the stations for each reef system (i.e., Clerke and Mermaid, South and North Scott, and Seringapatam) and comparing them for both the 1986 publication results and the present survey, a clearer indication of collecting effort was determined (Figure 5). For example, 20 stations were sampled in the data published in 1986 for Clerke Reef with only two stations at Mermaid Reef - giving a total of 22 stations for the reef system. The third atoll of the system, Imperieuse Reef, was not surveyed in 1986. When this figure (22 stations)

Left: Pedum spondyloideum (Gmelin, 1791); **Right:** Lambis truncata (Humphrey, 1786) (Photos: Clay Bryce)

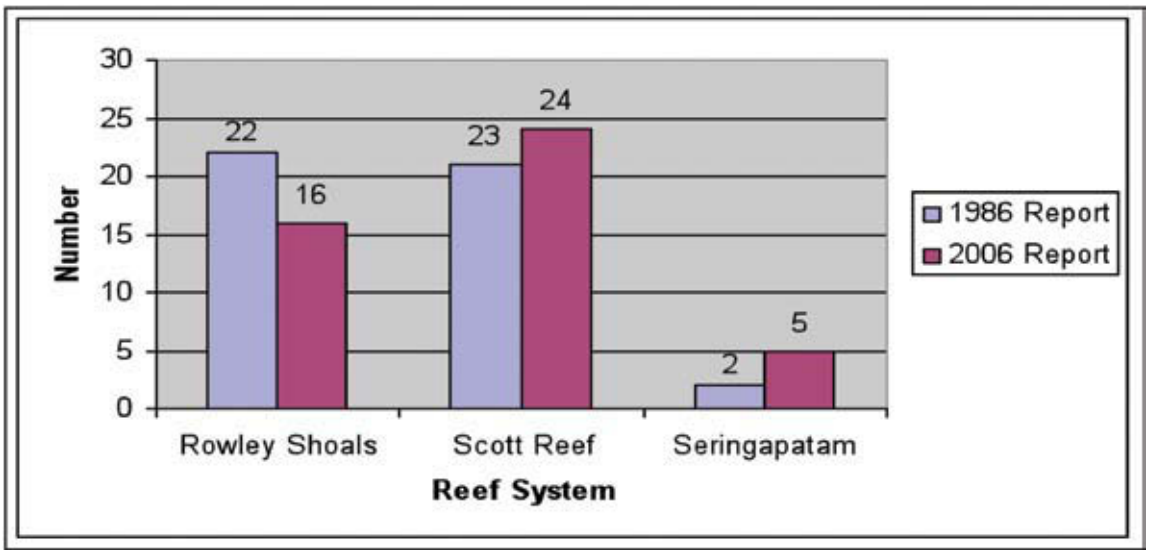


Figure 5 Comparison of the number of stations between reef systems for 1986 and 2006 reports.

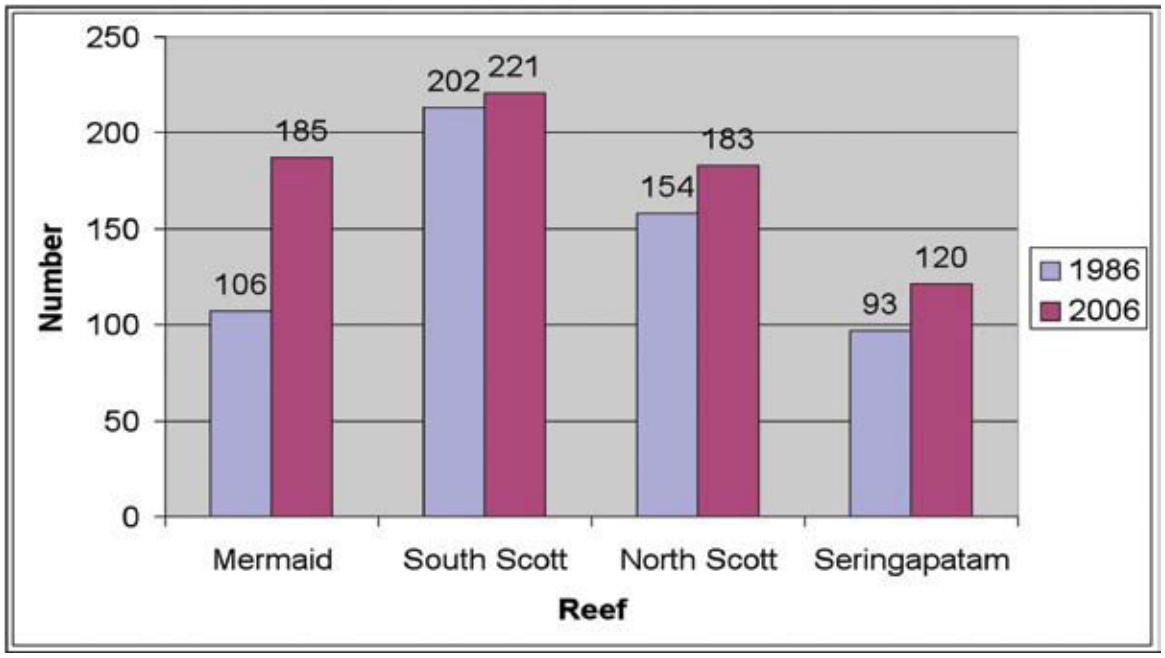


Figure 6 Comparative total species counts for Mermaid, South Scott, North Scott and Seringapatam Reefs for 1986 publication results and 2006 surveys.

is compared to the 2006 Rowley Shoals count (16 stations), the comparison can be seen to be more meaningful.

A comparison of total molluscan species recorded for all reefs during this survey and for those published in 1986 is provided in Figure 6. Slightly more species were recorded in the 2006 survey, which may be due to differing collecting methodologies and advances in taxonomy.

The Venn diagram (Figure 7) portrays the distribution of all 479 species across three reef systems for both the 1986 published results and the 2006 survey, combined.

Scott Reef (North and South), with its greater habitat diversity, had the greater species total (372) and also that of reef-confined species (121). The lower total of species recorded for Seringapatam Reef (173) would seem to be due to a lower collecting effort, yet it still displayed a modest species affinity with its near neighbour, Scott Reef (North and South), sharing 27 species. Rowley

Table 5 Comparison of results of this and similar surveys of northwest Australian areas (listed from north to south)

Surveyed Locality	Indication of Effort		Total species	Source
	Number of Collectors	Survey days		
Christmas I.	3	12 (36 person days)	313	Wells & Slack-Smith, 1988
Ashmore & Cartier Rf.	2	11 (22 person days)	433	Wells, 1993
Cocos (Keeling) Is.	2	20 (40 person days)	380	Wells, 1994
Mermaid, Scott & Seringapatam Reefs	**2**	**16 (32 person days)**	**339**	**This survey**
Mermaid, Scott & Seringapatam Reefs	2	11 (22 person days)	324	Wells & Slack-Smith, 1986
Central Kimberley	1	13 (13 person days)	292	Bryce, 1997
Southern Kimberley	2	13 (26 person days)	232	Wells & Bryce, 1995
Dampier Arch.	2	26 (52 person days)	695	Slack-Smith & Bryce, 2004
Montebello Is.	3	17 (51 person days)	633	Wells, Slack-Smith & Bryce, 1993

Shoals and Scott Reef (North and South) share 100 species but still portray considerable species exclusivity with 85 and 121 species respectively. The three reefs have 124 species in common, with a reduction in overall species diversity from Scott Reef to Mermaid Reef. These figures appear to demonstrate the influence of the Indian Ocean Through-Flow current regime and the effects of inter and intra-reef system recruitment.

Table 5 compares the molluscs recorded from the 2006 survey with those of similar surveys undertaken by the WA Museum at other localities, including an indication of effort. Care should be taken in the interpretation of this table regarding the figures associated with surveys of the nearby Kimberley coast. Despite the greater habitat diversity of the Kimberley coast, the figures give a lower species count than for any of the surveyed oceanic locations. This is probably due to a bias towards the surveying of only intertidal platforms, mangals and general shoreline habitats, and a surveying of only a very small number of subtidal stations. Further surveying of Kimberley subtidal stations would, undoubtedly, increase the mainland-coast species count appreciably.

New molluscan records.

The discovery of the gastropod mollusc, *Marchia martinetana* (Röding, 1798) (Figure 8a) at North Scott Reef is a new record for Australia. New records for the Western Australian fauna are the columbellid gastropod, *Euplica deshayesii* (Crosse, 1859) (Figure 8b), the nudibranch, *Notodoris serenae* Gosliner and Behrens, 1997 (Figure 8c) and the lucinid bivalve *Monitilora simplex* (Reeve, 1850) (Figure 8d). Also of note is the venerid bivalve, *Pitar spoori* Lamprell and Whitehead, 1990 (Figure 8e). This species had previously been recorded in Western Australia only from Hibernia Reef (Willan, 2005).

CONCLUSIONS:

The molluscan fauna of the surveyed atolls is typical of Indo-West Pacific offshore, oceanic coral reefs (Wells & Slack-Smith, 1986; Willan, 2005). From Table 1 it can be seen that the fauna has a greater affinity with that of the Indonesian Archipelago than with the Western Australian mainland. As such, these reefs are considered to represent a unique habitat of great conservation value.

The inclusion of replicated transects into a molluscan collecting regime has added valuable quantitative information by providing an indication of average molluscan density. The very act of swimming a transect tends to focus researchers' attention along a continuous band of substrate. This band is actually a defined slice through an otherwise borderless station area, thus providing for ongoing monitoring opportunities within a more defined area. Planned deviations from the transect and searching areas adjacent to the

From top: *Tridacna crocea* Lamarck, 1819; *Hippopus hippopus* (Linnaeus, 1758); *Tridacna squamosa* Lamarck, 1819; *Tridacna gigas* (Linnaeus, 1758); *Tridacna maxima* (Röding, 1798). (Photos: Clay Bryce)

Above: *Distorsio anus* (Linnaeus, 1758) with eggs. (Photo: Clay Bryce)

Above: *Octopus cyanea* Gray, 1849 (Photo: Clay Bryce)

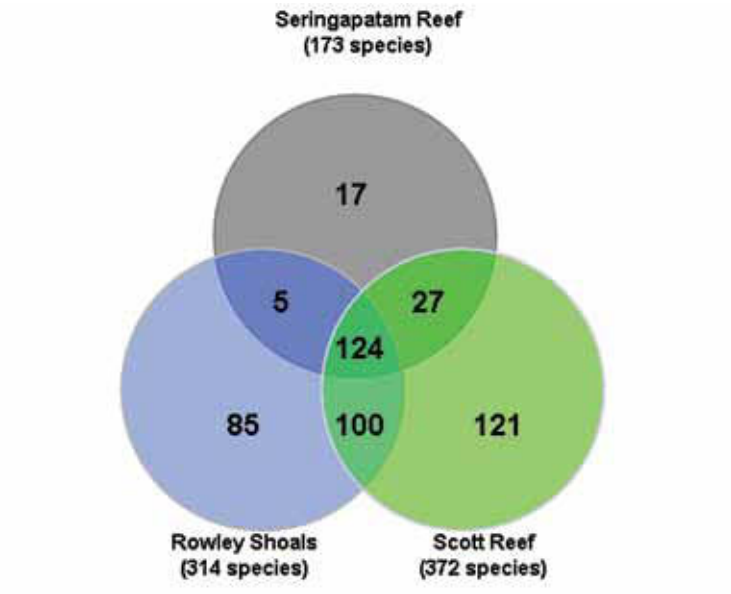


Figure 7 Venn Diagram showing species distributions at the Rowley Shoals, Scott Reef and Seringapatam Reef systems from the 1986 published report and this 2006 survey combined (n = 479 species).

transect did allow for the amassing of qualitative species records. This is evidenced by examination of the species collected during this survey when compared to other surveys (Table 4).

The results of the 2006 survey yielded a total of 339 species of macromolluscs from Mermaid, Scott and Seringapatam Reefs but is not a complete inventory of the molluscan fauna as it does not include the poorly known and highly speciose micromolluscan fauna or faunal records housed in the collections of the WA Museum and of other museums in Australia and elsewhere (Table 4).

The relative diversity and number of marine habitats at these atolls influences their overall molluscan species diversity. South Scott Reef, with its large size, north-facing open lagoon, deep lagoonal waters (not sampled) and fractured back reef edge, provided a greater variety of habitats than the other atolls. However, unregulated fishing, cyclonic activity and recent warm water events leading to coral bleaching appear to have played an important part in reducing molluscan abundance and, to some extent, molluscan diversity on this reef. North Scott and Seringapatam Reefs have also suffered the same environmental and fishing pressures as South Scott Reef but appear to have the added constraint of reduced habitat diversity. This is due to their small size, annular shape and a reduced flushing regime. Mermaid Reef, 400 km to the south, mirrors North Scott and Seringapatam Reefs in shape and dimensions but apparently was little affected by high water temperatures (Gilmore *et al*., 2007) or fishing pressure due to its protected status.

All of these atolls, with the exception of Mermaid Reef, have severely depleted populations of giant clams and of *Tectus niloticus* in both the shallow (Bryce, 2006) and the deeper waters of regions covered in this paper. This was attributed to the effects of environmental pressures and unregulated fishing practices.

The apparent increase in abundance of *Cerithium echinatum*, *Conus miliaris* and *Conus musicus* since the WA Museum's 1986 report may be attributed to these species having taken advantage of habitat changes due to an increase in nutrient-rich habitats possibly caused by the depletion of holothurian stocks (Bryce, 2006) across all reefs, except Mermaid Reef.

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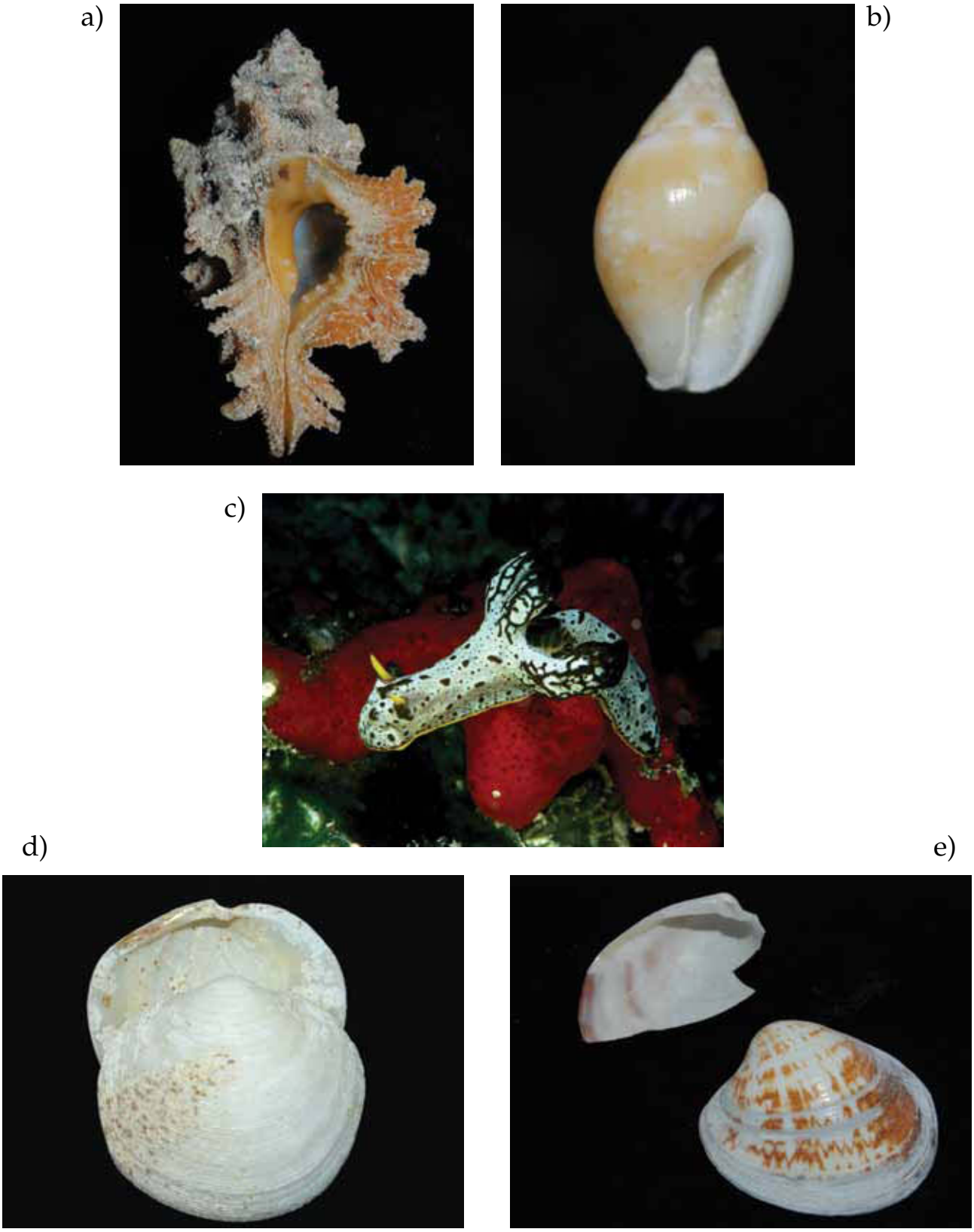

Figure 8 a: *Marchia martinetana* (Röding, 1798); b: *Euplica deshayesii* (Crosse, 1859); c: *Notodoris serenae* Gosliner and Behrens, 1997; d: *Monitilora simplex* (Reeve, 1850); e: *Pitar spoori* Lamprell and Whitehead, 1990.

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