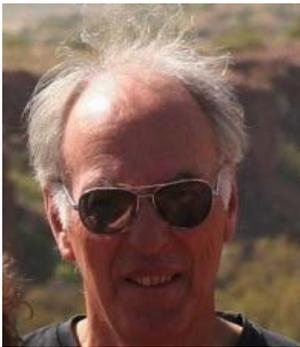


# Intertidal Invertebrates Survey, Ningaloo Reef, August 2007-2010



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As part of the Western Australian Marine Science Institution Project 3.2.2b, a quantitative pilot study of the composition of the benthic community of macro-invertebrates of intertidal rocky platforms was conducted to:

- Provide detailed information on variation in biodiversity along the length of the Ningaloo Marine Park.
- Determine the appropriate design of a monitoring protocol powerful enough to determine predefined levels of change.

These general overall aims were in the context of Ningaloo Marine Park Draft Management Plan (2004) which set out a vision of maintaining the ecological values in the Park, and protecting it from adverse human impacts.

**This document provides supporting information about the sites surveyed (**sites**), and the invertebrates found (**taxonomy**) during the sampling.**

# Sites

Intertidal rocky platforms in Ningaloo Marine Park were sampled for invertebrates from 32 sites (listed below from north to south).

## Mildura Wreck

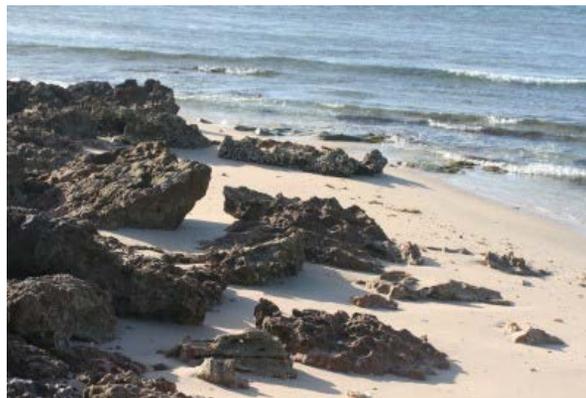
21°47'6.30"S 114° 9'54.52"E



The site is reached from the main parking lot by way of the eastern path. The site is seaward and to the left of the rock identified by the arrow.

## Mildura West

21°47'9.05"S 114° 9'44.85"E



This site is to the west of Mildura Wreck site by about 300 m west, offshore from a low rocky notch on the upper shore.

## Surfers North

21°47'13.05"S 114° 9'35.84"E



This site is about 290 m west and south from Mildura West, or about 725 m north of Surfers South. It can also be reached from a very sandy track (best walked rather than driven) from the main road.

## Surfers South

21°47'26.16"S 114° 9'14.37"E



This site has access from the path from the parking lot just to the right of picture on the left. The parking lot is the third main (fenced) one from the turn off from the main road, and the last one before the end of the paved road and access to the Mildura Wreck and Mildura West sites.

## Jurabi Out 1

21°50'51.78"S 114° 1'51.30"E



This site is in the shallow water just above the heads of the people in the picture on the left. The site is at the end of the path leading from the parking lot at Bauden Access.

## Jurabi Out 2

21°50'44.64"S 114° 2'10.14"E



This site is just shoreward of the line of the breaking wave identified by the arrow. It is about 550 m north of Jurabi Out 1, but can also be reached from the second parking lot north of the Bauden Access parking lot that is closest to Jurabi Out 1.

## Jurabi Out 3

21°50'48.00"S 114° 2'0.02"E

## Jurabi Out 4

21°50'51.00"S 114° 1'55.80"E

Jurabi Out 3 and Jurabi Out 4 are between Jurabi Out 1 and Jurabi Out 2.

## Jurabi In 1

21°50'57.63"S 114° 1'33.43"E



The site is the first section of platform that abuts the upper shore and a small section of rocks close to shore are higher than the seaward platform. The image above looks back (north and east) at the rocky point where the boundary to the sanctuary zone is.

## Jurabi In 2

21°51'1.25"S 114° 1'26.81"E



This site is east of the termination of the large dune indicated by the arrow. The green hummocks in the left half of the left hand image are the landmarks for this site. It is about 220 m from Jurabi In 1, and is just west of the second section of platform attached to the shore from the rocky point.

## Jurabi In 3

21°51'6.13"S 114° 1'21.89"E



This site is 200 m along the shore from Jurabi In 2.

## Jurabi In 4

21°51'4.50"S 114° 1'26.40"E

## Mangrove Bay

21°57'40.88"S 113°56'25.43"E



This site is seaward of the stacks indicated by the arrows lining the shoreward side of the long platform reached by crossing the large flat between the shore and this higher platform.

## Mangrove Point

21°57'50.14"S 113°56'24.78"E



This site is 60 m from shore and can be reached by walking south-west past the stack and then south-east towards the point across a narrow channel between the two platforms.

## Mandu South Cobble

22° 8'43.16"S 113°52'12.04"E



This site can be reached by the track just south of where Mandu Mandu Creek crosses the main road with a parking lot just behind the large berm of cobbles. The site is off shore from the tidal pool behind the cobble berm, and south of the post embedded in the northern part of this cobble-field.

## Mandu South Flat

22° 8'45.01"S 113°52'11.25"E



This site can be reached by the track just south of where Mandu Mandu Creek crosses the main road with a parking lot just behind the large berm of cobbles. The site is on the higher part of the platform above the exposed rock on the shore extending seaward towards a ridge of higher platform at the seaward edge of the platform.

## Pilgramunna

22°11'39.48"S 113°51'17.38"E



This site is reached from the Pilgramunna Creek turnoff. At low tide, there is parking on the south side of the creek where the campers are. The site is south of the rocky point near the creek mouth.

## Yardie Creek North

22°19'36.17"S 113°48'31.95"E



The Yardie Creek sites are reached from the parking lot at the end of the road (before the 4WD track). The sites are on a huge platform south of the creek, reached by walking along the shore (~460 m from the parking lot-side of the creek to the northern site). This site is in the middle of the platform out some distance from the shore, beyond the lower distribution of the numerous ceriths.

## Yardie Creek South

22°19'42.12"S 113°48'29.52"E



The Yardie Creek sites are reached from the parking lot at the end of the road (before the 4WD track). The sites are on a huge platform south of the creek, reached by walking along the shore (~460 m from the parking lot-side of the creek to the northern site). This site is about 160 m westward from the northern site.

## Bateman Bay Out 1

23° 2'37.76"S 113°49'39.20"E



The Bateman Bay sites are reached from the paved Coral Bay road. The sites outside the sanctuary zone are at a place called Cardiac Hill on which the boundary posts are situated. The end of the Cardiac Hill track is a loop where parking is available. Walk to the boundary marker and then turn south to get down the hill, which is very steep.

## Bateman Bay Out 2

23° 2'17.90"S 113°49'42.98"E



The sites outside the sanctuary zone are at a place called Cardiac Hill on which the boundary posts are situated. The end of the Cardiac Hill track is a loop where parking is available. This site is a 610 m walk north from Bateman Bay Out 1 site where the platform is narrower.

## Bateman Bay In

23° 2'58.41"S 113°49'24.34"E



This site was accessed off the Cardabia Ningaloo Road via a track that links Cardiac Hill to Dog Rock along the coast. The site is directly off the beach at the car park at Dog Rock as seen in the left image – to the right of the point shown by the arrow.

## Coral Bay North

23° 9'11.32"S 113°46'6.00"E



The Coral Bay Sites are south of the Coral Bay town. This site is reached from one of the coastal tracks off the paved road to the parking lot, or from the DEC storage building in town.

## Coral Bay South

23° 9'24.01"S 113°45'59.89"E



The Coral Bay Sites are south of the Coral Bay town. This site is reached from the parking lot. The site is seaward from several large rocks broken off the notch and about 150 m south of the groyne.

## Elles In

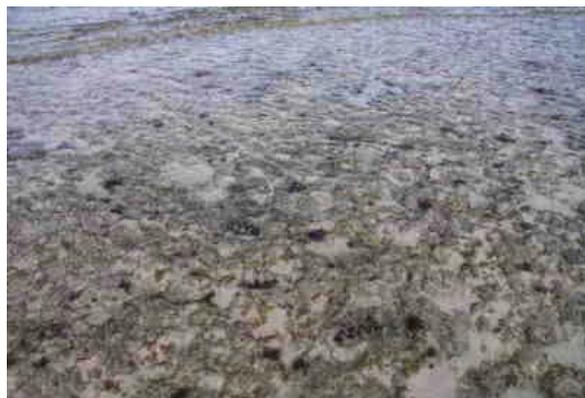
23°26'0.79"S 113°46'52.76"E



The Elle sites are reached from Warroora Station via the Warroora East road. This site is along the platform at the base of the inlet indicated by the arrow.

## Elles Out

23°26'16.14"S 113°46'48.08"E



The Elle sites are reached from Warroora Station via the Warroora East road. This site the platform is connected to shore to the left some distance, but separated from shore by a channel. The southern boundary marker of Pelican Sanctuary Zone is close to where the platform joins the shore.

## Gnaraloo Bay Out 1

23°45'47.82"S 113°33'30.24"E



The Gnaraloo sites are reached from Gnaraloo Station - 1.3 km from the gate leading to the parking area at the boat launching area. This track ends at a locked gate, and the parking place is before the locked gate. This site is visible from the top of the dune at the parking area and is on a high platform in the middle of its length to the west of eastern end that is connected to the shore. Parts of the platform have high densities of urchins as shown in the image on the right.

## Gnaraloo Bay Out 2

23°45'36.72"S 113°33'43.14"E



The Gnaraloo sites are reached from Gnaraloo Station - 1.3 km from the gate leading to the parking area at the boat launching area. This track ends at a locked gate, and the parking place is before the locked gate. This site is 500 m north-east along the beach and is a narrow platform seaward from a rocky notch on the shore.

## Gnaraloo Bay In 1

23°46'19.75"S 113°32'10.30"E



The sites in the sanctuary zone are reached from the parking lot at the end of the track north from the station. This site is about 1300 m south along the shore.

## Gnaraloo Bay In 2

23°46'13.93"S 113°32'15.93"E



The sites in the sanctuary zone are reached from the parking lot at the end of the track north from the station. This site is about 1100 m south along the shore and is close to the beginning to the platform.

## Three Mile North

23°52'13.51"S 113°29'48.00"E



The Three Mile sites are close to the Three Mile camping ground. This site is reached by walking along the beach or by entering the campground, and parking behind the dune where there is a boat-launching place.

## Three Mile In 1

23°52'32.00"S 113°29'38.68"E



The Three Mile sites are close to the Three Mile camping ground. This site is immediately to the north of the boundary marker as indicated by the arrow.

## Three Mile In 2

23°52'30.39"S 113°29'40.80"E



The Three Mile sites are close to the Three Mile camping ground. This site is north of Three Mile In 1 and can be reached from the south, or from the north (from the end of the tracks in the campground). The platform is narrow and pitted by small pools.

## Three Mile Out 1

23°52'33.00"S 113°29'37.63"E



The Three Mile sites are close to the Three Mile camping ground. This site is immediately to the south of the boundary marker as indicated by the arrow.

## Three Mile Out 2

23°52'45.54"S 113°29'25.42"E



The Three Mile sites are close to the Three Mile camping ground. This site is a narrow platform that has two sections - horizontal extending from the notch, and then sloping towards the seaward edge. The change in slope forms the midline of the site.

# Taxonomy

Intertidal rocky platforms in Ningaloo Marine Park were sampled for invertebrates from 32 sites. 31,059 individuals were counted, which represented 289 species. Taxa mentioned in the WAMSI report are presented below divided up into :

- **Cnidaria**
- **Bivalves**
- **Chitons**
- **Gastropods**
- **Crustaceans**
- **Echinoderms**
- **Other Phyla**

## Cnidaria

### Actinaria

Anemone brown (5 cm)



Anemone commensal *Tonna*/hermit (3 cm)



Anemone green colonial (10 cm x 5 cm)



Anemone sand (6 cm)



### Alcyonacea

Soft coral (20 cm)



Soft coral feathery (5 cm)



## Alcyonacea (contd.)

Soft coral two-toned



Soft coral 1 (3 cm)



Soft coral 2 (2.5 cm)



Soft coral 3 (3 cm)



Soft coral 4 (1 cm)



Soft coral 5



Soft coral 6 (2 cm)  
Very slimy



Soft coral 7 (2 cm)  
Specimen squashed



Soft coral 8 (3 cm)



Soft coral 9 (3 cm)



Soft coral 10 (top 3 cm;  
bottom 20 cm)



Soft coral bumps  
(30 cm)



## Alcyonacea (contd.)

Soft coral cream bag 151 (3 cm)



Soft coral JP photo bag (3 cm)



Soft coral warty (3 cm)

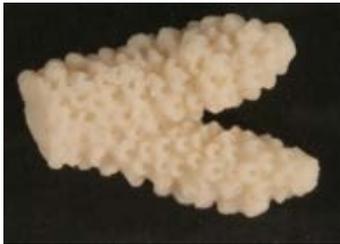


Soft coral photo only – not in quadrats (15 cm)



## Scleractinia

*Acropora* spp. (top 2 cm, bottom 20 cm)



Coral sp. 2 (bottom 3 cm)



Coral 152 (3 cm)



Coral brown digitate (3 cm)



## Scleractinia (contd.)

Coral brown – pooled at least two species (whole colonies up to 7 cm)

Corallites with separate walls = *Favia* sp.



Corallites with common walls = *Goniastrea* sp.



Coral brown favid (5 cm)



Coral flat brown (15 cm)



Coral grey (10 cm)



Coral irregular polyps  
"Platygyra" (20 cm)



Coral massive small (7 cm)



Coral unknown branch  
small polyp (top 3 cm)



## Scleractinia (contd.)

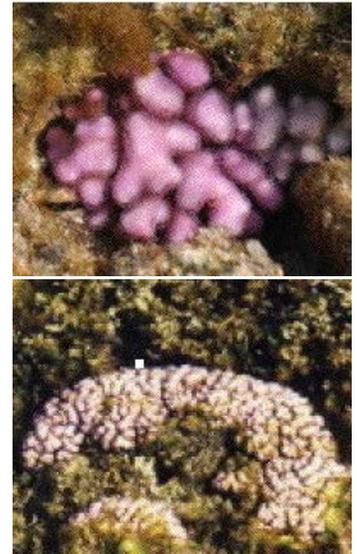
Coral brown *Porites* (top 3 cm, middle 20 cm)



"*Montipora*" (top 35 cm, bottom 5 cm)



*Pocillopora damicornis* Linnaeus, 1758 (top 5 cm, bottom 20 cm)



## Zoanthidea

*Palythoa densa* Calgren, 1954. Polyps fused together. Colour tan to green (10 cm)



*Palythoa heideri* Calgren, 1954. Expanded disk is green, each polyp 1 cm diameter



*Zoanthus marshi* Calgren, 1954. Expanded disk pink tentacles, each polyp 0.5 cm diameter



*Isaurus tuberculatus* Gray, 1828. Column of polyp curved and with tubercles, each polyp 0.5 cm diameter



## Bivalves

### PTERIOMORPHA

#### Mytilidae

*Brachidontes ustulatus* Lamarck, 1819 (to 2.5 cm long). Coarser ribs than *Septifer*



*Septifer bilocularis* Linnaeus, 1758 (to 3 cm long). Green blue interior, curved hinge line.



*Modiolus auriculatus* Krauss, 1848 (to 3.5 cm long). Thin shell, concentric striations



#### Trapeziidae

*Trapezium bicarinatum* Schumacher, 1871 (3 cm)



#### Pteriidae

*Pinctada cf margaritifera* Linnaeus, 1758 (3 cm)



## Isognomonidae

*Isognomon isognomon* Linnaeus, 1758 (5.5 cm )



## Spondylidae

*Spondlyus* sp. (9 cm )



## Ostreidae

Oysters rock (7 cm )



Oyster flat 2 (1.5 cm )



## HETERODONTA

### Lucinidae

*Codakia* sp. (1 cm)



## Chamidae

*Chama* sp. (7 cm )



*Cardita variegata* Bruguiere, 1792



## Tridacnidae

*Tridacna maxima* Roding, 1798 (15 cm )



*Tridacna squamosa* Lamarck, 1819 (15 cm ). Fewer undulations than *T. maxima*.



## Veneridae

*Irus irus* Linnaeus, 1758 (1.5 cm )



## Unknown

Unknown (2 cm ), arc shell?



Clam red mantle (7 cm)



## Chitons

### Chitonidae

*Acanthopleura gemmata* Blainville, 1825 (left 1.7 cm wide, right 3 cm wide)



*Acanthopleura spinosa* Bruguiere, 1792 (10 cm). Not in quadrats.



Chiton smooth girdle (5 cm )



*Clavarizona hirtosa* Blainville, 1825 (8 cm)



### Cryptoplacidae

*Cryptoplax* sp. (4 cm )



### Unknown

Chiton 114 (2 cm )



Chiton granular girdle =  
*A. gemmata*?



Chiton light (1.5 cm )



## Unknown (contd.)

Chiton pale (1 cm )



Chiton smooth (left 1.5 cm, right 5 cm )



Chiton patterned (1.5 cm )



Chiton – spinose tufts (0.5 cm )



Chiton white (35 cm )



## Gastropods

### DOCOGLOSSA

#### Acmaeidae

*Patelloidea saccharina* (2 cm).

Ribs prominent



*Patelloidea alticostata* Angus, 1865 (2 cm).

Ribs reduced, black chevrons on lighter shell



## Patellidae

*Cellana cf radiata* (1.5 cm). Small head, shiny interior, no siphonal ridge



*Scutellastra laticostata*  
Blainville, 1825 (10 cm)



## NERITMORPHA

### Neritidae

*Nerita undata* Linnaeus, 1758 (1.2 cm wide)



*Nerita albicilla* Linnaeus, 1758 (1.4 cm wide)



## ARCHAEOGASTROPODA

### Fissurellidae

*Hemitoma cf excentrica* Iredale, 1929 (1 cm)



*Macrochisma munita* Iredale, 1940 (1.6 cm)



## Haliotidae

*Haliotis varia* Linnaeus, 1758 (2.5 cm)



*Haliotis* another species? (7 cm)



## Trochidae

*Angaria tyria* Reeve, 1843 and/or *Angaria delphinus* Linnaeus, 1758 (4 cm)



*Austrocochlea zeus* Fischer, 1874 (1.5 cm)



*Hybochelus cancellatus* Krauss, 1848 (1.5 cm)



*Tectus cf fenestratus* Gmelin, 1791 (2.5 cm)



*Trochus hanleyanus* Reeve, 1842 (3.5 cm). Pink zigzag lines.



*Tectus pyramis* Borne, 1778 (top 5 cm, bottom 6 cm). Blue colour.



## Stomatellidae

*Pseudostomatella papyracea* Gmelin, 1791 (1.2 cm)



*Stomatella* sp. (1 cm)



## Turbinidae

*Australium pileotum* (5 cm).

Blue operculum



*Turbo* cf *argyrostomus* Linnaeus, 1758 (5 cm).

Not in quadrats



*Turbo haynesi* Preston, 1914 (2.5 cm)



## Phasianellidae

*Phasianella variegata*

Lamarck, 1822 (1.5 cm)



## Liotiinae

*Liolina peronii* Kieber, 1839 (1.3 cm)



## NEOTAENIOGLOSSA

### Cerithiidae

*Cerithium atromarginatum* Dautzenberg and Bruce, 1933 (1.2 cm)



*Cerithium cf nesioticum* Pilsbry and Vanetta, 1906 (1.5 cm)



*Cerithium balteatum* Philippi, 1848 (1 cm)



*Cerithium cf novaehollandiae* Adams in Sowerby, 1855 (2.5 cm). Fine but prominent striations, aligned nodules



*Cerithium cf tenellum* Sowerby, 1855 (2.2 cm)



*Cerithium zonatum* Wood, 1828 (2.6 cm)



*Clypeomorus bifasciata* Sowerby, 1855 (1.5 cm)



## Cerithiidae (contd.)

*Liotina peronii* Kieber, 1839 (1.3 cm)



*Pseudovertagus aluco* Linnaeus, 1758 (5 cm)



*Rhinoclavis bituberculata*  
Sowerby, 1865 (3.5 cm)



*Rhinoclavis brettinghami*  
Cerochowsky, 1974 (4 cm)



*Rhinoclavis echinatum*  
Lamarck, 1822 (2 - 5 cm)



## Planaxidae

*Planaxis sulcatus* Born, 1780 (1.5 cm)



## Modulidae

*Modulis tectum* Gmelin, 1791 (1.6 cm). Note teeth



## Architectonicidae

*Philippia* sp. (1 cm)



## Strombidae

*Lambis chiragra* Linnaeus, 1758 (20 cm)



*Strombus mutabilis* Swainson, 1821 (3.4 cm)



## Vermetidae

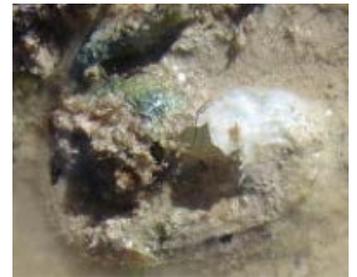
*Petalochchus* (0.4 cm diameter). White interior



*Serpulorbis* cf *sipho* (up to 1.5 cm diameter). Dark interior



Vermetid ridged shell (3 cm)



## Ovulidae

*Ovula ovum* Linnaeus, 1758 (7 cm). Not in quadrats



## Cypraeidae

*Cypraea annulus*  
Linnaeus, 1758 (3 cm)



*Cypraea clandestina*  
Linnaeus, 1767 (1.4 cm)



*Cypraea erosa*  
Linnaeus, 1758 (2.5 cm)



*Cypraea caputserpentis* Linnaeus, 1758 (2.5 cm)



*Cypraea helvoa*  
Linnaeus, 1758 (2.2 cm)



*Cypraea erronea* Linnaeus, 1758 (2.5 cm)



*Cypraea hirundo*  
Linnaeus, 1758 (1.5 cm)



*Cypraea kieneri*  
Hidalgo, 1906 (1 cm)



*Cypraea limacina*  
Lamarck, 1810 (2 cm)



*Cypraea lynx*  
Linnaeus, 1758 (3 cm)



## Cypraeidae (contd.)

*Cypraea moneta* Linnaeus, 1758 (2.5 cm)



*Cypraea pallidula*  
Gasloin, 1849 (1 cm)



*Cypraea vitellus* Linnaeus, 1758 (4 cm)



## Triviidae

*Trivia* sp. (0.5 cm)



## Lamellariidae

Lamellariidae grey cream (0.8 cm)



## Naticidae

*Natica euzona* Recluz, 1844 (1 cm)



*Natica qualtieriana* Recluz, 1844 (2cm)



*Polinices melanostomus* Gmelin, 1791 (1.5 cm)



*Polinices cf sebae/simiae* (2 cm)



*Polinices cf sebae* (1 cm)



## Bursidae

*Bursa bufonia* Gmelin, 1791 (7 cm)



*Bursa granularis* Roding, 1798 (4 cm)



*Bursa rosa* Perry, 1811 (1.5 – 2.5 cm)



## Cassidae

*Casmaria erinacea* Linnaeus, 1758 (4 cm)



## Ranellidae

*Cymatium mundum*  
Gould, 1848 (2 cm)



*Cymatium muricinum* Roding, 1798 (3.5 cm)



*Cymatium occidentale*  
Morch, 1877 (2 cm)



*Cymatium vespaceum*  
Lamarck, 1822 (2 cm)



## Tonnidae

*Tonna perdix* Linnaeus, 1758 (5 cm)



## Epitoniidae

*Epitonium cf fasciatum*  
Sowerby, 1844 (1 cm)



*Epitonium* sp. (2 cm).  
Not in quadrats



## NEOGASTROPODA

### Muricidae

*Cronia avellana* Reeve, 1846 (1.5 - 3 cm). Variable colour and shape; shell often fouled with coralline algae



*Cronia crassulnata*  
Hedley, 1914 (3.3 cm)



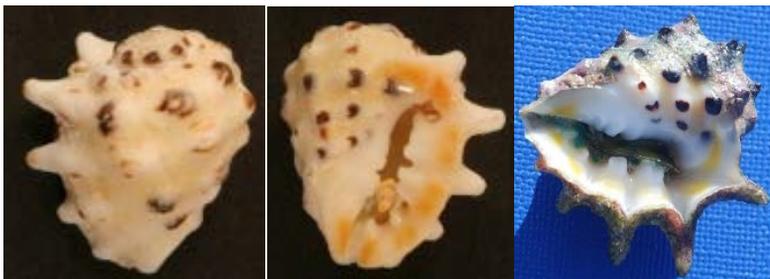
*Drupa morum* Roding, 1798 (3.5 cm)



*Drupella cornus*  
Roding, 1798 (3.5 cm)



*Drupa ricinus* Linnaeus, 1758 (2.5 cm)



*Favartia salmonea* Melville  
and Standen, 1899 (1.5 cm)



## Epitoniidae (contd.)

*Maculotriton cf serriale*  
Deshayes, 1830 (1 cm)



*Morula granulata* Duclos, 1832 (2 -3 cm). Four white prominent teeth, white on columella, heavy thick shell



*Morula 'brown'* (1.5 - 2 cm). Smaller, low sculpture, brown on columella, 4 to 5 narrow low teeth that extend back from margin as a s ridge, aperture interior is white with dark colour along ridges extending from teeth



*Morula nodicostata* Pease, 1868  
(1.2 cm). Small, equal-sized teeth on margin of aperture, prominent posterior siphonal notch, pale purple mouth



*Morula whiteheadae* (3.5 cm). Mauve interior, elongate, 5 to 7 regular teeth towards anterior, longitudinal growth ridges crossed by spiral threads



*Morula cf uva* Roding, 1798 (1.5 - 2 cm). Purple mouth, 2 large posterior and several smaller anterior teeth that are same colour as interior, nodules spiny to smooth and black or white



## Epitoniidae (contd.)

*Nassa francolina* Bruguiere, 1789 (4.4 cm)



*Pascula ochrostoma*  
Blainville, 1832 (1.9 cm)



*Pinaxia versicolor* Gray,  
1839 (1.5 cm)



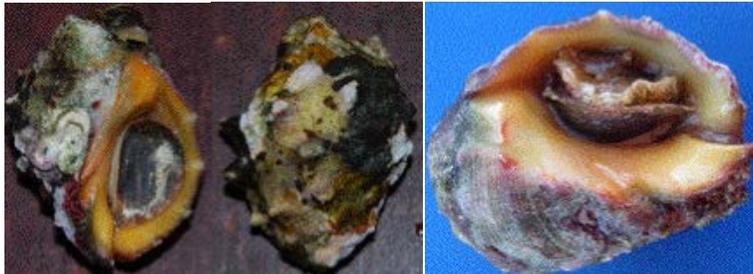
*Thais aculeata* Deshayes and  
Edwards, 1844 (3.7 cm)



*Thais orbita* Gmelin,  
1791 (3.4 cm)



*Thais alouina* Roding, 1798 (3 cm)



Thaid 2 (1.5 cm)



## Coralliophilinae

*Coralliopila* cf *erosa* Roding,  
1798 (1.5 cm)



*Coralliopila neritoidae* Lamarck,  
1816 (1.5 cm)



## Buccinidae

*Cantharus erythrostomus* Reeve, 1846 (2 cm)



*Pisania ignea*  
Gmelin, 1791 (2 cm)



## Fasciolariinae

*Crassicantharus noumeensis*  
Crosse, 1870 (1.5 cm)



*Peristernia incarnata*  
Kieber, 1830 (2 cm)



## Nassariinae

*Hebra horrida*  
Dunker, 1847 (1 cm)



*Nassarius albescens*  
Dunker, 1846 (1.5 cm)



*Nassarius sufflatus*  
Gould, 1860 (1.5 cm)



*Nassarius reeveanus*  
Dunker, 1847 (2 cm)



## Columbellidae

### *Mitrella albina*

Kiener, 1841 (1.5 cm)



### *Pyrene bidentata* Menke, 1843 (1.5 cm)



### *Pyrene testudinaria* Link, 1807 (1.6 cm)



### *Pyrene flava* Brug, 1789 (1.8 cm)



### *Pyrene turturina* Lamarck, 1822 (1.5 cm)



### *Pyrene cf varians* Sowerby, 1832 (0.7 cm)



## Volutidae

*Cymbiola nivosa* Lamarck, 1804 (8 cm). Not in quadrats



## Columbellidae

*Vexillum cadaverosum*  
Reeve, 1844 (2 cm)



## Mitridae

*Mitra litterata* Lamarck, 1811  
(1.5 cm). Not in quadrats



*Mitra ticonica*  
Reeve, 1844 (1.5 cm)



*Mitra puncticulata*  
Lamarck, 1811 (2.6 cm)



*Mitra scutulata* Gmelin, 1791 (2 - 3 cm).  
With and without yellow stripe



## Turridae

Turrid brown (1 cm)



*Turridrupa cf xenoturris* (1 cm)



## Conidae

*Conus sponsalis* Hwass in Bruguiere, 1792 (2.5 cm)



*Conus dorreensis* Peron, 1807 (3 cm)



*Conus coronatus*  
Gmelin, 1791 (2.9 cm)



*Conus lividis* Hwass in Bruguiere, 1792 (4 cm)



*Conus miles*  
Linnaeus, 1758 (5 cm)



*Conus chaldaeus* Roding, 1798 (left 2.6 cm, right 4 cm)



*Conus ebraeus*  
Linnaeus, 1758 (3 cm)



*Conus lischkeanus* Weinkauff, 1875 (2.5 cm)



## Pyramidellidae

Pyramidellidae? (1.5 cm)



## OPISTHOBRANCHIA

### Bullidae

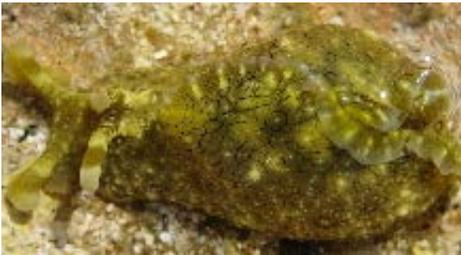
*Bulla* sp. (2.5 cm)



### Aplysiidae

*Aplysia dactylomela* Rang, 1828 (15 cm)

*Aplysia parvula* Morch, 1863 (2 cm)



### Volvatellidae

*Volvatella* sp. (0.5 cm)

*Volvatella* another sp.? (0.5 cm)



## PULMONATA

### Siphonariidae

*Siphonaria* sp. (0.5 cm). Siphonal ridge on anterior right



## Crustaceans

### Cirrepedia

Barnacle (1 cm)



Barnacle 2 (surf) (2 cm)



### Stomatopoda

*Squilla* sp. (4 cm)



### Paguridae

Hermits

1 cm in gastropod shells



*Dardanus megistos*. Not in quadrats



## Dromiidae

Sponge crab

Crab on left and sponge removed from crab on right



Close up of crab with sponge removed



## Calappidae

*Calappa* sp. (4 cm).

Dorsal view



Ventral view



## Majidae

Crab majid (1.5 cm)



Crab majid *Huenia* (2 cm)



## Portunidae

Crab pale of portunid (1.5 cm)



Crab portunid *Thalamita* (1.5 cm)



## Xanthidae

*Macromedalus cf crassimanus* (2.5 cm)



Crab xanthid grey green (2 cm)



Crab xanthid shiny (3.5 cm)



## Menippidae

*Eriphia sebana* (5 cm). Not in quadrats, regularly seen



## Pilumnidae

Crab furry *Pilumnus verspillo?* (3 cm)



## Unknown

Crab smooth



Crab hairy spotted legs (4 cm)



Crab rough grey marbled



Crab warty cf *Liomera* (1.5 cm)



## Echinoderms

### Asteroidea

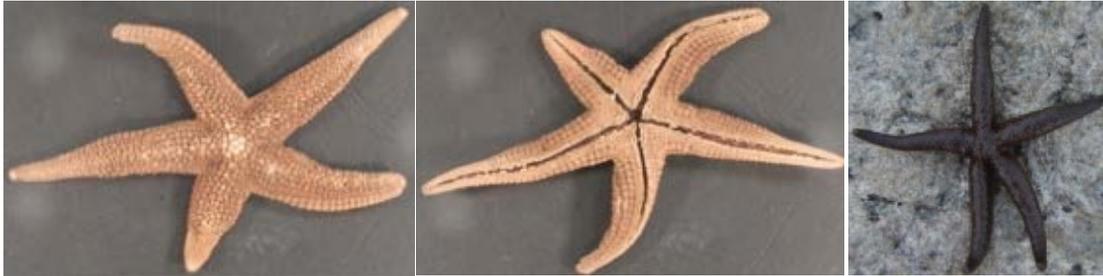
cf *Aquilomastra cephus* Muller and Troschel, 1842 (up to 2.5 cm)



*Linckia* sp. (20 cm). Not in quadrats



*Nardoa galathea* Lutken, 1865 (14 cm)



### Crinoidea

cf *Comatula purpurea* (5 – 10 cm)



### Echinoidea

*Echinometra mathaei*  
Blainville, 1825 (7 cm)



*Stomopneustes* sp. (8 cm)



*Tripneustes gratilla*  
Linnaeus, 1758 (up to 15 cm)



*Tripneustes* ? (1.5 cm)

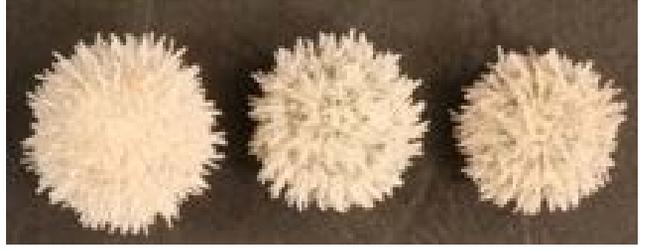


## Echinoidea (contd.)

*Peronella orbicularis* Leske, 1778 (1 - 2 cm)



*Nudechinus multicolor* Yashiwara, 1893 (1 - 3 cm)



## Holothuroidea

*Holothuria atra* Jaeger, 1833 (20 cm)



*Holothuria not atra* (20 cm)



Holothurian brown (15 cm)



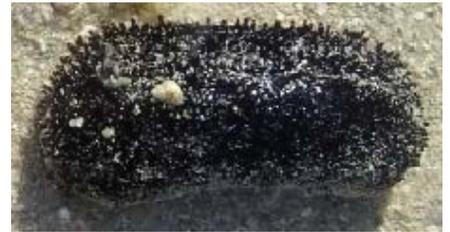
Holothurian black spiny (15 cm)



*Actinopyga echintes*  
Jaeger, 1833 (20 cm)



*Actinopyga miliaris* Quoy  
and Gaimard, 1833 (15 cm)



Holothurian black/red nodules (2 -10 cm)



Holothurian white spots (50 cm)



## Holothuroidea (contd.)

Holothurian brown (6 - 15 cm)



Holothurian small cream bag 137 (6 cm)



Holothurian thin epidermis (2.5 cm)



Holothurian white brown spots (15 cm)



Holothurian unidentified, lighter underneath (15 cm)



Holothurian unidentified (25 cm)



## Ophuroidea

Ophiuroid large brown (20 cm)



Ophiuroid thin smooth stiff arms (7 cm)



Ophiuroid (7 cm)



## Other phyla

### Nemertea

Nemertean white red stripe (6 cm)



Nemertean cream (6 cm)



### Echiura

Echiuran green (15 cm)



### Enteropneusta

*Balanoglossus* (8 cm)



### Cephalopoda

*Octopus* sp. (head 7 cm across eyes)



### Urochordate

Ascidian simple (2 cm). Two species under a rock



### Polychaeta

Polychaete sedentary  
(1 cm diameter)

