

Diversity and distribution of subtidal benthic molluscs from the Dampier Archipelago, Western Australia; results of the 1999 dredge survey (DA2/99)

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Abstract – From a dredge survey of the subtidal fauna of the Dampier Archipelago a total of 422 species of macromolluscs was identified, comprising 227 gastropods, 188 bivalves, four scaphopods and three chitons. Most species were uncommon but abundant taxa included the bivalves *Melaxinaea vitrea*, *Corbula tunicata* and *C. crassa* and the gastropods *Herpetopoma atrata* and *Xenophora solaroides*. Community analysis identified eight molluscan assemblages, reflecting the varied and patchy nature of the substrates that ranged from muds and silts to coarse sands, gravel, rubble and rocks. The most species-rich stations were those located inshore at water depths <10 m. These muddy stations were also notable for the diversity and abundance of suspension-feeding bivalves. Most of the mollusc species identified are distributed widely around tropical Australia and the Indo-West Pacific but a few are endemic to northwestern Australia, including the newly described lucinid bivalve *Lamellolucina pilbara*.

INTRODUCTION

Although the northwestern Australian shelf is of outstanding biological interest for its suspected high diversity and the relatively high numbers of endemic taxa, the subtidal molluscan fauna is poorly known. Surveys have been made at some locations relatively close to the Dampier Archipelago, including the Montebello and Muiron Islands and Exmouth Gulf, but the results are held in internal reports (Wells, Slack-Smith and Bryce, 1993; Slack-Smith and Bryce, 1996). Most of the published information on molluscs of the Dampier region lies in taxonomic accounts (see Wilson, 1993–4; Lamprell and Whitehead, 1992; Lamprell and Healy, 1998; and bibliographies) and there have been no published studies of offshore subtidal benthic communities. Faunal surveys of subtidal molluscs that have been published concern locations further south along the Western Australian coast such as Shark Bay (Slack-Smith, 1990), the Houtman Abrolhos Islands (Glover and Taylor, 1997; Wells and Bryce, 1997) and Rottnest Island (Glover and Taylor, 1999). The probable high endemism of the molluscan fauna in the Dampier area may be reflected in the number of new species described with variations on “dampier” as part of the name (e.g. *Amoria dampieria* Weaver, 1960; *Conus dampieriensis* Coomans and Filmer, 1985).

Recent increasing interest in global diversity patterns is revealing the dearth of data from some

parts of the world. Studies of latitudinal gradients in molluscan diversity usually focus on well-documented continental margins such as the eastern Pacific coast of North America (Roy, Jablonski and Valentine, 2001; Valentine, Roy and Jablonski, 2002). For example, in a study of bivalve global diversity patterns, Crame (2000a, b) has highlighted Australia as an apparent high diversity “hotspot” in the southern hemisphere. Although published information for northern Western Australia is generally lacking, our observations of museum collections and recent fieldwork suggest a serious underestimation of the true diversity. New publications are beginning to confirm this idea (Glover and Taylor, 2001; Middlefart, 2002).

The results of the dredge survey (DA2/99) reported here are first steps toward recording the fauna of a poorly documented area that is of high ecological and biogeographical interest. Faunal surveys such as this provide a baseline for the recognition of future changes in diversity, abundance and distribution of the benthic fauna in relation to such factors as climate change, pollution and other types of environmental disturbance. Additionally, the area is being subjected to increasing levels of environmental disturbance. Factors that may continue to affect the Dampier area include: changes in water circulation patterns induced by the construction of salt extraction ponds; particulate material from iron ore loading;

dredging of shipping channels; pipeline construction; development of harbour installations and increased sedimentation from terrestrial construction activities.

Although a highly speciose fauna was recorded during this survey, this is just a part of the total molluscan diversity of the area. It does not include the fauna from the extensive and complex intertidal habitats, most of the rich subtidal rocky and coral habitats and the deeper burrowing infauna of subtidal soft substrates. Some of this molluscan fauna will be described in other publications from the area, including the results of the International Marine Biological Workshop held in 2000 (Wells, Walker and Jones, 2003). Additionally, most molluscs of <5.0 mm shell length were not retained by the dredge (but some were collected by grab) and are not included in this report.

MATERIALS AND METHODS

From 14–28 July 1999, a total of 99 dredge stations was sampled in inshore and offshore shallow water around the Dampier Archipelago covering an extensive range of habitats. Most of the archipelago is located within water depths of less than 30 m, with depths of 30–42 m seaward of the islands. Refer to the Station Lists section of this volume for the dredging expedition (DA2/99) station data and map.

The fauna was sampled with a box-shaped dredge measuring 1200 mm x 330 mm at the mouth with a 1.0 cm mesh using either a scooped or raked bottom plate. All dredge runs were of 10 minutes duration at a vessel speed of 2–3 knots except when interrupted by snagging. For some later stations, a sleeve of fly screen was inserted into the dredge to enhance recovery of smaller animals but this made little difference to mollusc recovery. The dredge samples, including sediment, rocks and sponges, were washed through sieves and the molluscs sorted and preserved in 80% ethanol or 8% buffered formaldehyde. Blocks of rocks, corals and sponges were broken up to recover cemented epifauna and endobionts.

Although the sampling time at each station was consistently maintained during the survey, an inherent bias in individual mollusc numbers is created by the uneven and patchy nature of the substrates, with the sporadic presence of large boulders, coral blocks, hard bottoms, sponge gardens and gravel. At some stations where sponges and corals were abundant, these were broken up to search for endolithic molluscs but it was not possible to consistently recover all the species from them. Nevertheless, for molluscs inhabiting soft substrates the relative frequency of species recorded in the dredge samples is likely a reflection of their natural abundance.

The molluscs were identified using the reference collections and library at the Natural History

Museum, London. Comparisons were made with type material where appropriate and reference made to original descriptions and illustrations. Voucher material is lodged at the Western Australian Museum and the Natural History Museum, London.

Data were analysed using PRIMER 5 (Plymouth Routines in Marine Environmental Research – www.pml.ac.uk/primer/primer-e.htm).

RESULTS

The molluscan species identified from the dredge stations sampled are listed in systematic order in Table 1. Molluscs recovered only as dead individuals are marked with “*”. A total of 422 species of molluscs was identified, comprising 227 gastropods, 188 bivalves, four scaphopods and three chitons. A single inarticulate brachiopod was also recorded. Out of this total, 321 species were recovered live, with around 25% of bivalves and 17% gastropods recorded as shells only. The most species-rich families were the Veneridae with 26 species, Turridae (24), Trochidae (21), Muricidae (17) and Tellinidae (11). An estimate of species richness was made using cumulative curves calculated with the EstimateS 5 programme (Colwell, 1999). The slope of the species accumulation curve (Figure 1) shows that the sample was not saturated. Extrapolations of total species richness (for the size range of mollusc sampled) gave estimates of between 335–450 species. Our list, including both live and dead-collected (422 species) falls within this range. Total richness is anticipated to be far higher than this because we have not sampled either small species or those with specialised habits such as commensal and parasitic taxa. Bouchet *et al.* (2002) showed that 33.5% of the molluscan species in their intensive sampling at New Caledonia have an adult size smaller than 4.0 mm.

The distribution of the 321 species of living molluscs at all stations is shown in Appendix 1. Most species were rare, with 96 (31%) recorded from single stations and only eight identified from more than 20 stations. A similar pattern is shown for species abundance, with 197 species (63%) represented by five or less individuals while 81 (26%) of these were recorded only as single specimens. Fifteen species composed about 50% of the mollusc individuals recovered, with only eight of these forming 41% of the numbers. Ranked abundances of the most frequent species are shown in Table 2, with some of these illustrated in Figures 2 and 3. The most abundant mollusc was the shallow burrowing glycymerid bivalve, *Melaxinaea vitrea*, followed by two other shallow burrowing bivalves, *Corbula crassa* and *C. tunicata*. The most abundant gastropod was the hard substrate-living

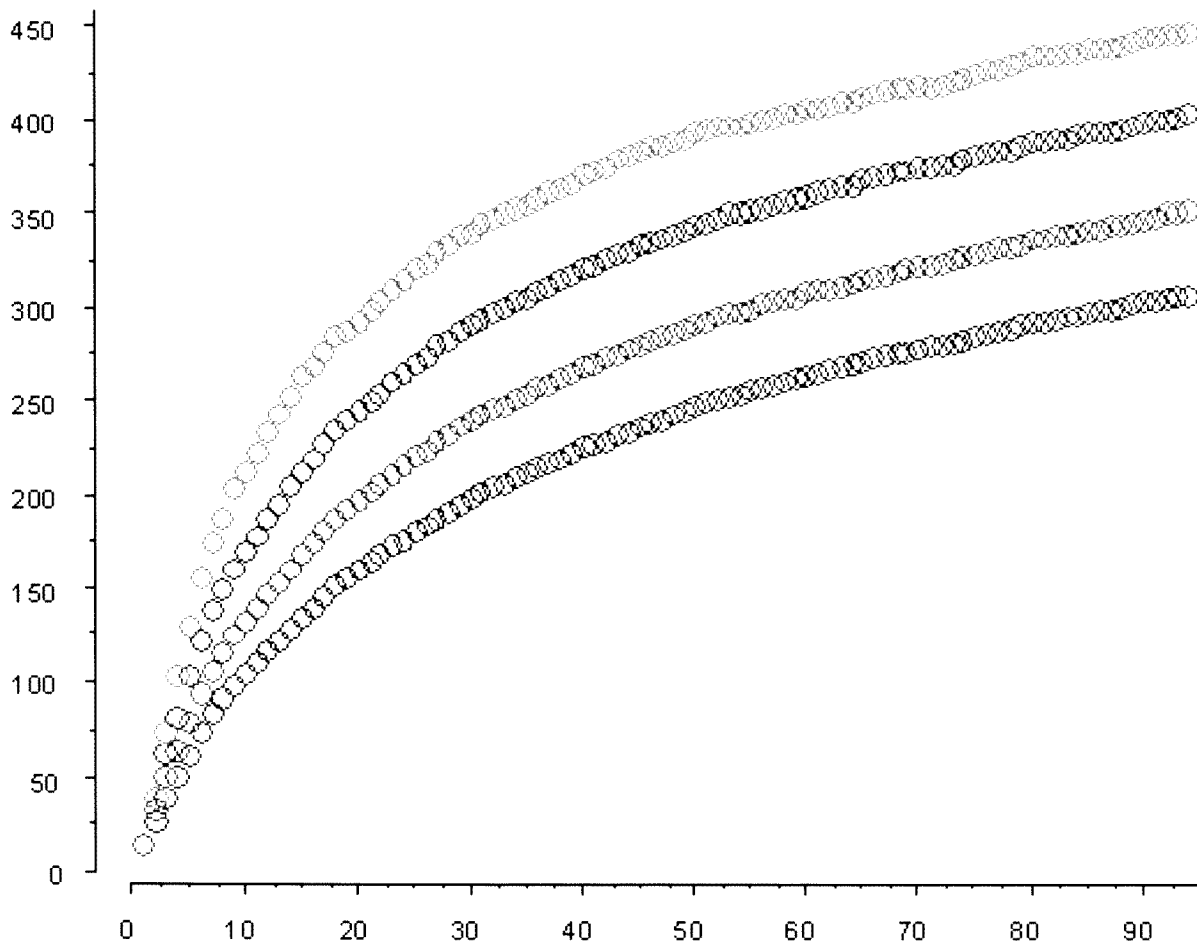


Figure 1 Species accumulation curves calculated using EstimateS 5 (Colwell, 1999). Extrapolations of species richness are given by Jackknife (Jack1 and Jack2) and Bootstrap methods. Data from Appendix 1.

trochid *Herpetopoma atrata*, with the soft substrate species *Xenophora solarioides*, *Archimediella fastigiata* and *Strombus vittatus* slightly less frequent. A few stations within Dampier Harbour were notable for large numbers of juvenile byssate *Trisidos semitorta*, an arcid bivalve.

For live molluscs, the most diverse stations (DA2/99/73, 66 and 65) were located in Mermaid Strait south of Enderby and East Eaglehawk Islands, in water depths of about 12 m. Station DA2/99/73 was the most species-rich, with a total of 50 taxa. The substrate at this station was largely coarse sand and gravel with a diversity of sponges and free living corals. Species frequent at this station, but less common elsewhere, included *Conus dampierensis*, three species of *Trigonostoma*, *Tucetona odhneri* and *Venericardia cardioides*. Station DA2/99/65 yielded 43 mollusc species and station DA2/99/66 had 38 species. A large number of stations elsewhere in the archipelago also yielded more than 30 molluscan species.

Gastropods exhibit the greatest trophic diversity; out of the live collected species 55% can be classified as predators, 14% as grazing carnivores on sedentary animals including sponges and cnidarians, 5% are

scavengers, 6% are commensals and ectoparasites, 15.5% are algal and detritus feeders and 3% are suspension feeders. The ratio of carnivorous to non-carnivorous species as defined by Valentine *et al.* (2002) is 3.7. Most of the bivalve species were suspension feeders with few deposit feeding animals and a single chemoautotrophic lucinid.

Community analysis

More detailed analysis of the sample data using PRIMER indicated a complex mosaic of benthic molluscan assemblages reflecting the highly varied nature of the bottom substrates around the archipelago. Results of the Bray Curtis classification based on the species abundance data (Appendix 1) are shown in Figure 4 and the distribution of stations shown in Figure 5. Typical or indicator species recognised by SIMPER for each of the groups are listed in Table 3. Multiple dimensional scaling (MDS) ordinations of the quantitative data (Figure 6) showed considerable overlap of the C1, C2, C3 and D groups recognised from the dendrogram (Figure 4). However, Groups E, F and B were clearly demarcated confirming their distinctiveness. The distribution and molluscan

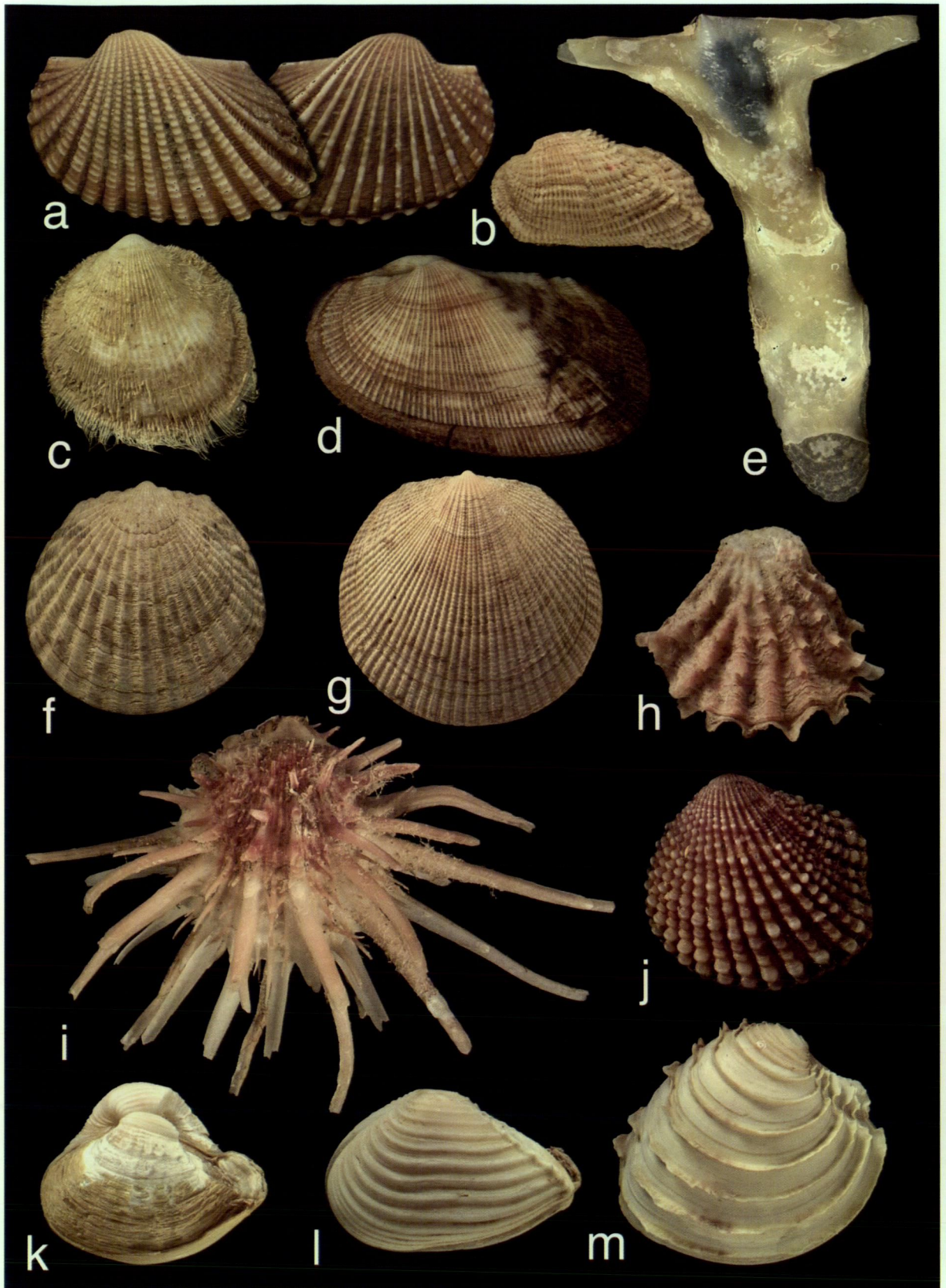


Figure 2 Some common subtidal benthic bivalves of the Dampier Archipelago. (Shell heights in mm). a, *Anadara hubbardi* (Iredale, 1929) 20.9; b, *Acar plicata* (Dillwyn, 1817) 10.5; c, *Limopsis multistriata* (Forskål, 1775) 18.6; d, *Trisidos semitorta* (Lamarck, 1819) 29.1; e, *Malleus albus* Lamarck, 1819 108.5; f, *Tucetona odhneri* Iredale, 1939 24.5; g, *Melaxinaea vitrea* (Lamarck, 1819) 33.4; h, *Plicatula chinensis* Mörch, 1853 21.4; i, *Spondylus wrightianus* Crosse, 1869 56.1; j, *Neotrigonia uniophora* (Gray, 1847) 16.8; k, *Corbula tunicata* (Hinds, 1843) 12.7; l, *Corbula crassa* (Reeve, 1843) 11.9; m, *Placamen calophyllum* (Philippi, 1836) 30.7.

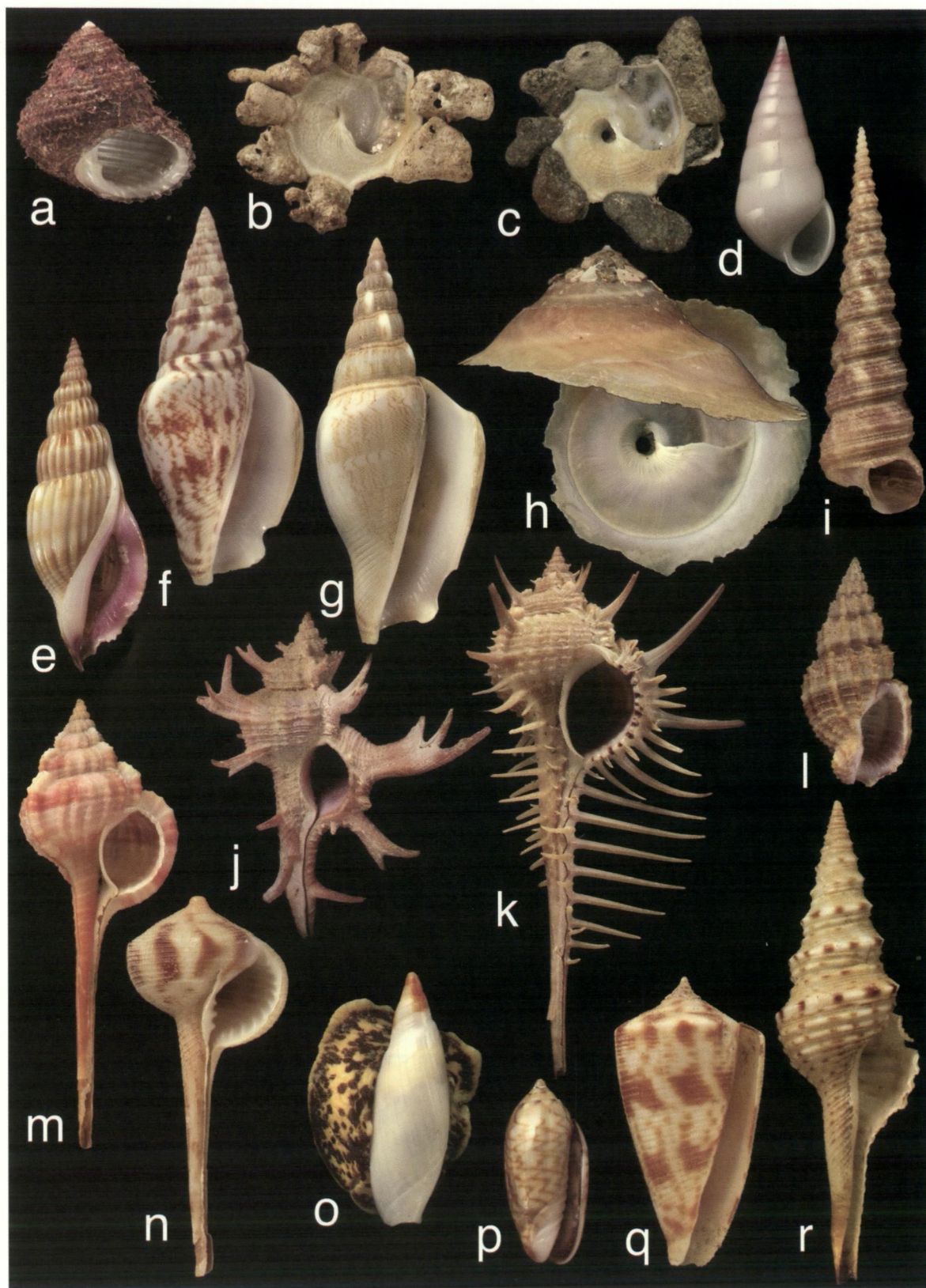


Figure 3 Some common subtidal benthic gastropods from the Dampier Archipelago. (Shell heights in mm). a, *Herpetopoma atrata* (Gmelin, 1791) 25.3; b, *Xenophora cerea* (Reeve, 1845) 118.1; c, *Xenophora solarioides* (Reeve, 1845) 8.7; d, *Melanella martinii* (A. Adams, 1854) 25.2; e, *Rimella cancellata* (Lamarck, 1816) 32.7; f, *Strombus campbelli* Griffith and Pidgeon, 1834 48.4; g, *Strombus vittatus* Linnaeus, 1758 49.3; h, *Xenophora indica* (Gmelin, 1791) 35.0; i, *Archimediella fastigiata* (Adams and Reeve, 1848) 45.6; j, *Haustellum multiplicatus* (Sowerby, 1895) 53.8; k, *Chicoreus cervicornis* (Lamarck, 1822) 38.8; l, *Murex pecten soelae* Ponder and Vokes, 1988 68.8; m, *Phos senticosus* (Linnaeus, 1758) 25.9; n, *Tudivasum inermis* (Angas, 1878) 42.5; o, *Ancillista muscae* (Pilsbry, 1926) 39.1; p, *Oliva brettinghami* Bridgman, 1909 11.9; q, *Conus dampieriensis* Coomans and Filmer, 1985 29.0; r, *Lophiotoma indica* (Röding, 1798) 42.4.

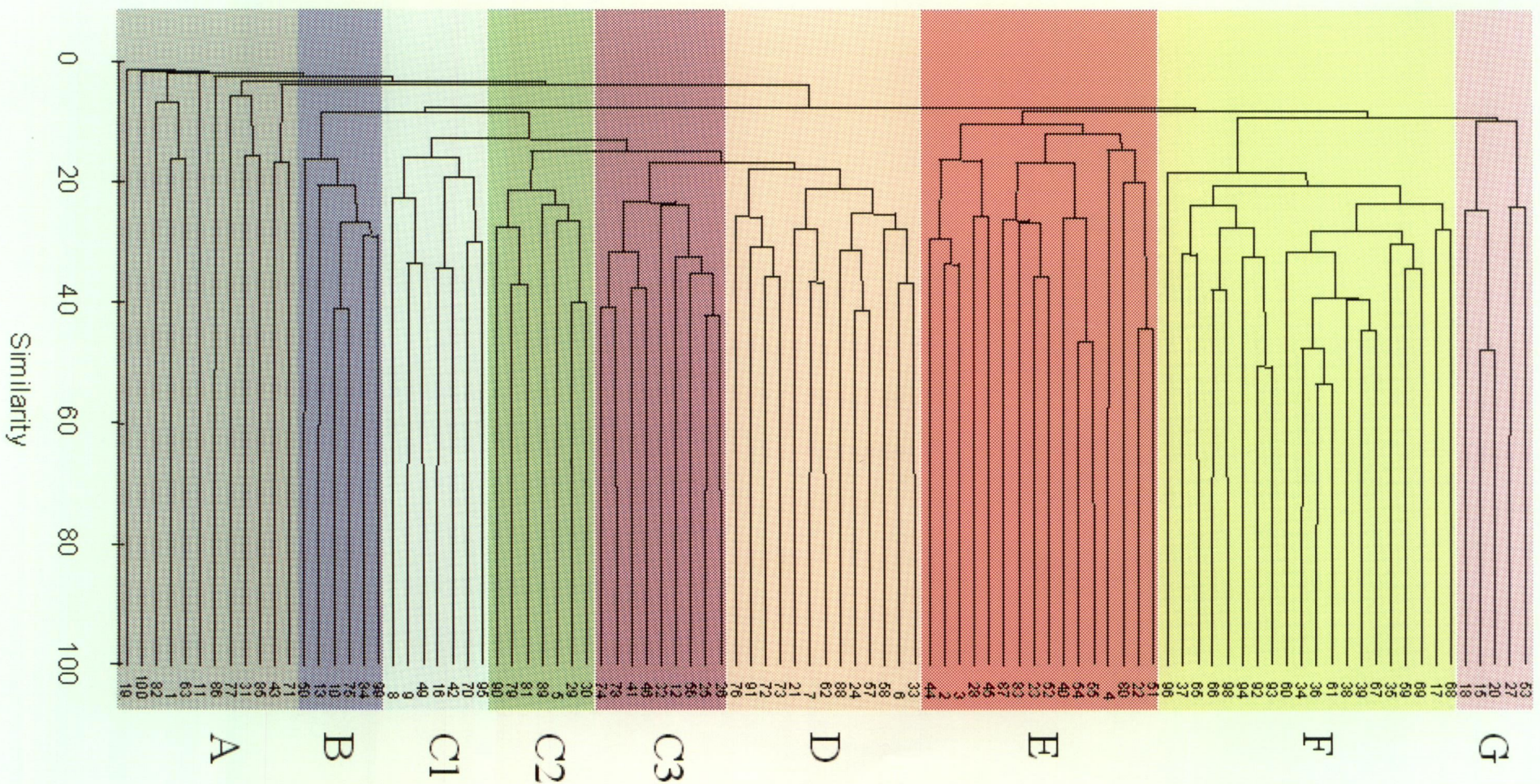


Figure 4 Dendrogram showing classification of Dampier dredge stations based on matrix in Appendix 1. Abundances were root transformed before comparing stations using the Bray-Curtis measure of similarity and the dendrogram produced by group average sorting.

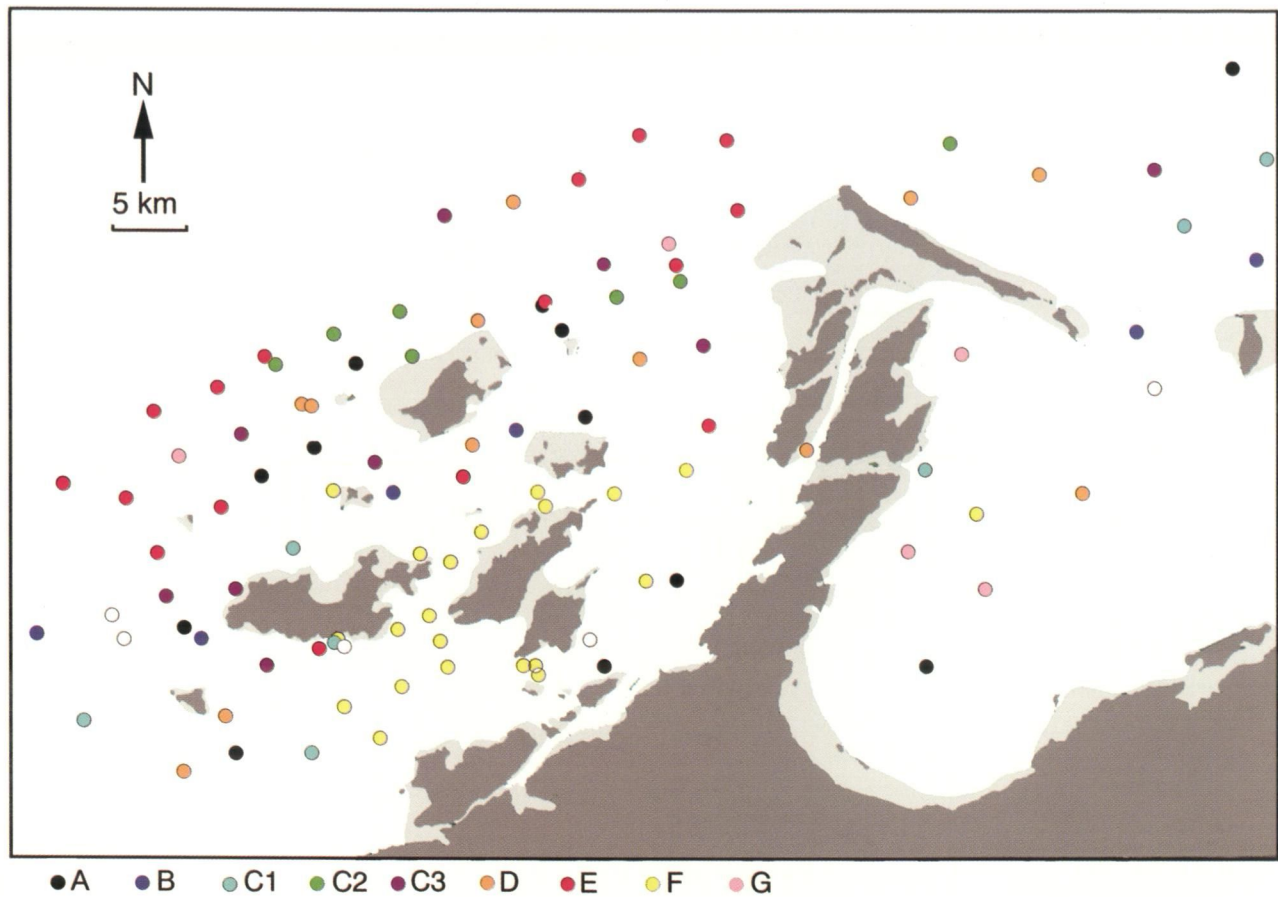


Figure 5 Map showing distribution of the stations classified into the groups recognised in Figure 4. Uncoloured circles denote stations at which no live molluscs were recovered (refer to Station Lists).

fauna of the various groups recognised in the analysis are discussed briefly below.

Group A

This group comprised miscellaneous, unclassified stations from which few molluscs were recovered. These showed extremely low similarity levels and are not considered further.

Group B (stations DA2/99/10, 13, 50, 75, 84, 99)

This group comprised several widely separated stations with a substrate of rocks, corals and sponges. The fauna was dominated by molluscs usually associated with hard substrates including, amongst the bivalves, the cemented *Chama lazarus*, the byssate *Acar plicata* and the sponge nestling *Hiatella australis*. Characteristic gastropods included the muricids *Thais echinata* and *Cronia avellana* and the abundant trochid *Hepetopoma atrata*.

Group C1 (stations DA2/99/08, 09, 16, 42, 49, 70, 95)

This group comprised widely separated stations having mixed substrates of sand, rubble, rocks and sponges. The fauna consisted of an assemblage of species characteristic of both soft and hard substrates. Notable species were the shallow

burrowing bivalve *Corbula tunicata*, the rock living gastropod *Cronia avellana*, the rock boring bivalves *Gastrochaena gigantea*, *Lithophaga malaccana* and *L. teres*, the byssate nestling bivalves *Malvufundus regula* and *Acar plicata* and the epifaunal gastropod *Hepetopoma atrata*.

Group C2 (stations DA2/99/05, 29, 30, 79, 81, 89, 90)

This group comprised stations largely located at depths in excess of 30.0 m and lying to the seaward of the islands. The substrate consisted of sand and sandy mud with some cobbles and shell debris. The fauna was characterised by an assemblage of sand living gastropods including the predators *Tudivasum inermis*, *Fusinus colus*, *Gemmula dampieriana* and *Turricula granobalteus* and the deposit feeding and grazing *Xenophora solaroides* and *Strombus plicatus*. Common shallow-burrowing, infaunal bivalves included *Corbula tunicata*, *Leionucula superba* and *Tucetona angusticosta*.

Group C3 (stations DA2/99/12, 25, 26, 32, 41, 46, 56, 74, 78)

Stations in this group lay largely between the islands of the archipelago with a typical substrate of coarse sand, often with accompanying rubble,

rocks, abundant bryozoans and sponge patches. Characteristic molluscs included the shallow burrowing bivalves *Corbula tunicata*, *Placamen tiara*, *Tucetona angusticosta* and *Dosinia deshayesi* and the epifaunal byssate and cemented species *Malleus albus*, *Plicatula chinensis* and *Spondylus wrightianus*. Common sand living gastropods included *Xenophora solarioides*, *Ancillista muscae* and *Strombus campbelli* in addition to the hard substrate living species *Herpetopoma atrata*. This C3 group differed from C2 notably in the abundance of *Corbula tunicata* and *Malleus albus* and the low abundance of *Tudivasum inermis*.

Group D (stations DA2/99/06, 07, 21, 24, 33, 44, 57, 58, 62, 72, 73, 75, 88, 91)

This group comprised an assemblage of spatially separated stations either lying between the islands, to the seaward of Legendre Island, or within Nickol Bay. The substrate consisted of coarse sand, gravel and rubble, with rhodoliths, sponges and bryozoans. The molluscan fauna of 161 species was rich and comprised a mixture of animals, including characteristic inhabitants of coarse sands and gravels, together with others associated with hard substrates. Abundant species were the bivalves *Corbula tunicata*, *Tucetona odhneri*, *Venericardia cardioides* and the gastropods *Chicoreus cervicornis*,

Conus dampierensis, *Phos senticosus*, *Strombus campbelli* and *Herpetopoma atrata*.

Group E (stations DA2/99/02, 03, 04, 22, 23, 28, 40, 44, 45, 51, 52, 54, 55, 80, 83, 87)

Stations in this group lay largely to the seaward of the islands. The substrate consisted of fine or muddy sand with some admixture of cobbles and rocks. The molluscan fauna was largely composed of species normally inhabiting soft substrates, with the gastropods *Xenophora solarioides*, *Natica vitellus*, *Phos senticosus* and the bivalves *Melaxinaea vitrea* and *Limopsis multistriata* most abundant. Group E differs from another seaward group (C2) in the much lower abundance of *Corbula tunicata* and *Tudivasum inermis*.

Group F (stations DA2/99/17, 34, 35, 36, 37, 38, 39, 59, 60, 61, 65, 66, 67, 68, 69, 92, 93, 94, 96, 98)

This group of stations was probably the most well defined geographically and mainly included those located relatively close inshore to the south of Enderby Island and around the Lewis Islands, mostly at water depths <10.0 m. The substrate mainly consisted of muds, silts and fine sands with some sponges. The molluscan fauna is the most diverse of all groups with 167 species, most of

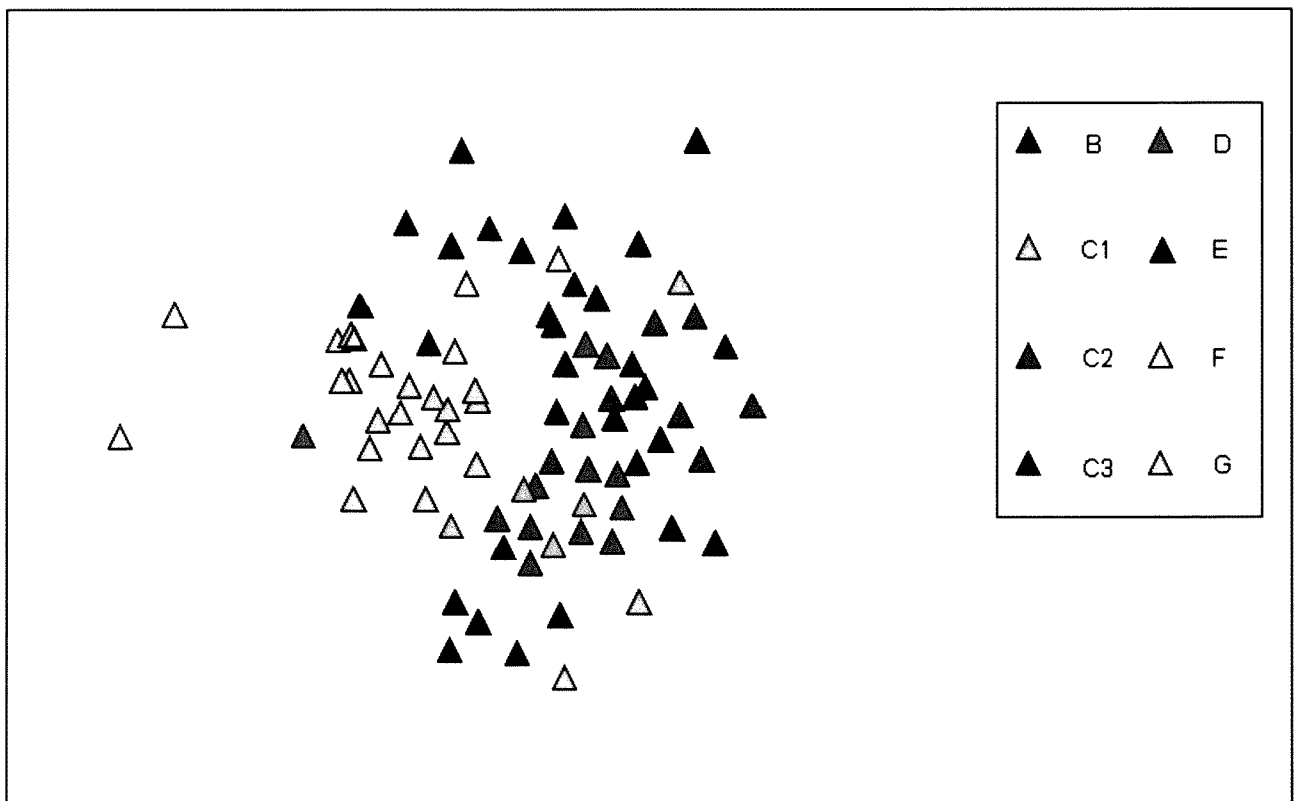


Figure 6 Ordination of stations using multidimensional scaling (MDS) based on the similarity matrix of Figure 4. Identifying letters for the groups correspond to those of Figure 4 and Table 2. Stations of Group A (miscellaneous stations of low similarity) have been omitted for clarity.

which were uncommon. The community is dominated by shallow-burrowing infaunal bivalves particularly *Melaxinaea vitrea*, *Corbula crassa*, *Placamen calophyllum* and *Anadara hubbardi*. A few stations around the southern side of Lewis Islands were notable for high abundance of juveniles of the byssate semi-infaunal arcid *Trisidos semitorta* (10.0–15.0 mm shell length).

Group G (stations DA2/99/15, 18, 20, 27, 53)

This group comprised a small number of stations, three within Nickol Bay. The substrate largely comprised fine muddy sands with abundant ophiuroids and asteroids. Molluscs were generally in low abundance, typified by the shallow burrowing venerid bivalve *Placamen calophyllum*, and the gastropods *Lophiotoma indica* and *Haustator cingulifera*.

Distribution of species

Even casual study of the dredge results shows that molluscs were not uniformly distributed around the Dampier Archipelago and large differences exist in the composition of the communities along, for example, the onshore-offshore gradient. Bivalves, for instance, were much more abundant at the shallow inshore stations (<10m) with muddy substrates; here an average of

around 225 bivalves per station were recovered, contrasting with only 13 per station at the deeper locations seaward of the Archipelago.

Amongst the bivalves, species of the shallowly burrowing Corbulidae showed an interesting pattern (Figure 7). Of the four species found in the survey, *C. crassa* was notably more abundant at inshore, shallow stations with muddy substrates whilst *C. tunicata* was the dominant species outside the islands and also at deeper water stations between them. Three other common shallow-burrowing bivalves, *Melaxinaea vitrea* (Figure 8), *Placamen calophyllum* (Figure 9) and *Trisidos semitorta* also showed an inshore distribution similar to that of *Corbula crassa*. In contrast, for gastropods, those stations seaward of the islands were notable for the abundance of three *Xenophora* species (Figure 10) along with *Tudivasum inermis* (Figure 11), *Bursa rana* and *Gemmula dampieriana*. All of these species were uncommon or absent at stations among the islands of the archipelago. The long-spined *Chicoreus cervicornis* was frequent at soft substrate stations between the islands (Figure 12).

It was notable that few molluscs were recovered at stations close to the iron ore loading jetty in Mermaid Sound, suggesting heavy disturbance from ore dust, channel dredging and harbour

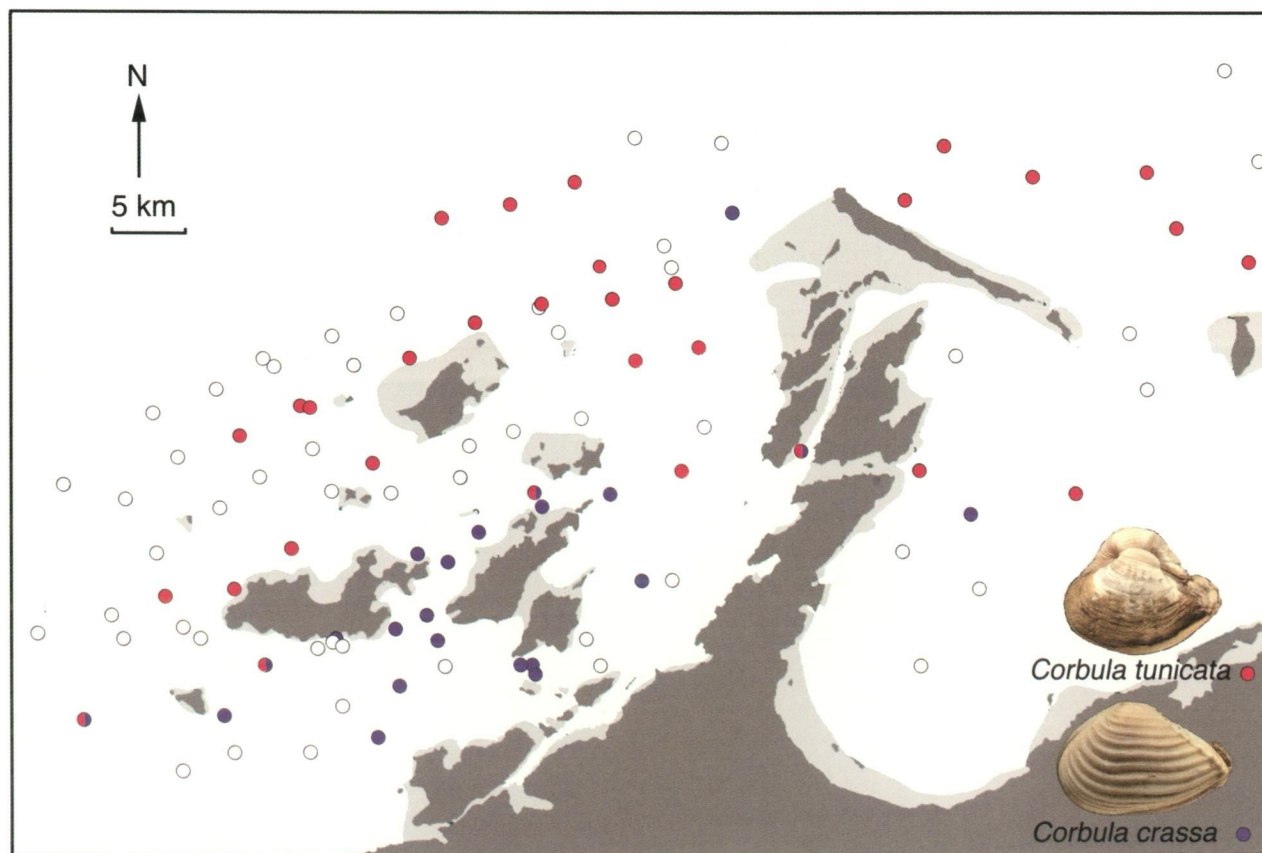


Figure 7 Distribution of *Corbula crassa* and *Corbula tunicata* at stations around the Dampier Archipelago.

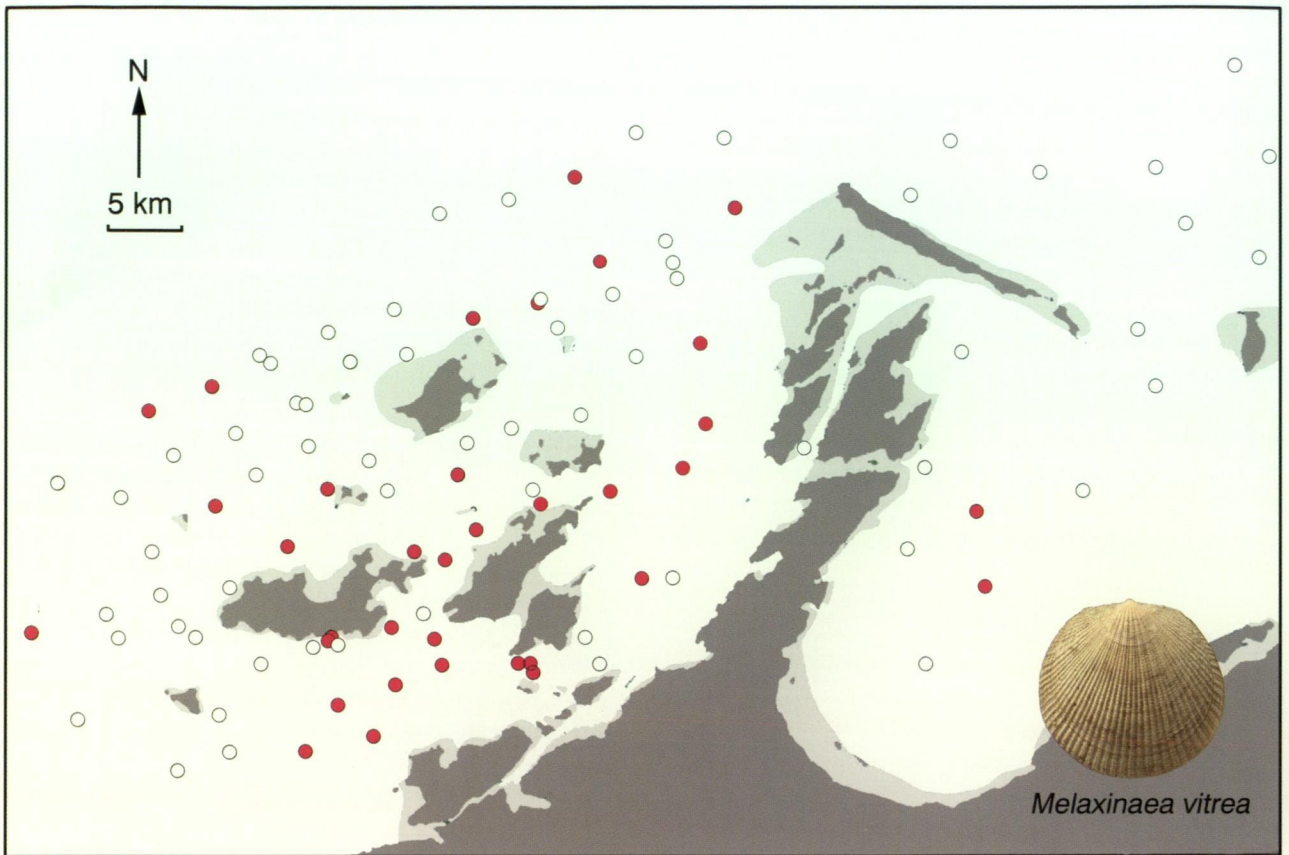


Figure 8 Distribution of *Melaxinaea vitrea* at stations around the Dampier Archipelago.

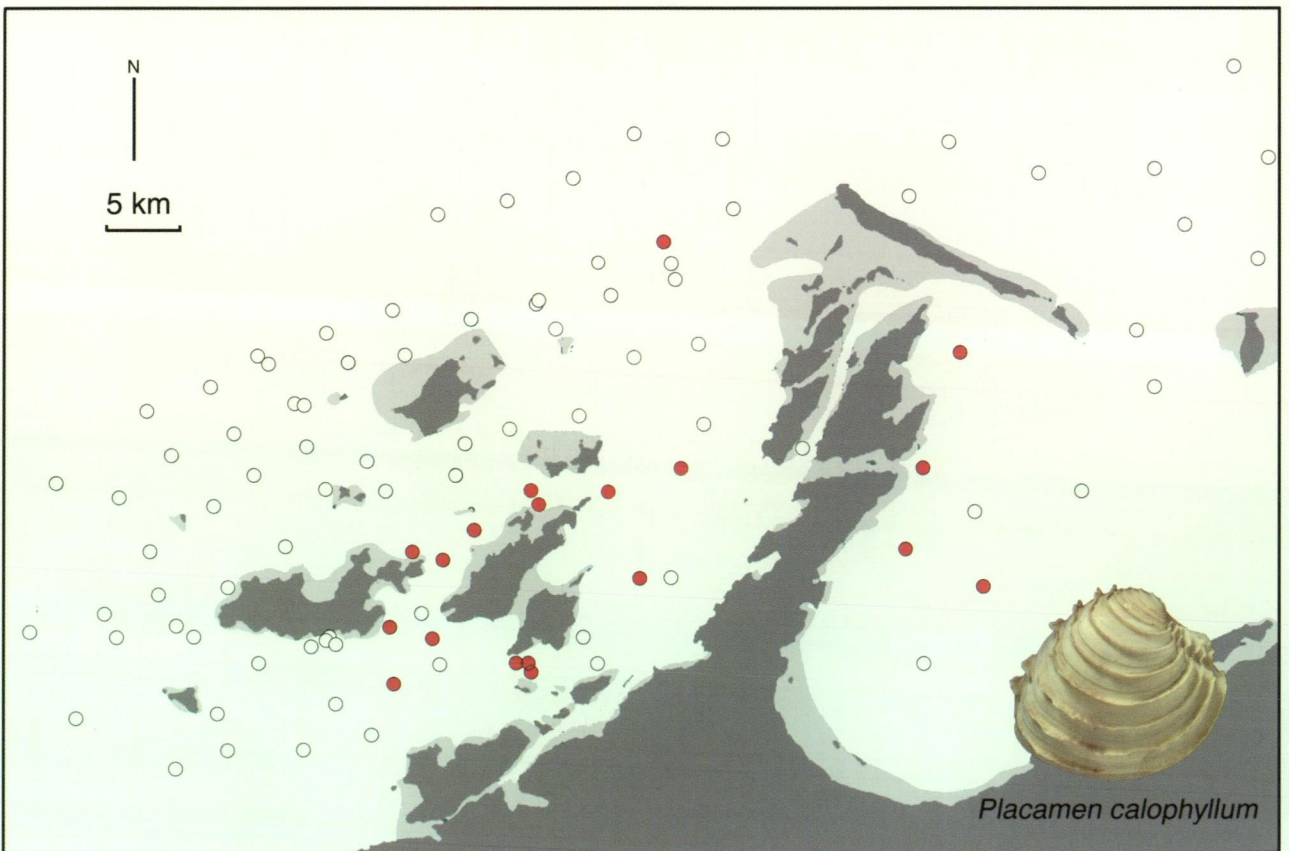


Figure 9 Distribution of *Placamen calophyllum* at stations around the Dampier Archipelago.

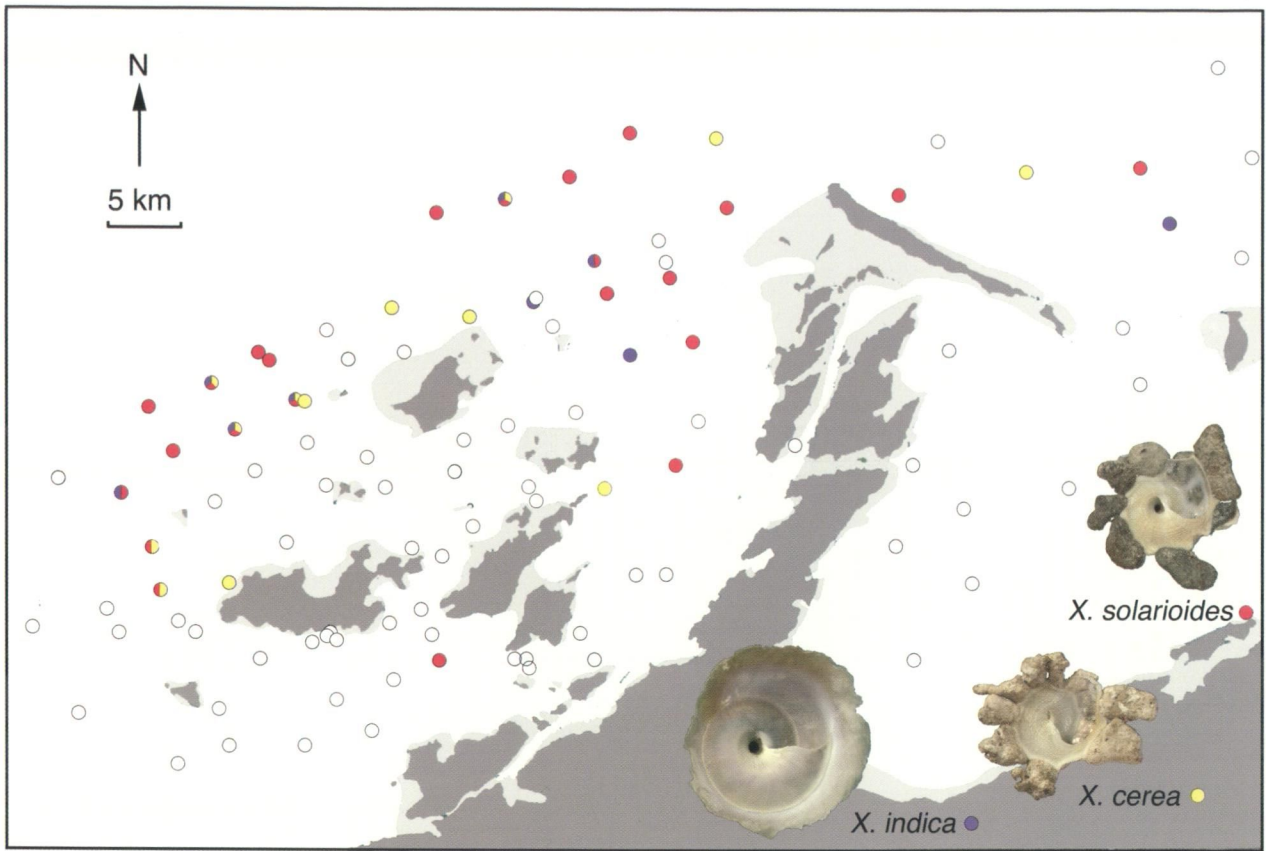


Figure 10 Distribution of *Xenophora cerea*, *X. indica* and *X. solarioides* at stations around the Dampier Archipelago.

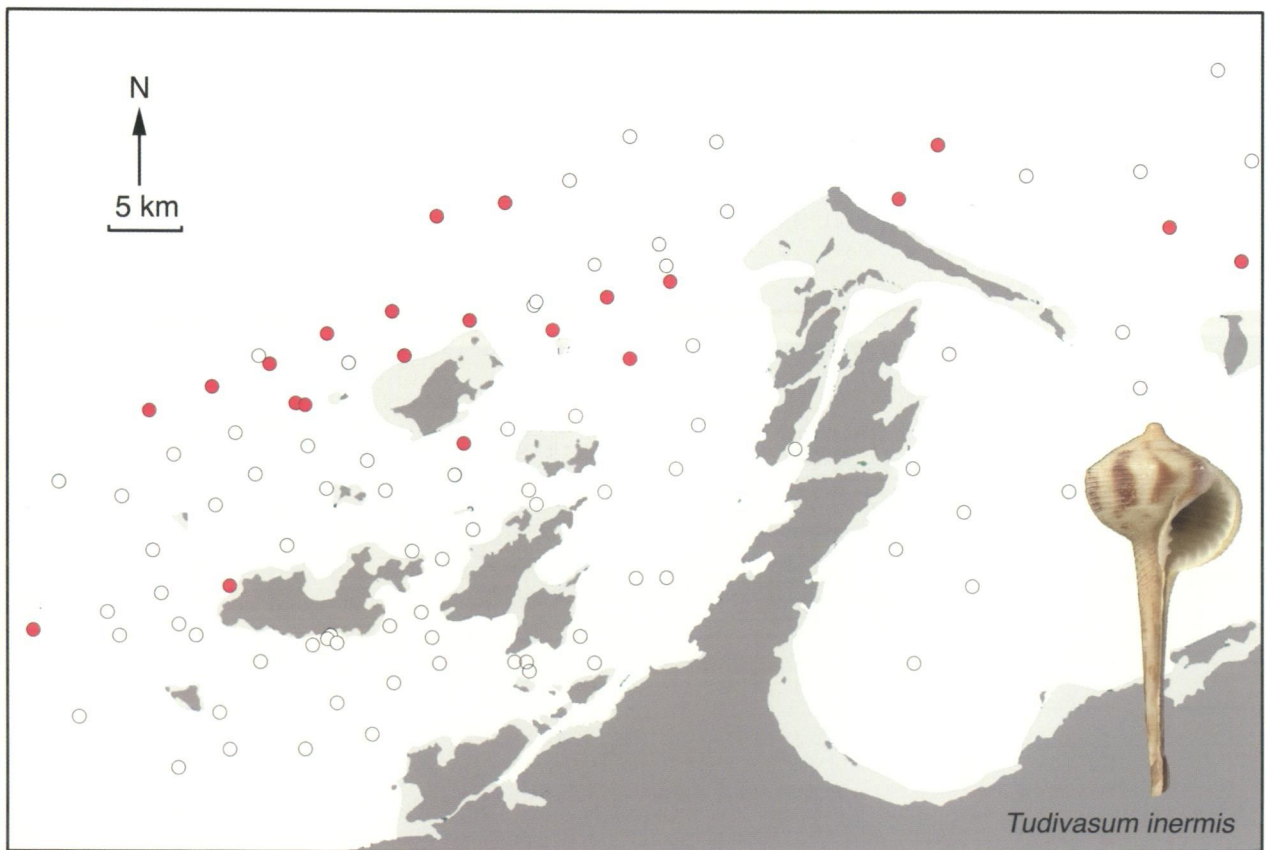


Figure 11 Distribution of *Tudivasum inermis* at stations around the Dampier Archipelago.

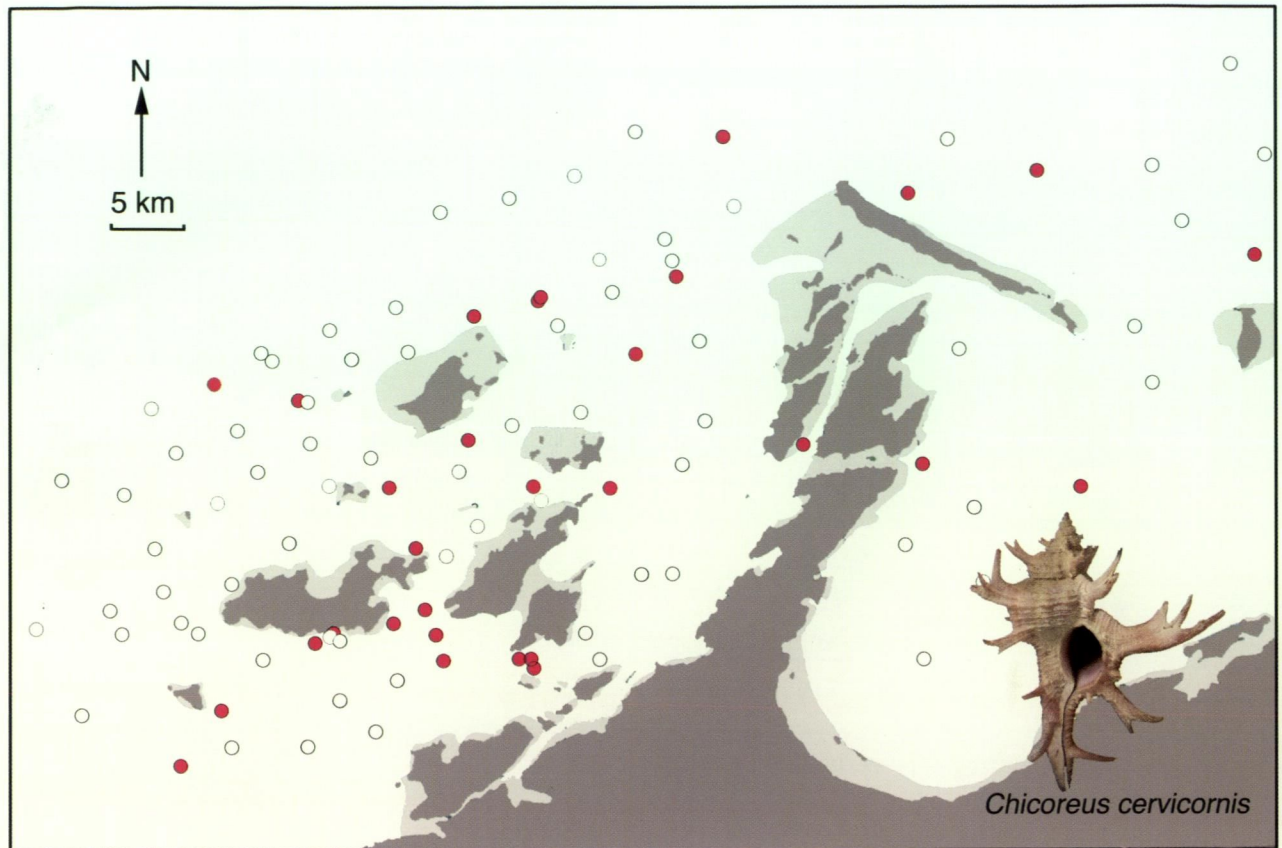


Figure 12 Distribution of *Chicoreus cervicornis* at stations around the Dampier Archipelago.

activities. This was indicated by the high iron content of the sediment dredged and the low diversity compared with stations at similar depths in Mermaid Strait.

An important discovery was of a previously undescribed species (*Lamellolucina pilbara*) (Figure 13) representing a new genus of chemosymbiotic lucinid from muddy substrate stations around Enderby Island and in Nickol Bay (Taylor and Glover, 2002). This new species may be endemic as it has not been recognised during extensive studies of museum collections from around Australia and elsewhere.

DISCUSSION

The molluscan fauna recorded here from subtidal habitats around the Dampier Archipelago represents only a portion of the likely total. Recent studies involving massive sampling effort (Bouchet *et al.*, 2002) have demonstrated that estimates of molluscan species richness on Indo-West Pacific coral reefs have been hugely underestimated, with 2738 species recorded from a 295km² coral reef site at New Caledonia. Even in relatively well sampled areas, such as the Florida Keys, species richness has been severely underestimated (Mikkelsen and Bieler, 2000). Nevertheless, despite these limitations, our dredge survey has yielded a

species-rich gastropod and bivalve fauna. When these results are combined with the lists of molluscs recorded from the large variety of intertidal and diver-sampled habitats, the fauna of the Dampier area will likely approach the diversity of the tropical Queensland coast. Furthermore, the dredge sampling probably failed to capture many deeper burrowing species. For example, although razor shells (*Solen* spp) were recovered frequently, only the siphonal tips of live animals were retained in the dredge. Additionally, the micromolluscan fauna has not been studied; Bouchet *et al.* (2002) suggests that this, including those with specialised commensal and parasitic habits, is likely to account for over one-third of species. Although diversity surveys, such as attempted by Bouchet and his colleagues, are highly labour intensive, there is now a sufficient knowledge of molluscs, based on the all the recent surveys of the Dampier region, to attempt a similar comprehensive estimate of total numbers.

A north-south diversity gradient exists along the Western Australian coast, with the northern tropical fauna becoming attenuated southwards and replaced by the warm temperate fauna, with a transitional overlap zone lying between Cape Leeuwin and North West Cape. Superimposed on this gradient are endemic species forming about 10% of the total (Wells, 1980; Morgan and Wells, 1991; Wells and Bryce, 1997). Although detailed

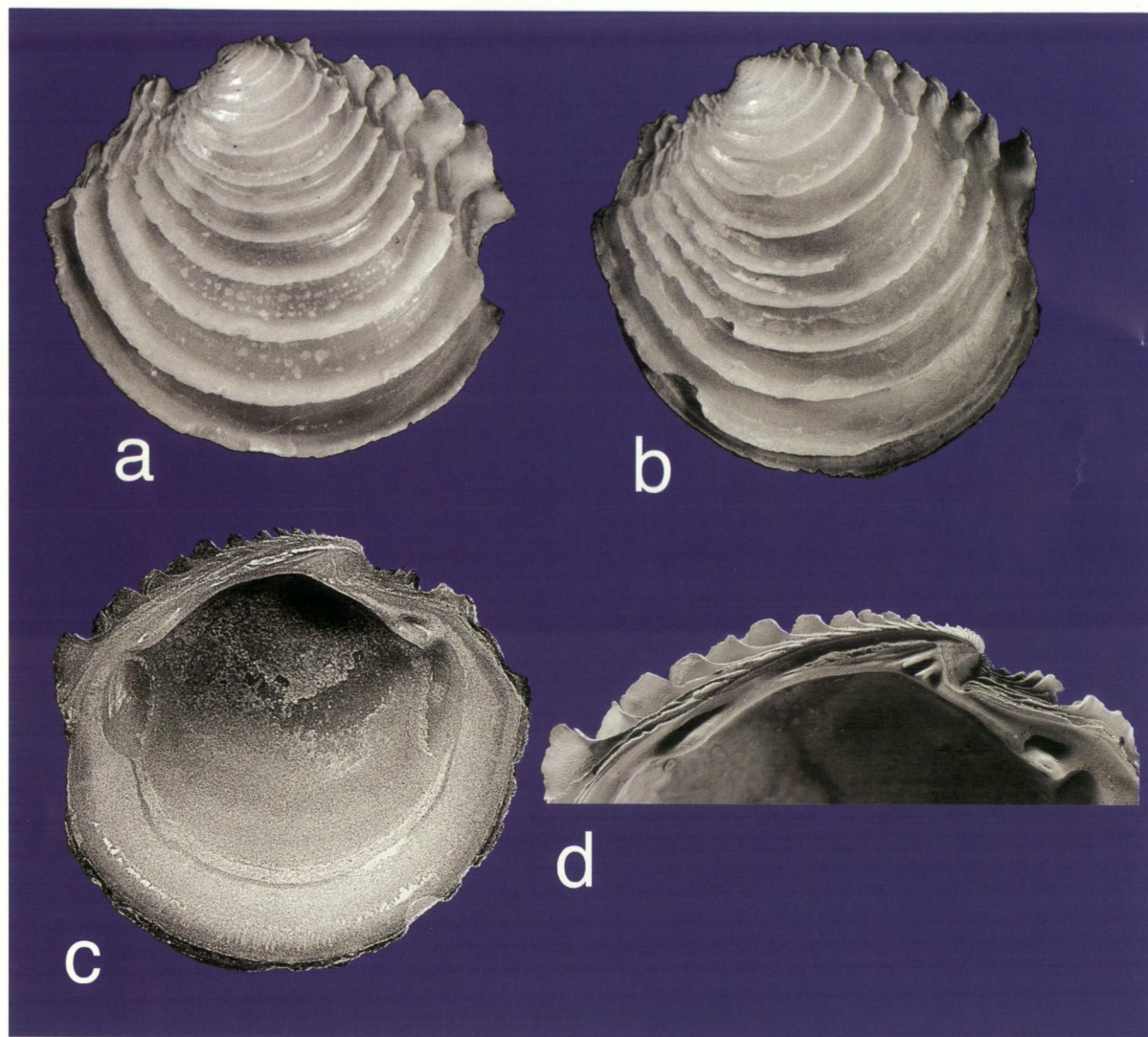


Figure 13 *Lamellolucina pilbara* Taylor and Glover, 2002, a newly described species of chemosymbiotic lucinid bivalve from the Dampier area. a, left valve of holotype (Western Australian Museum 12064) shell length 14.8mm; b, left valve of paratype (WAM 12065) shell length =14.0mm; c, interior of left valve of holotype; d, detail of hinge teeth of paratype.

distribution patterns for many of the species are not known, it is apparent that the majority of molluscs recovered during the dredge survey are tropical and are more or less widely distributed around the northern coasts of Australia or within the Indo-West Pacific Province. Some species have narrower ranges and are endemic to the area or northwestern Australia. These include the volutid gastropods *Amoria dampieria*, *A. ellioti* and *A. jamrachi*, *Cymbiola oblita*, the conoideans *Gemmula dampieriana* and *Conus dampieriensis* and the lucinid bivalve *Lamellolucina pilbara*.

Although different habitats were sampled and close comparisons are thus difficult, the fauna dredged from the Dampier area is similar in diversity and composition to that recorded from the Muiron Islands and eastern Exmouth Gulf (Slack-Smith and Bryce, 1996). The few reports concerning sub-tidal, soft substrate, mollusc faunas along the

West Australian coast confirm that there is a major diversity gradient, with both the Dampier area and Muiron Islands being significantly more diverse than the more southerly locations. Compared to a similar survey around the Easter Group of the Houtman Abrolhos islands, made in 1994 with the same ship, dredging gear and techniques (Glover and Taylor, 1997), the Dampier stations are much more diverse, comprising 179 live gastropod and 140 live bivalve species compared to 69 and 65, respectively, around the Abrolhos. This compares with a total of 492 species that have been recorded from all habitats around all the Abrolhos Islands (Wells and Bryce, 1997). A similar dredge survey around the more southerly Rottnest Island, near Perth, again using the same ship and gear, but sampling fewer stations, yielded only 47 gastropod and 62 bivalve species (Glover and Taylor, 1999).

One feature of the benthic molluscan

communities is their patchiness, a response to the highly variable nature of the substrate which varies between mud/silt to sand, gravel, cobbles, rock, coral patches and sponge gardens. The molluscan fauna reflects this variability, with at most stations mixed assemblages of species that normally inhabit both soft and hard substrates. The most spatially circumscribed association we recognised is Group E, comprising the community inhabiting muds, silts and fine sand in the inshore area south of Enderby and Eaglehawk Islands. This is also the most species-rich assemblage, dominated numerically by shallow burrowing bivalves. The marked difference in the abundance of bivalves between the rich inshore sites and the sparsely populated outer stations is probably related to both substrate availability and also to the higher levels of terrigenous nutrient input near-shore.

The most abundant mollusc encountered during the survey was the glycymerid bivalve *Melaxinaea vitrea*. Glycymerids are usually associated with clean sand and gravel substrates of tropical and temperate continental shelves (Thomas, 1980), as exemplified in Western Australia by the abundance of two species (*Glycymeris persimilis* and *G. striatularis*) around Rottneest Island (Glover and Taylor, 1999). However, unusually amongst glycymerids, *Melaxinaea vitrea* is associated around Dampier with the more inshore silts and muds. This species is different in morphology to most other glycymerids, having a highly compressed, discoidal shell with finely beaded ribs, features that may be adaptations to living in muddy substrates. Another glycymerid, *Tucetona odhneri*, from around Dampier has coarse ribs and is found in the more usual habitat of coarse sands.

In terms of trophic specialization, more than half the species of gastropods can be classified as predators and a further set as having carnivorous habits (faunal grazers, ectoparasites). This matches similar numbers for other tropical continental margins (Taylor and Taylor, 1977) and the ratio of carnivorous to non-carnivorous species of 3.7 attains the levels recorded from tropical sites in the eastern Pacific by Valentine *et al.* (2002). This high proportion of predatory species, particularly of Neogastropoda with highly specialised feeding habits, accounts for much of the high diversity reported for tropical molluscan faunas (Crame, 2001; Valentine *et al.*, 2002).

It is unfortunate that little biological information is available for any of the species recorded in our surveys, even those occurring abundantly. Inferences about life habits are mainly derived from comparisons with species from outside of the region or even from non-tropical areas. Indeed, for some of the common genera, such as *Fusinus*, *Tudivasum*, *Xenophora*, *Murex*, *Chicoreus* and *Phos*, there is little information on feeding habits and ecological role in

benthic communities available from anywhere in the Indo-Pacific region. Similarly, for most of the bivalves from the Dampier area, such as the abundant *Corbula* species and *Melaxinaea vitrea*, we have no basic biological information which might enable us to understand their interesting distribution patterns around the Dampier Archipelago.

A concluding observation is that the most species-rich stations identified in this survey lie close inshore between the mainland and Enderby Island, within the area most at risk from anthropogenic disturbance, including onshore development such as salt pond construction, channel dredging and harbour expansion.

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REFERENCES

- Bouchet, P., Lozouet, P., Maestrati, P. and Heros, V. (2002). Assessing the magnitude of species richness in tropical marine environments: exceptionally high numbers of molluscs at a New Caledonia site. *Biological Journal of the Linnean Society* **75**: 421–436.
- Colwell, R.K. (1999). *Estimates: statistical estimation of species richness and shared species from samples*, version 5. <http://viceroy.eeb.uconn.edu/estimates>.
- Crame, J.A. (2000a). The nature and origin of taxonomic diversity gradients in marine bivalves. In Harper, E.M., Taylor, J.D. and Crame, J.A. (eds), *The evolutionary biology of the Bivalvia*. Geological Society, London Special Publications, **177**: 347–360.
- Crame, J.A. (2000b). Evolution of taxonomic diversity gradients in the marine realm: evidence from the composition of Recent bivalve faunas. *Paleobiology* **26**: 188–214.
- Crame, J.A. (2001). Taxonomic diversity gradients through geological time. *Diversity and Distributions* **7**: 175–189.
- Glover, E.A. and Taylor, J.D. (1997). Diversity and distribution of subtidal molluscs from the outer continental shelf, Houtman Abrolhos Islands, Western Australia. In Wells, F.E. (ed.), *The Marine Flora and Fauna of the Houtman Abrolhos Islands, Western Australia*: 281–305. Western Australian Museum, Perth.

- Glover, E.A. and Taylor, J.D. (1999). Diversity and distribution of subtidal macromolluscs around Rottnest Island, Western Australia. In Walker, D.I. and Wells, F.E. (eds), *The Seagrass Flora and Fauna of Rottnest Island, Western Australia*: 101–119. Western Australian Museum, Perth.
- Glover, E.A. and Taylor, J.D. (2001). Systematic revision of Australian and Indo-Pacific Lucinidae (Mollusca: Bivalvia): *Pillucina*, *Wallucina* and descriptions of two new genera and four new species. *Records of the Australian Museum* **53**: 263–292.
- Lamprell, K. and Healy, J. (1998). *Bivalves of Australia. Volume 2*. Backhuys Publishers, Leiden.
- Lamprell, K. and Whitehead, T. (1992). *Bivalves of Australia. Volume 1*. Crawford House Press, Bathurst.
- Mikkelsen, P.M. and Bieler, R. (2000). Marine bivalves of the Florida Keys: discovered biodiversity. In Harper, E.M., Taylor, J.D. and Crame, J.A. (eds), *The evolutionary biology of the Bivalvia*. Geological Society, London Special Publications, **177**: 367–387.
- Middelfart, P. (2002). Revision of the Australian Cuninae *sensu lato* (Bivalvia: Carditoidea: Condylorcardiidae). *Zootaxa* **112**: 1–124.
- Morgan, G.J. and Wells, F.E. (1991). Zoogeographic provinces of the Humbolt, Benguela and Leeuwin Current Systems. *Journal of the Royal Society of Western Australia* **74**: 59–69.
- Roy, K., Jablonski, D. and Valentine, J.W. (2001). Climate change, species range limits and body size in marine bivalves. *Ecology Letters* **4**: 366–370.
- Slack-Smith, S.M. (1990). The bivalves of Shark Bay, Western Australia. In Berry, P.F., Bradshaw, S.D. and Wilson, B.R. (eds), *Research in Shark Bay. Report of the France-Australe Bicentenary Expedition Committee*: 129–157. Western Australian Museum, Perth.
- Slack-Smith, S.M. and Bryce, C.W. (1996). Part 6 Molluscs. In Hutchins, J.B., Slack-Smith, S.M., Bryce, C.W., Morrison, S.M. and Hewitt, M.A. (eds), *Marine Biological Survey of the Muiron Islands and the eastern Shore of Exmouth Gulf*: 64–100. Western Australian Museum, Perth.
- Taylor, J.D. and Glover, E.A. (2002). *Lamellolucina*: a new genus of lucinid bivalve with four new species from the Indo-West Pacific. *Journal of Conchology* **37**: 317–336.
- Taylor, J.D. and Taylor, C.N. (1977). Latitudinal distribution of predatory gastropods on the eastern Atlantic shelf. *Journal of Biogeography* **4**: 73–81.
- Thomas, R.D.K. (1975). Functional morphology, ecology and evolutionary conservatism in the Glycymerididae (Bivalvia). *Palaeontology* **26**: 217–254.
- Valentine, J.W., Roy, K. and Jablonski, D. (2002). Carnivore/non-carnivore ratios in northeastern Pacific marine gastropods. *Marine Ecology Progress Series* **228**: 153–163.
- Wells, F.E. (1980). The distribution of shallow-water marine prosobranch gastropod molluscs along the coastline of Western Australia. *Veliger* **22**: 232–247.
- Wells, F.E. and Bryce, C.W. (1997). A preliminary checklist of the marine macromolluscs of the Houtman Abrolhos Islands, Western Australia. In Wells, F.E. (ed.), *The Marine Flora and Fauna of the Houtman Abrolhos Islands, Western Australia*: 363–383. Western Australian Museum, Perth.
- Wells, F.E., Slack-Smith, S.M. and Bryce, C.W. (1993). Molluscs. In Berry, P.F. (ed.), *A survey of the marine fauna and habitats of the Montebello Islands, August 1993*: 35–66. Western Australian Museum, Perth.
- Wells, F.E., Walker, D.I. and Jones, D.S. (eds) (2003). *Proceedings of the Eleventh International Marine Biological Workshop: The Marine Flora and Fauna of Dampier, Western Australia*. Western Australian Museum, Perth. 1–587 pp (2 volumes).
- Wilson, B. 1993–4. *Australian marine shells, volumes 1 and 2*. Odyssey Publishing, Kallaroo.

Table 1 List of molluscs dredged from stations around the Dampier Archipelago July 1999. Species indicated by "*" were collected as dead shells only.

BIVALVIA

Family Nuculidae

- Leionucula superba* (Hedley, 1902)
Leionucula cf. *cumingi* (Hinds, 1843) *

Family Nuculanidae

- Nuculana* (*Scaeolea*) *lectilis* (Hedley, 1915)

Family Arcidae

- Arca avellana* Lamarck, 1819
Arca navicularis Bruguière, 1798
Arca ventricosa Lamarck, 1819
Anadara hubbardi (Iredale, 1929)
Anadara sp. B ? *crebricostata* (Reeve, 1844) *
Barbatia sp. A ? *foliata* (Forskål, 1775)
Barbatia cf. *bistrigata* Dunker, 1866
Trisidos semitoria Lamarck, 1819
Acar plicata (Dillwyn, 1817)
Acar cf. *riculata* (Gmelin, 1791)

Family Cucullaeidae

- Cucullaea labiata* (Lightfoot, 1786)

Family Glycymerididae

- Glycymeris dampieriensis* Matsukuma, 1984 *
Tucetona angusticosta Lamprell and Whitehead, 1990
Tucetona auriflua (Reeve, 1843) *
Tucetona odhneri Iredale, 1939
Melaxinaea vitrea (Lamarck, 1819)

Family Limopsidae

- Limopsis multistriata* (Forskål, 1775)

Family Mytilidae

- Stavelia subdistorta* Récluz, 1852
Modiolus cf. *barbatus* (Linnaeus, 1758)
Modiolus philippinarum Hanley, 1843
Modiolatus elongatus (Swainson, 1821)
Septifer bilocularis (Linnaeus, 1758)
Musculus cf. *cumingianus* Reeve, 1857
Botula silicula Lamarck, 1853
Gregariella otteri (Iredale, 1939)
Lithophaga lima (Lamy, 1919)
Lithophaga malaccana (Reeve, 1858)
Lithophaga teres Philippi, 1846

Family Pteriidae

- Pteria cookei* Lamprell and Healy, 1997
Pteria falcata (Lamarck, 1819)
Pteria lata (Gray, 1845)
Pteria penguin (Röding, 1798)
Pteria sp.
Pinctada maxima (Jameson, 1901)
Electroma spadicea (Dunker, 1852)
Pterelectroma physoides (Lamarck, 1819)

Family Malleidae

- Malleus albus* Lamarck, 1819
Malvufundus regula (Forskål, 1775)
Vulsella vulsella (Linnaeus, 1758)

Family Isognomonidae

- Isognomon legumen* (Gmelin, 1790)

Family Pinnidae

- Pinna deltooides* Menke, 1843 *
Atrina pectinata (Linnaeus, 1767)
Pinna sp. juveniles

Family Pectinidae

- Amusium pleuronectes* (Linnaeus, 1758)
Pecten cf. *excavatus* Anton, 1839 *
Annachlamys flabellata (Lamarck, 1819)
Excellichlamys histrionica (Gmelin, 1791)
Decatopecten strangei (Reeve, 1852)
Complicachlamys dringi (Reeve, 1853)
Mimachlamys "scabricostata" (Sowerby, 1915) species group
Cryptopecten nux (Reeve, 1853)
Hemipecten forbesianus Adams and Reeve, 1849

Family Spondylidae

- Spondylus albibarbatus* Sowerby, 1847
Spondylus eastae Lamprell, 1992
Spondylus victoriae Sowerby, 1843 *
Spondylus wrightianus Crosse, 1869
Spondylus sp. A *
Spondylus sp. B *
Spondylus sp. C *

Family Limidae

- Lima nimbifer* Iredale, 1924
Limatula ponderi Fleming, 1978 *
Limaria fragilis (Gmelin, 1791)
Limaria sp.
Ctenoides annulata (Lamarck, 1819) *

Family Ostreidae

- Hyotissa hyotis* (Linnaeus, 1758)
Parahyotissa numisma (Lamarck, 1819) *
Dendrostrea folium (Linnaeus, 1758)
Planostrea ?pestigris (Hanley, 1846) juveniles
Alectryonella plicatula (Gmelin, 1791)

Family Plicatulidae

- Plicatula australis* Lamarck, 1819
Plicatula chinensis Mörch, 1853 *

Family Anomidae

- Monia* sp.

Family Placunidae

- Placuna* (*Ephippium*) *lobata* (Sowerby, 1871)

Family Trigoniidae

- Neotrigonia bednalli* (Verco, 1907)
Neotrigonia uniophora (Gray, 1847)

Family Lucinidae

- Lamellolucina pilbara* Taylor and Glover, 2002
Cardiolucina pisiformis (Thiele, 1930)
Callucina (*Pseudolucinisca*) *lacteola* (Tate, 1897) *
Anodontia bullula (Reeve, 1850) *
Anodontia sp.
Divaricella irpex (Smith, 1885) *

Family Ungulinidae

- Diplodonta sublateralis* (Smith, 1884) *

Diplodonta cf. *holosphaera* Melvill, 1899
Diplodonta sp. *

Family Galeommatidae

Scintilla cf. *aurantia* (Deshayes, 1835)
Scintilla spp
Galeomma sp.
Ephippodonta sp.

Family Lasaeidae

Lepton sp.
Kellia sp. *

Family Crassatellidae

Talabrica ziczac (Reeve, 1842)
Eucrassatella pulchra (Reeve, 1842)
Salaputium rhomboides (Smith, 1885)

Family Carditidae

Venericardia cf. *cardioides* (Reeve, 1843)
Cardita crassica Lamarck, 1819
Cardita cf. *incrassata* Sowerby, 1825
Cardita variegata Bruguière, 1792

Family Chamidae

Chama asperella Lamarck, 1819
Chama lazarus Linnaeus, 1758 *
Chama pacifica Broderip, 1834
Chama sp.

Family Cardiidae

Vepricardium multispinosum (Sowerby, 1838)
Nemocardium bechei (Reeve, 1840)
Ctenocardia fornicata (Sowerby, 1840)
Ctenocardia perornata (Iredale, 1929) *
Acrosterigma attenuatum (Sowerby, 1841) *
Acrosterigma biradiatum (Bruguière, 1789)
Acrosterigma dampierense Wilson and Stevenson, 1977
Acrosterigma rosemariensis Wilson and Stevenson, 1977
Vasticardium elongatum (Bruguière, 1789) *
Lunulicardia retusa (Linnaeus, 1767)
Lyrocardium lyratum (Sowerby, 1834) *
Fulvia aperta (Bruguière, 1798) *

Family Mactridae

Mactra incarnata Reeve, 1854
Lutraria australis (Reeve, 1854) *
Oxyperas triangularis (Lamarck, 1819) *

Family Trapeziidae

Coralliophaga coralliophaga (Gmelin, 1791)

Family Tellinidae

Arcopella cf. *isseli* (H. Adams, 1871)
Arcopaginula inflata (Gmelin, 1791)
Clathrotellina elegantissima (Smith, 1885)
Clathrotellina pretium (Salisbury, 1934)
Tellinella asperrima (Hanley, 1844)
Tellinella cf. *radians* (Deshayes, 1854) *
Tellinella verrucosa (Hanley, 1844)
Angulus emarginata (Sowerby, 1825) *
Tellinides ovalis (Sowerby, 1825)
Pinguitellina casta (Hanley, 1844)
Leporimetis spectabilis (Hanley, 1844) *
Macoma (Psammacoma) candida (Lamarck, 1818) *
Merisca piratica (Hedley, 1918) *

Family Semelidae

Semele casta A. Adams, 1853

Family Psammobiidae

Gari anomala (Deshayes, 1855)
Gari rasilis (Melvill and Standen, 1899) *
Gari pulcherrima (Deshayes, 1855) *
Gari maculosa (Lamarck, 1818)
Gari amethystus (Wood, 1815)

Family Solecurtidae

Solecurtus sulcatus (Dunker, 1861) *
Solecurtus sp. *
Azorinus minutus (Dunker, 1861) *

Family Solenidae

Ensiculus cultellus (Linnaeus, 1758)
Solen aureomaculatus Habe, 1964 *
Solen kajiyamai Habe, 1964 *
Solen sp. undescribed species

Family Veneridae

Antigona chemnitzii (Hanley, 1844)
Antigona lamellaris Schumacher, 1817
Globivenus embrithes (Melvill and Standen, 1899)
Sunetta contempta Smith, 1891
Placamen calophyllum (Philippi, 1836)
Placamen tiara (Dillwyn, 1817)
Dosinia deshayesii A. Adams, 1855
Dosinia histrio (Gmelin, 1790) *
Dosinia cf. *juvenilis* Gmelin 1791
Dosinia scalaris (Menke, 1843) *
Dosinia cf. *subalata* Smith, 1916
Callista cf. *roseotincta* (Smith, 1885)
Tawera laticostata (Ohdner, 1917)
Paphia gallus (Gmelin, 1791)
Paphia semirugata (Philippi, 1847)
Circe scripta (Linnaeus, 1758)
Pitar cf. *trevori* Lamprell and Whitehead, 1990
Pitar sp. A
Pitar sp. B *
Pitarina sp. C *
Pitar (Hyphantosoma) sp. juvenile *
Lioconcha fastigiata (Sowerby, 1851)
Tapes platyptycha Pilsbry, 1901
Callista (Costacallista) planatella (Lamarck, 1818)
Clementia papyracea (Gray, 1825) *
Irus irus (Linnaeus, 1758)

Family Corbulidae

Corbula crassa Reeve, 1843
Corbula macgillivrayi Smith, 1885
Corbula taheitensis Lamarck, 1818
Corbula tunicata Hinds, 1843

Family Pholadidae

Parapholas quadrizonata (Spengler, 1791)
Jouannetia cumingi (Sowerby, 1850)

Family Gastrochaenidae

Gastrochaena dentifera Dufo, 1840
Gastrochaena gigantea Deshayes, 1830
Spengleria plicatilis (Deshayes, 1855)
Cucurbitula cymbium (Spengler, 1783)

Family Hiatellidae

Hiatella australis (Lamarck, 1818)

Table 1 (cont.)

Family Sphenidae <i>Sphenia</i> cf. <i>rueppellii</i> A. Adams, 1851	Family Calyptraeidae <i>Cheilea equestris</i> (Linnaeus, 1758) * <i>Crepidula aculeata</i> (Gmelin, 1791)
Family Laternulidae <i>Laternula</i> cf. <i>anatina</i> (Linnaeus, 1758)	Family Capulidae <i>Capulus danieli</i> (Crosse, 1858) *
Family Myochamidae <i>Myadora pavimenta</i> Hedley, 1912	Family Hipponicidae <i>Hipponix</i> sp.
Family Cleidothaeridae <i>Cleidothaerus plicifera</i> (Ohdner, 1917)	Family Turritellidae <i>Archimediella fastigiata</i> (Adams and Reeve, 1848) <i>Haustator cingulifera</i> (Sowerby, 1825)
Family Clavagellidae <i>Brechites vaginiferus australis</i> (Chenu, 1843) * <i>Brechites philippinensis</i> (Chenu, 1843) *	Family Vanikoridae <i>Vanikoro cancellata</i> (Lamarck, 1822)
SCAPHOPODA <i>Laevidentalium longitrorsum</i> (Reeve, 1842) <i>Dentalium exmouthensis</i> Lamprell and Healy, 1998 <i>Dentalium</i> cf. <i>octangulatum</i> Donovan, 1803 <i>Dentalium</i> sp. *	Family Siliquariidae <i>Siliquaria ponderosa</i> (Mörch, 1860) <i>Siliquaria</i> sp. A* <i>Siliquaria</i> sp. B
GASTROPODA	Family Vermetidae <i>Vermetus</i> sp.
Family Fissurellidae <i>Diodora jukesii</i> (Reeve, 1850) <i>Diodora singaporensis</i> (Reeve, 1850) <i>Diodora ticaonica</i> (Reeve, 1850) <i>Emarginula incisura</i> (Adams, 1853) * <i>Scutus unguis</i> (Linnaeus, 1758) <i>Tugali cicatricosa</i> A. Adams, 1851	Family Strombidae <i>Strombus campbelli</i> Griffith and Pidgeon, 1834 <i>Strombus dilatatus</i> Swainson, 1821 <i>Strombus plicatus pulchellus</i> Reeve, 1851 <i>Strombus vittatus vittatus</i> Linnaeus, 1758 <i>Terebellum terebellum</i> (Linnaeus, 1758) <i>Rimella cancellata</i> (Lamarck, 1816)
Family Trochidae <i>Angaria delphinus</i> (Linnaeus, 1758) * <i>Calliostoma simile</i> (Reeve, 1863) * <i>Calliostoma (Astele) monile</i> (Reeve, 1863) <i>Calthalotia</i> sp. <i>Calthalotia mundula</i> (Adams and Angas, 1864) <i>Clanculus bicarinatus</i> Angas, 1880 <i>Clanculus comarilis</i> (Hedley 1912) <i>Euchelus</i> sp. <i>Herpetopoma atrata</i> (Gmelin, 1791) <i>Herpetopoma instricta</i> (Gould, 1849) <i>Liotina crassibasis</i> Smith, 1880 <i>Liotina peronii</i> (Kiener, 1839) * <i>Microtis tuberculata</i> (Adams, 1850) * <i>Monilea callifera</i> (Lamarck, 1822) <i>Notogibbula</i> sp. <i>Stomatia phymotis</i> Helbling, 1779 <i>Talopena vernicosa</i> (Gould, 1861) * <i>Trochus histrio</i> Reeve, 1848 * <i>Trochus maculatus</i> Linnaeus, 1758 * <i>Trochus schlueteri</i> Sowerby, 1894 <i>Turcica maculata</i> (Brazier, 1877)	Family Xenophoridae <i>Xenophora indica</i> (Gmelin, 1791) <i>Xenophora cerea</i> (Reeve, 1845) <i>Xenophora solarioides</i> (Reeve, 1845)
Family Turbinidae <i>Astrarium stellare</i> (Gmelin, 1791) <i>Turbo haynesi</i> Preston, 1914	Family Ovulidae <i>Hiatovolva depressa</i> (Sowerby, 1875) <i>Primovulva striatula</i> (Sowerby, 1828) <i>Diminovula</i> cf. <i>alabaster</i> (Reeve, 1865) <i>Prionovula cavanaghi</i> (Iredale, 1931) <i>Phenacovolva tokioi</i> Cate, 1973 * <i>Phenacovolva haynesi</i> (Sowerby, 1889) <i>Phenacovolva philippinarum</i> (Sowerby, 1848) <i>Volva volva</i> (Linnaeus, 1758) *
Family Cerithiidae <i>Cerithium novaehollandiae</i> (Adams and Sowerby, 1855) <i>Cerithium torresi</i> Smith, 1844 <i>Rhinoclavis articulata</i> (Adams and Reeve, 1850) <i>Rhinoclavis kochi</i> (Philippi, 1848)	Family Cypraeidae <i>Cypraea gracilis</i> Gaskoin, 1849 <i>Cypraea miliaris</i> Gmelin, 1791 <i>Cypraea subviridis</i> Reeve, 1835 <i>Cypraea teres</i> Gmelin, 1791
	Family Velutinidae <i>Lamellaria</i> sp.
	Family Eulimidae <i>Melanella martinii</i> (A. Adams, 1854) <i>Thyca stellasteris</i> Koehler and Vainey, 1912
	Family Epitoniidae <i>Cirsotrema kieneri</i> (Tapparone-Canefri, 1876) * <i>Cirsotrema bavayi</i> (de Boury, 1912) <i>Epitonium</i> cf. <i>pallasi</i> Kiener, 1838

Family Naticidae

- Natica collei* Récluz, 1844
Natica euzona Récluz, 1844 *
Natica simplex Schepman, 1909
Natica vitellus (Linnaeus, 1758)
Natica sp.
Eunaticina papilla (Gmelin, 1791)
Polinices powisiana (Récluz, 1844)
Polinices simiae (Deshayes, 1838) *
Sinum haliotoideum (Linnaeus, 1758)

Family Ranellidae

- Cymatium labiosum* (Wood, 1828)
Cymatium pfefferianum (Reeve, 1844) *
Cymatium vespaceum (Lamarck, 1822)
Cymatium sp.
Cymatium (Ranularia) cynocephalum (Lamarck, 1816) *
Cymatium (Monoplex) thersites (Reeve, 1844)
Gyrineum caudatum (Gmelin, 1791)
Gyrineum lacunatum (Mighels, 1845)
Biplex pulchellum (Sowerby, 1825)

Family Bursidae

- Bursa granularis* (Röding, 1798)
Bursa rana (Linnaeus, 1758)
Bufo naria margaritcola (Deshayes, 1832) *

Family Cassidae

- Phalium bandatum* (Perry, 1811)
Semicassis angasi (Iredale, 1927) *

Family Ficidae

- Ficus eopsila* (Peron, 1807) *
Ficus subintermedia (Orbigny, 1852)

Family Tonnidae

- Tonna variegata* (Lamarck, 1822) *
Tonna zonata (Green, 1830) *

Family Muricidae

- Chicoreus banksii* (Sowerby, 1841)
Chicoreus cervicornis (Lamarck, 1822)
Chicoreus cornucervi (Röding, 1798)
Hexaplex stainforthi (Reeve, 1842)
Haustellum multiplicatus (Sowerby, 1895)
Murex acanthostephes Watson, 1883
Murex brevispina macgillivrayi Dohrn, 1862
Murex pecten soelae Ponder and Vokes, 1988
Orania ficula (Reeve, 1848) *
Pterynotus pinnatus (Swainson, 1822) *
Pterynotus acanthopterus (Lamarck, 1816)
Pterynotus akation Vokes, 1993
Rapana rapiformis (Born, 1778)
Thais echinata (Blainville, 1832)
Cronia avellana (Reeve, 1846)
Cronia margaritcola (Broderip, 1833)
Morula spinosa (H. and A. Adams, 1853)

Family Coralliophilidae

- Coralliophila costularis* (Lamarck, 1816)

Family Nassariidae

- Cyllene sulcata* Sowerby, 1859
Nassarius albinus (Thiele, 1930) *
Nassarius algidus (Reeve, 1853)
Nassarius bicallosus (Smith, 1876)
Nassarius comptus (A. Adams, 1852)

- Nassarius conoidalis* (Deshayes, 1832)
Nassarius glans (Linnaeus, 1758)
Nassarius pauperus (Gould, 1850)
Nassarius sinusigerus (A. Adams, 1852)

Family Buccinidae

- Cantharus erythrostroma* (Reeve, 1846)
Colubraria sp.
Phos sculptilis Watson, 1886
Phos senticosus (Linnaeus, 1758)

Family Fasciolaridae

- Dolicholatirus* sp.
Fusinus colus (Linnaeus, 1758)
Latirus craticulatus (Linnaeus, 1758)
Latirus paetelianus (Kobelt, 1876)
Latirus sp.

Family Costellariidae

- Vexillum* cf. *coronatum* (Helbling, 1779) *
Vexillum modestum (Reeve, 1845) *
Vexillum cf. *obeliscus* (Reeve, 1844)
Vexillum unifasciatum (Wood, 1828) *
Vexillum vulpecula (Linnaeus, 1758) *
Vexillum sp.

Family Mitridae

- Mitra fraga* Quoy and Gaimard, 1833 *
Mitra gilbertsoni (J. Cate, 1968)
Mitra rosacea Reeve, 1845 *
Mitra variabilis Reeve, 1844
Cancilla praestantissima (Röding, 1798)
Neocancilla circula (Kiener, 1838) *
Neocancilla ?sp. *
Scabricola coriacea (Reeve, 1845)
Ziba flammea (Quoy and Gaimard, 1833)
Ziba interlirata (Reeve, 1844) *

Family Harpidae

- Harpa articularis* Lamarck, 1822 *
Harpa sp.

Family Olividae

- Ancillista cingulata* (Sowerby, 1830) *
Ancillista muscae (Pilsbry, 1926)
Ancillista velesiana Iredale, 1936 *
Oliva bretteinghami Bridgman, 1909
Oliva panniculata Duclos, 1835
Oliva sp.

Family Turbinellidae

- Syrinx aruanus* (Linnaeus, 1758)
Tudivasum inermis Angas, 1878

Family Volutidae

- Amoria dampieria* Weaver, 1960
Amoria ellioti (Sowerby, 1864) *
Amoria grayi Ludbrook, 1953
Amoria jamrachi Gray, 1864 *
Amoria praetexta (Reeve, 1849)
Cymbiola oblita (Smith, 1909)
Melo amphora (Lightfoot, 1786)
Volutoconus hargreavesi (Angas, 1872)

Family Cancellariidae

- Cancellaria melanostoma westralis* (Sowerby, 1849)
Cancellaria cf. *panamuna* Garrard, 1975

Table 1 (cont.)

<i>Trigonostoma amasia</i> (Iredale, 1930)	<i>Terebra marmorata</i> Deshayes, 1859
<i>Trigonostoma scalare</i> (Gmelin, 1791)	<i>Terebra nitida</i> Hinds, 1844
<i>Trigonostoma scalarina</i> (Lamarck, 1822)	<i>Terebra polygyrata</i> Deshayes, 1859
<i>Trigonostoma textilis</i> (Kiener, 1841)	<i>Terebra textilis</i> Hinds, 1844
	<i>Terebra walkeri</i> E. A. Smith, 1899
	<i>Terebra</i> sp.
Family Turridae	Family Pyramidellidae
<i>Gemmula dampieriana</i> Powell, 1964	<i>Pyramidella acus</i> (Gmelin, 1791)
<i>Lophiotoma acuta</i> (Perry, 1811)	
<i>Lophiotoma indica</i> (Röding, 1798)	Family Atyidae
<i>Lophiotoma</i> sp.	<i>Atya</i> sp. *
<i>Turris crispa</i> (Lamarck, 1816)	
<i>Xenuroturris millepunctata</i> (Sowerby, 1908)	Family Scaphanderidae
<i>Turricula granobalteatus</i> (Hedley, 1922)	<i>Cylichna</i> sp. *
<i>Tomopleura</i> cf. <i>cicatrigula</i> (Hedley, 1922)	
<i>Inquisitor</i> cf. <i>dampieri</i> (Hedley, 1922)	Family Hydatinidae
<i>Inquisitor</i> cf. <i>flindersianus</i> (Hedley, 1922)	<i>Hydatina albocincta</i> (van der Hoven, 1839) *
<i>Inquisitor formidabilis</i> (Hedley, 1922) *	
<i>Inquisitor intertincta</i> (Smith, 1877)	Family Pleurobranchidae
<i>Inquisitor spicata</i> (Hinds, 1843) *	<i>Pleurobranchus</i> sp.
<i>Funa</i> sp. A	<i>Euselelops</i> cf. <i>luniceps</i> (Cuvier, 1817)
<i>Funa</i> sp. B	
<i>Ptychobela crenularis</i> (Lamarck, 1816)	Family Dorididae
<i>Crassispira</i> sp.	<i>Discodoris</i> sp.
<i>Vexitomina</i> sp.	<i>Platyodoris</i> sp.
<i>Cerodrillia</i> sp.	<i>Trippa intecta</i> (Kelaart, 1858)
<i>Daphnella</i> cf. <i>subula</i> (Reeve, 1845)	
<i>Etrema</i> cf. <i>acricula</i> (Hedley, 1922)	Family Chromodorididae
<i>Eucithara</i> sp.	<i>Ceratosoma trilobatum</i> (Gray, 1827)
	<i>Chromodoris</i> sp.
Family Conidae	Family Arminidae
<i>Conus dampieriensis</i> Coomans and Filmer, 1985	<i>Armina</i> cf. <i>cygnea</i> (Bergh, 1876)
<i>Conus longurionis</i> Kiener, 1845 *	
<i>Conus reductaspiralis</i> Walls, 1979	
<i>Conus spectrum</i> Linnaeus, 1758 *	
<i>Conus suturatus</i> Reeve, 1844	
<i>Conus trigonus</i> Reeve, 1848	
Family Terebridae	POLYPLACOPHORA
<i>Duplicaria australis</i> (Smith, 1873) *	<i>Notoplax jaubertensis</i> (Ashby, 1924)
<i>Terebra bathyraphe</i> Smith, 1875	<i>Chiton (Rhyssoplax)</i> sp.
<i>Terebra commaculata</i> (Gmelin, 1791) *	<i>Callistoichiton</i> sp.
<i>Terebra cingulifera</i> Lamarck, 1822 *	
<i>Terebra exiguoides</i> Schepman, 1913	BRACHIOPODA
	<i>Discinisca</i> sp.

Table 2 Ranked abundance of the most common living molluscs (N = 4433).

Species	N	%
<i>Melaxinaea vitrea</i>	543	12.2
<i>Corbula tunicata</i>	261	5.9
<i>Corbula crassa</i>	256	5.8
<i>Herpetopoma atrata</i>	242	5.5
<i>Xenophora solarioides</i>	156	3.5
<i>Trisidos semitorta</i>	143	3.2
<i>Placamen calophyllum</i>	111	2.5
<i>Archimediella fastigiata</i>	99	2.2
<i>Strombus vittatus vittatus</i>	85	1.9
<i>Anadara hubbardi</i>	70	1.6
<i>Oliva bretteghami</i>	67	1.5
<i>Tucetona odhneri</i>	59	1.3
<i>Venericardia cardioides</i>	54	1.2
<i>Chicoreus cervicornis</i>	53	1.2
<i>Haustator cingulifera</i>	48	1.1
<i>Phos senticosus</i>	45	1.0
<i>Tudivasum inermis</i>	44	1.0
<i>Malleus albus</i>	44	1.0
<i>Strombus campbelli</i>	43	1.0
<i>Plicatula chinensis</i>	43	1.0
<i>Acar plicata</i>	39	0.9
<i>Gastrochaena gigantea</i>	39	0.9
<i>Lophiotoma indica</i>	37	0.8
<i>Lithophaga teres</i>	37	0.8
<i>Dendrostrea folium</i>	37	0.8

Table 3 Summary data and indicator species for the station groups from the Bray-Curtis analysis (Figure 4). Miscellaneous stations of Group A not included.

Group	B	C1	C2	C3	D	E	F	G
Number of stations	6	7	7	9	14	15	20	5
Number of species	69	72	44	78	161	81	167	25
Average similarity	22.68	19.63	24.4	27.10	23.00	14.3	24.50	17.96
Indicator Species	<i>Chama lazarus</i>	<i>Corbula tunicata</i>	<i>Tudivasum inermis</i>	<i>Corbula tunicata</i>	<i>Corbula tunicata</i>	<i>Xenophora solarioides</i>	<i>Melaxinaea vitrea</i>	<i>Placamen calophyllum</i>
	<i>Acar plicata</i>	<i>Cronia avellana</i>	<i>Corbula tunicata</i>	<i>Herpetoma atrata</i>	<i>Chicoreus cervicornis</i>	<i>Melaxinaea vitrea</i>	<i>Corbula crassa</i>	<i>Lophiotoma indica</i>
	<i>Hiatella australis</i>	<i>Gastrochaena gigantea</i>	<i>Xenophora solarioides</i>	<i>Xenophora solarioides</i>	<i>Conus dampieriensis</i>	<i>Natica vitellus</i>	<i>Placamen calophyllum</i>	<i>Haustator cingulifera</i>
	<i>Herpetoma atrata</i>	<i>Herpetoma atrata</i>	<i>Fusinus colus</i>	<i>Malleus albus</i>	<i>Phos senticosus</i>	<i>Limopsis multistriata</i>	<i>Trisidos semitorta</i>	<i>Herpetoma atrata</i>
	<i>Thais echinata</i>	<i>Lithophaga malaccana</i>	<i>Gemmula dampieriana</i>	<i>Placamen tiara</i>	<i>Venericardia cf cardioides</i>	<i>Malleus albus</i>	<i>Anadara hubbardi</i>	
	<i>Lima nimbifer</i>	<i>Malvufundus regula</i>	<i>Strombus plicatus pulchellus</i>	<i>Plicatula chinensis</i>	<i>Strombus campbelli</i>	<i>Leionucula superba</i>	<i>Circe scripta</i>	
	<i>Cronia avellana</i>	<i>Mimachlamys "scabricostata"</i>	<i>Turricula granobalteatus</i>	<i>Ancillista muscae</i>	<i>Tudivasum inermis</i>	<i>Plicatula chinensis</i>	<i>Oliva bretteghami</i>	
	<i>Pteria lata</i>	<i>Strombus campbelli</i>	<i>Leionucula superba</i>	<i>Strombus campbelli</i>	<i>Tucetona odhneri</i>	<i>Clathrotellina elegantissima</i>	<i>Chicoreus cervicornis</i>	
	<i>Mimachlamys "scabricostata"</i>	<i>Limaria fragilis</i>	<i>Distorsio reticulata</i>	<i>Tucetona angusticosta</i>	<i>Herpetoma atrata</i>	<i>Pteria cookei</i>	<i>Nassarius comptus</i>	
	<i>Scutus unguis</i>	<i>Acar plicata</i>	<i>Xenophora cerea</i>	<i>Dosinia deshaysii</i>	<i>Cantharus erythrostoma</i>	<i>Phos senticosus</i>	<i>Turricula granobalteus</i>	

Species	Stations																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
<i>Scutus unguis</i>																																
<i>Diodora jukesii</i>																																
<i>Diodora singaporensis</i>																																
<i>Diodora ticaonica</i>								1																								
<i>Tugali cicatricosa</i>																																
<i>Trochus schlueteri</i>																																
<i>Notogibbula</i> sp.																																
<i>Calthalotia mundula</i>																								1								
<i>Calthalotia</i> sp.									1																							
<i>Stomatia phymotis</i>																																
<i>Calliostoma monile</i>																																
<i>Clanculus bicarinatus</i>										1																						
<i>Clanculus comarilis</i>																																
<i>Turcica maculata</i>							2																									
<i>Euchelus</i> sp.																																
<i>Herpetopoma instricta</i>									1																							
<i>Monilea callifera</i>																																
<i>Herpetoma atrata</i>											2	18		1					2					1	1	3					3	
<i>Turbo haynesi</i>																																
<i>Astraliium stellare</i>																																
<i>Cerithium novaehollandiae</i>																																
<i>Cerithium torresi</i>															8	2																
<i>Rhinoclavis articulata</i>																									1							
<i>Rhinoclavis kochi</i>																																
<i>Haustator cingulifera</i>																											5					
<i>Archimediella fastigiata</i>				1						1		1																				
<i>Strombus vittatus vittatus</i>																																
<i>Strombus campbelli</i>						2	1		1																							
<i>Strombus dilatatus</i>									1																							
<i>Strombus plicatus pulchellus</i>							1	1																								
<i>Rimella cancellata</i>																																
<i>Terebellum terebellum</i>																								1								
<i>Crepidula aculeata</i>																																
<i>Hipponix</i> sp.																																
<i>Siliquaria</i> sp.																																
<i>Vanikoro cancellata</i>													1																			
<i>Xenophora indica</i>																								1		1						
<i>Xenophora cerea</i>				2			1																	1								
<i>Xenophora solaroides</i>		4				2						1										11	2	27	2	1		3	5		1	
<i>Cypraea subviridis</i>												1					1															

<i>Cypraea miliaris</i>																				
<i>Cypraea teres</i>									2											1
<i>Cypraea gracilis</i>																				1
<i>Phenacovolva haynesi</i>									1											
<i>Hiatovolva depressa</i>																				
<i>Phenacovolva philippinarum</i>																				
<i>Prionovula cavanaghi</i>																				
<i>Diminovula ?alabaster</i>																				
<i>Primovula striatula</i>																				
<i>Lamellaria</i> sp.							1													
<i>Polinices powisiana</i>																				1
<i>Natica simplex</i>																				1
<i>Natica vitellus</i>			1	2	1															1
<i>Natica collei</i>																				
<i>Eunaticina papilla</i>																				
<i>Sinum hatiotoides</i>					1															
<i>Bursa granularis</i>						1														2
<i>Bursa rana</i>														11					2	2
<i>Cymatium vespaceum</i>		1																		
<i>Gyrineum lacunatum</i>		1																		1
<i>Cymatium labiosum</i>							1	1												1
<i>Cymatium</i> sp.																				
<i>Biplex pulchellum</i>																				
<i>Ficus subintermedia</i>										1										
<i>Distorsio reticulata</i>						1				2										1
<i>Phalium bandatum</i>																				2
<i>Epitonium pallasii</i>																				
<i>Cirsotrema bavayi</i>																				
<i>Thyca stellasteris</i>																				2
<i>Melanella martinii</i>								1												
<i>Murex brevispina macgillivrayi</i>																				2
<i>Murex pecten soelae</i>																				3
<i>Haustellum multiplicatus</i>																				1
<i>Murex acanthostephes</i>																				1
<i>Chicoreus banksii</i>																				
<i>Chicoreus cervicornis</i>																				1
<i>Chicoreus cornucervi</i>																				
<i>Rapana rapiformis</i>																				1
<i>Pterynotus acanthopterus</i>																				
<i>Pterynotus akation</i>																				
<i>Hexaplex stainforthi</i>																				
<i>Thais echinata</i>										1		1								
<i>Cronia avellana</i>										2										1
<i>Cronia margaritcola</i>																				2
<i>Morula spinosa</i>																				

Species	Stations																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
<i>Coralliophila costularis</i>																																	
<i>Phos sculptilis</i>				1																													
<i>Colubraria</i> sp.				2																													
<i>Cantharus erythrostoma</i>						1	1			2								1															
<i>Phos senticosus</i>	2			2		2	3																2							6			
<i>Tudivasum inermis</i>					1	1		1		1						2							5	1					1	1			
<i>Syrinx aruanus</i>					1																												
<i>Fusinus colus</i>				1	1						1	1										1		1									
<i>Latirus paetelianus</i>																																	
<i>Latirus</i> sp.																																	
<i>Dolicholatirus</i> sp.																																	
<i>Nassarius algidus</i>																																	
<i>Nassarius bicallosus</i>																																	
<i>Nassarius comptus</i>																1												1					
<i>Nassarius conoidalis</i>																																	
<i>Nassarius glans</i>																																	
<i>Nassarius pauperus</i>																15		5															
<i>Nassarius sinusigerus</i>																20		15															
<i>Cyllene sulcata</i>																								1									
<i>Amoria dampieria</i>						2																					1					2	
<i>Amoria grayi</i>																																	
<i>Amoria praetexta</i>				1																													
<i>Cymbiola oblita</i>	1						1																										
<i>Volutoconus hargreavesi</i>				1																													
<i>Melo amphora</i>																																	
<i>Ancillista muscae</i>												3											1			3							
<i>Oliva bretteinghami</i>																		16															
<i>Oliva panniculata</i>																																	
<i>Mitra gilbertsoni</i>																																	
<i>Mitra variabilis</i>																																	
<i>Cancilla praestantissima</i>																																	
<i>Scabricola coriacea</i>																																	
<i>Ziba flammea</i>																																	
<i>Harpa</i> sp.																							1										
<i>Vexillum</i> cf. <i>obeliscus</i>							1					1										1								2			
<i>Vexillum</i> sp.																																	
<i>Trigonostoma amasia</i>																																	
<i>Trigonostoma scalare</i>																																	
<i>Trigonostoma scalarina</i>	1																																
<i>Trigonostoma textilis</i>																																	1

<i>Cancellaria melanostoma westralis</i>																													
<i>Cancellaria panamuna</i>					1																								
<i>Conus dampieriensis</i>						1	1							1			1				1								
<i>Conus trigonus</i>																													
<i>Conus suturatus</i>							1	1														1							
<i>Terebra bathyraphe</i>														7															
<i>Terebra exiguoides</i>																													
<i>Terebra marmorata</i>																								1					
<i>Terebra nitida</i>																													
<i>Terebra textilis</i>							1																						
<i>Lophiotoma acuta</i>											1		1																
<i>Lophiotoma indica</i>												5	2		1					2		2							
<i>Lophiotoma sp.</i>																													
<i>Turris crispa</i>																													
<i>Gemmula dampieriana</i>																					2								
<i>Xenuroturrus millepunctata</i>																													
<i>Turricula granobalteatus</i>				1									8							1			3	1					
<i>Ptychobela suturalis</i>																													
<i>Ptychobela crenularis</i>																													
<i>Funa sp. A</i>																													
<i>Funa sp. B</i>						1																							
<i>Inquisitor cf. damperius</i>																								1					
<i>Inquisitor cf. flindersiana</i>																													
<i>Inquisitor cf. intertinctoria</i>																								1					
<i>Cerodrillia sp.</i>																													
<i>Etrema cf. acricula</i>																													
<i>Daphnella cf. subula</i>																													
<i>Eucithara sp.</i>																													
<i>Pyramidella acus</i>																								1					
<i>Cylichna sp.</i>																													
<i>Euselenops cf. luniceps</i>																								1					
<i>Pleurobranchus sp.</i>																													
<i>Hexabranhus sanguineus</i>																													
<i>Ceratosoma trilobatum</i>																													
<i>Armina cygnea</i>																													
<i>Trippa intecta</i>																													
<i>Chromodoris sp.</i>																													
<i>Discodoris sp.</i>																													
<i>Platydoris sp.</i>																													
Total gastropods	6	1	8	15	5	15	23	13	5	13	1	11	26	14	57	7	43	1	15	13	14	49	7	10	11	5	21	7	10

Species	Stations																																
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	65	66		
<i>Scutus unguis</i>							1									1																	
<i>Diodora jukesii</i>																																	
<i>Diodora singaporensis</i>																										1							
<i>Diodora ticaonica</i>																						1			1								
<i>Tugali cicatricosa</i>																																	
<i>Trochus schlueteri</i>																																	
<i>Notogibbula</i> sp.																							1										
<i>Calthalotia mundula</i>											1														1								
<i>Calthalotia</i> sp.																										1							
<i>Stomatia phymotis</i>																																	
<i>Calliostoma monile</i>								1			1																						
<i>Clanculus bicarinatus</i>																																	
<i>Clanculus comarilis</i>	1																																
<i>Turcica maculata</i>																																	
<i>Euchelus</i> sp.																																	
<i>Herpetopoma instricta</i>																																	
<i>Monilea callifera</i>												1													1								
<i>Herpetoma atrata</i>	1		3		3	2	2		16	1				7	6				1		1		1	1	5					1	2		
<i>Turbo haynesi</i>								3																					3				
<i>Astrarium stellare</i>																																	
<i>Cerithium novaehollandiae</i>																																	
<i>Cerithium torresi</i>		4				16	1																						2				
<i>Rhinoclavis articulata</i>																																	
<i>Rhinoclavis kochi</i>																																	
<i>Haustator cingulifera</i>																			7	8	26												
<i>Archimediella fastigiata</i>	1	25		11		47																1	2			2	5						
<i>Strombus vittatus vittatus</i>												2							2		2												
<i>Strombus campbelli</i>	1				1		5		1					3	1									1				2		2	2		
<i>Strombus dilatatus</i>																																	
<i>Strombus plicatus pulchellus</i>	1																					1		2	1								
<i>Rimella cancellata</i>										2															1								1
<i>Terebellum terebellum</i>		1																					3		1								
<i>Crepidula aculeata</i>						3																											
<i>Hipponix</i> sp.																																	
<i>Siliquaria</i> sp.																																	
<i>Vanikoro cancellata</i>																											1						
<i>Xenophora indica</i>	4																1				1	3	2										
<i>Xenophora cerea</i>									1				1	1								1	5	2	1	2							
<i>Xenophora solaroides</i>													8	1			4					2	15	33	27	1		1				1	
<i>Cypraea subviridis</i>						3	1									1															3		

<i>Cypraea miliaris</i>					1										1	
<i>Cypraea teres</i>																
<i>Cypraea gracilis</i>																
<i>Phenacovolva haynesi</i>															1	
<i>Hiatovolva depressa</i>																
<i>Phenacovolva philippinarum</i>																
<i>Prionovula cavanaghi</i>																
<i>Diminovula ?alabaster</i>																
<i>Primovula striatula</i>																
<i>Lamellaria</i> sp.																2
<i>Polinices powisiana</i>																1
<i>Natica simplex</i>						1										
<i>Natica vitellus</i>								1			1			2		2
<i>Natica collei</i>																1
<i>Eunaticina papilla</i>																
<i>Sinum hatiotoideum</i>																1
<i>Bursa granularis</i>																
<i>Bursa rana</i>																2
<i>Cymatium vespaceum</i>																1
<i>Gyrineum lacunatum</i>																3
<i>Cymatium labiosum</i>																1
<i>Cymatium</i> sp.																1
<i>Biplex pulchellum</i>																1
<i>Ficus subintermedia</i>																1
<i>Distorsio reticulata</i>																1
<i>Phalium bandatum</i>																2
<i>Epitonium pallasi</i>																
<i>Cirsotrema bavayi</i>																
<i>Thyca stellasteris</i>																2
<i>Melanella martinii</i>																1
<i>Murex brevispina macgillivrayi</i>	1	1		1	3											5
<i>Murex pecten soelae</i>	1	1	2													1
<i>Haustellum multiplicatus</i>	2			1												1
<i>Murex acanthostephes</i>																1
<i>Chicoreus banksii</i>																1
<i>Chicoreus cervicornis</i>	2	2		6	1	1	1									2
<i>Chicoreus cornucervi</i>																1
<i>Rapana rapiformis</i>																
<i>Pterynotus acanthopterus</i>																1
<i>Pterynotus akation</i>																
<i>Hexaplex stainforthi</i>																
<i>Thais echinata</i>																1
<i>Cronia avellana</i>																2
<i>Cronia margaritcola</i>																3
<i>Morula spinosa</i>																1

Species	Stations																																		
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	65	66				
<i>Coralliophila costularis</i>																																			
<i>Phos sculptilis</i>																					1														
<i>Colubraria</i> sp.																																			
<i>Cantharus erythrostoma</i>	1														1													1			3				
<i>Phos senticosus</i>	4		1						1	1										4				3	1										
<i>Tudivasum inermis</i>	1										2				2					2	2			7	3										
<i>Syrinx aruanus</i>																1	1							1										1	
<i>Fusinus colus</i>							1																1	1										1	
<i>Latirus paetelianus</i>																1																			
<i>Latirus</i> sp.																																			
<i>Dolicholatirus</i> sp.																													1						
<i>Nassarius algidus</i>						1	1																												
<i>Nassarius bicallosus</i>							1																												
<i>Nassarius comptus</i>			1		3		1																			2						2			
<i>Nassarius conoidalis</i>												1				1																			
<i>Nassarius glans</i>																																			
<i>Nassarius pauperus</i>																																	3		
<i>Nassarius sinusigerus</i>																																			
<i>Cyllene sulcata</i>																																			
<i>Amoria dampieria</i>																											1								
<i>Amoria grayi</i>																																			
<i>Amoria praetexta</i>																							1												
<i>Cymbiola oblita</i>																												1	1				1		
<i>Volutoconus hargreavesi</i>																																			
<i>Melo amphora</i>									1																										
<i>Ancillista muscae</i>																				1		1	1	1		3									
<i>Oliva brettinghami</i>			3	2			2										1			1											2		6		
<i>Oliva panniculata</i>																																			
<i>Mitra gilbertsoni</i>	1																																		
<i>Mitra variabilis</i>																																		1	
<i>Cancilla praestantissima</i>																				2			3												
<i>Scabricola coriacea</i>							1																												
<i>Ziba flammea</i>																							2										1		
<i>Harpa</i> sp.																																			
<i>Vexillum</i> cf. <i>obeliscus</i>			12																													2			
<i>Vexillum</i> sp.							1																												
<i>Trigonostoma amasia</i>																																			
<i>Trigonostoma scalare</i>																																			
<i>Trigonostoma scalarina</i>																																			1
<i>Trigonostoma textilis</i>																																			
<i>Cancellaria melanostoma westralis</i>							1						5	2									1												

Species	Stations																																		
	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	98	99	100		
<i>Scutus unguis</i>																																		1	
<i>Diodora jukesii</i>													1				1																		
<i>Diodora singaporensis</i>																																		1	
<i>Diodora ticaonica</i>																																			
<i>Tugali cicatricosa</i>										1																									
<i>Trochus schlueteri</i>						18	1			3																									
<i>Notogibbula</i> sp.																																			
<i>Calthalotia mundula</i>						2	5																												
<i>Calthalotia</i> sp.																																		1	
<i>Stomatia phymotis</i>										1																									
<i>Calliostoma monile</i>					1																														
<i>Clanculus bicarinatus</i>																																			
<i>Clanculus comarilis</i>																																			
<i>Turcica maculata</i>																							1				1								
<i>Euchelus</i> sp.																																		1	
<i>Herpetopoma instricta</i>																																			
<i>Monilea callifera</i>																1							1												
<i>Herpetoma atrata</i>				1	11	2	86	6	1	2		3					2								38					5		1			
<i>Turbo haynesi</i>										1																									
<i>Astraliium stellare</i>						2				1																									
<i>Cerithium novaehollandiae</i>																								1											
<i>Cerithium torresi</i>																																			
<i>Rhinoclavis articulata</i>												2																							
<i>Rhinoclavis kochi</i>								2		2																									
<i>Haustator cingulifera</i>																							2												
<i>Archimediella fastigiata</i>																																			
<i>Strombus vittatus vittatus</i>							18																											39	1
<i>Strombus campbelli</i>	3			1	2	3	4	1		1		1														21									
<i>Strombus dilatatus</i>																										3									
<i>Strombus plicatus pulchellus</i>													4		1																				
<i>Rimella cancellata</i>	1																																		
<i>Terebellum terebellum</i>							1																												
<i>Crepidula aculeata</i>																													1				2		
<i>Hipponix</i> sp.											4																								
<i>Siliquaria</i> sp.			5													5																			
<i>Vanikoro cancellata</i>																																			
<i>Xenophora indica</i>																							1												
<i>Xenophora cerea</i>													2											1		2									
<i>Xenophora solaroides</i>												1	2	1																					
<i>Cypraea subviridis</i>				1	1	1																													
<i>Cypraea miliaris</i>																																			1

<i>Cypraea teres</i>														
<i>Cypraea gracilis</i>														
<i>Phenacovolva haynesi</i>														
<i>Hiatovolva depressa</i>			1					1						
<i>Phenacovolva philippinarum</i>	1													
<i>Prionovula cavanaghi</i>			1											
<i>Diminovula ?alabaster</i>								1						
<i>Primovula striatula</i>											1			
<i>Lamellaria sp.</i>														
<i>Polinices powisiana</i>		1			1									
<i>Natica simplex</i>									1					
<i>Natica vitellus</i>														
<i>Natica collei</i>			1											
<i>Eunaticina papilla</i>											1			
<i>Sinum hatiotoideum</i>														
<i>Bursa granulatis</i>														
<i>Bursa rana</i>									1					
<i>Cymatium vespaceum</i>											1			
<i>Gyrineum lacunatum</i>					1	3								
<i>Cymatium labiosum</i>														
<i>Cymatium sp.</i>														
<i>Biplex pulchellum</i>														
<i>Ficus subintermedia</i>										1				
<i>Distorsio reticulata</i>										1				
<i>Phalium bandatum</i>														
<i>Epitonium pallasii</i>	1													
<i>Cirsotrema bavayi</i>		1			1									
<i>Thyca stellasteris</i>							2			2				
<i>Melanella martinii</i>		17	1											2
<i>Murex brevispina macgillivrayi</i>														
<i>Murex pecten soelae</i>	1		1									1		
<i>Haustellum multiplicatus</i>				1	1					2				
<i>Murex acanthostephes</i>					1									
<i>Chicoreus banksii</i>													1	
<i>Chicoreus cervicornis</i>		2		3	4	2		1	1	1		3	1	
<i>Chicoreus cornucervi</i>					1									
<i>Rapana rapiformis</i>														
<i>Pterynotus acanthopterus</i>				1	1		4					1		1
<i>Pterynotus akation</i>										1				
<i>Hexaplex stainforthi</i>												1		
<i>Thais echinata</i>	1					2	1							1
<i>Cronia avellana</i>			1		3	1	9		1				1	1
<i>Cronia margaritcola</i>														
<i>Morula spinosa</i>												1		
<i>Coralliophila costularis</i>														1

Species	Stations																																		
	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	98	99	100		
<i>Phos sculptilis</i>																						1											1		
<i>Colubraria</i> sp.																																			
<i>Cantharus erythrostoma</i>							4		1																		2								
<i>Phos senticosus</i>							5						2								4	1											1		
<i>Tudivasum inermis</i>												3		1					1			3	1	1	1										
<i>Syrinx aruanus</i>		1				1																													
<i>Fusinus colus</i>		1	1	2		1				1			2		1									1										1	
<i>Latirus paetelianus</i>							1		1																										
<i>Latirus</i> sp.																							1												
<i>Dolicholatirus</i> sp.																																			
<i>Nassarius algidus</i>		2																																	
<i>Nassarius bicallosus</i>																																			
<i>Nassarius comptus</i>																										1	1							1	
<i>Nassarius conoidalis</i>													1																						
<i>Nassarius glans</i>																							1	1											
<i>Nassarius pauperus</i>		2																								1									
<i>Nassarius sinusigerus</i>		7																																	
<i>Cyllene sulcata</i>																																			
<i>Amoria dampieria</i>																																			
<i>Amoria grayi</i>																							1												
<i>Amoria praetexta</i>																																			
<i>Cymbiola oblita</i>																																			1
<i>Volutoconus hargreavesi</i>																																			
<i>Melo amphora</i>																																			
<i>Ancillista muscae</i>									1							1								1											1
<i>Oliva brettinghami</i>		5				3	9																												
<i>Oliva panniculata</i>																																			
<i>Mitra gilbertsoni</i>																																			
<i>Mitra variabilis</i>																								1											
<i>Cancilla praestantissima</i>																							1												
<i>Scabricola coriacea</i>																																			
<i>Ziba flammea</i>													1									1													
<i>Harpa</i> sp.																																			
<i>Vexillum</i> cf. <i>obeliscus</i>												1																							
<i>Vexillum</i> sp.																																			
<i>Trigonostoma amasia</i>			1																																
<i>Trigonostoma scalare</i>							1																												
<i>Trigonostoma scalarina</i>		1					2																												
<i>Trigonostoma textilis</i>							1					1																							
<i>Cancellaria melanostoma westralis</i>												1																							

Bivalvia	Stations																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
<i>Leionucula superba</i>				1																	1			1			2					
<i>Arca avellana</i>																																
<i>Arca navicularis</i>	1																															
<i>Arca ventricosa</i>																																
<i>Anadara hubbardi</i>																																
<i>Barbatia cf. foliata</i>	1	1		1																										1		
<i>Barbatia cf. bistrigata</i>																																
<i>Trisidos semitorta</i>																																
<i>Acar plicata</i>				8		10		10	10	9						2																
<i>Acar cf. riculata</i>																																
<i>Cucullaea labiata</i>																																
<i>Tucetona angusticosta</i>					1					1											1				4		1			1		
<i>Tucetona odhneri</i>																				1			1									
<i>Melaxinaea vitrea</i>		1	1													4	1						1		1						11	
<i>Limopsis multistriata</i>																						9			1							
<i>Stavelia subdistorta</i>																																
<i>Modiolus cf. barbatus</i>																																
<i>Modiolus philippinarum</i>																																
<i>Modiolatus elongatus</i>																																
<i>Septifer bilocularis</i>																																
<i>Musculus cf. cumingianus</i>																																
<i>Botula silicula</i>						1						1																		1		
<i>Gregariella otteri</i>				2		2		4	4																							
<i>Lithophaga lima</i>																																
<i>Lithophaga malaccana</i>										6		1	3			7																
<i>Lithophaga teres</i>						1		10				7				9																
<i>Pteria cookei</i>																												5			2	
<i>Pteria falcata</i>																																
<i>Pteria lata</i>				2								1																				
<i>Pteria penguin</i>												1	1																			
<i>Pteria sp.</i>																																
<i>Pinctada maxima</i>																																
<i>Electroma spadicea</i>																																
<i>Pterelectroma physoides</i>													10		5																	
<i>Malleus albus</i>				1		1						2												2		1	1					
<i>Malvufundus regula</i>									2							1																
<i>Vulsella vulsella</i>										1																						
<i>Isognomon legumen</i>																5																
<i>Atrina pectinata</i>																																
<i>Pinna sp.</i>	1																															
<i>Annachlamys flabellata</i>						1	1															2										

<i>Decatopecten strangei</i>																									
<i>Complicacchlamys dringi</i>																									
<i>Mimachlamys "scabricostata"</i>			1	2	1		2																		
<i>Cryptopecten nux</i>			1																						1
<i>Hemipecten forbesianus</i>			5																						
<i>Spondylus albibarbatus</i>																									
<i>Spondylus eastae</i>																									
<i>Spondylus wrightianus</i>						1								2					1			1			
<i>Spondylus</i> sp. B					1																				
<i>Lima nimbifer</i>		2				8			8																
<i>Limaria fragilis</i>					1																				
<i>Limaria</i> sp.																									
<i>Hyotissa hyotis</i>																									
<i>Dendrostrea folium</i>					1			1		9		6												15	
<i>Planostrea</i> cf. <i>pestigris</i>																									
<i>Plicatula australis</i>													1												
<i>Plicatula chinensis</i>		2	4										1					2	9	3	3	1			
<i>Monia</i> sp.																									
<i>Placuna lobata</i>																									
<i>Neotriconia bednalli</i>								1																	
<i>Neotriconia uniophora</i>																									
<i>Lamellolucina pilbara</i>												2													
<i>Cardiolucina pisiformis</i>												2													
<i>Diplodonta</i> cf. <i>holosphaera</i>					1																				
<i>Scintilla</i> cf. <i>aurantia</i>																									
<i>Scintilla</i> spp									1																
<i>Galeomma</i> sp.																									
<i>Ephippodonta</i> sp.								1																	
<i>Lepton</i> sp.																									
<i>Talabrica ziczac</i>	1		3																						
<i>Eucrassatella pulchra</i>					1			1																	
<i>Salaputium rhomboides</i>																									
<i>Venericardia cardioides</i>																								1	
<i>Cardita crassica</i>												1													
<i>Cardita incrassata</i>	1				1			2						1									2		
<i>Cardita variegata</i>																									
<i>Chama asperella</i>	2	1	7																						
<i>Chama lazarus</i>						1	3																		
<i>Chama pacifica</i>									1															1	
<i>Chama</i> sp.																									2
<i>Vepricardium multispinosum</i>										1															
<i>Nemocardium bechei</i>																			1						
<i>Ctenocardia fornicata</i>																									
<i>Acrosterigma biradiatum</i>																									
<i>Acrosterigma dampierense</i>																									
<i>Acrosterigma rosemariensis</i>																									

Bivalvia	Stations																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
<i>Lunulicardia retusa</i>																																1
<i>Mactra incarnata</i>																																
<i>Coralliophaga coralliophaga</i>						2						1																				
<i>Arcopella cf. isseli</i>																																
<i>Arcopaginula inflata</i>											1																					
<i>Clathrotellina elegantissima</i>			3													1											1					
<i>Clathrotellina pretium</i>																																
<i>Tellinella verrucosa</i>																														2		
<i>Tellinella asperrima</i>		1																														
<i>Tellinides ovalis</i>																																
<i>Pinguitellina casta</i>							2																									
<i>Semele casta</i>																									1	1						
<i>Gari amethystus</i>																																
<i>Gari anomala</i>																																
<i>Gari maculosa</i>																																
<i>Gari pulcherrima</i>																																
<i>Gari rasilis</i>									5																							
<i>Ensiculus cultellus</i>																																
<i>Solen sp.</i>																																
<i>Solen siphons</i>																																
<i>Antigona lamellaris</i>																															1	
<i>Sunetta contempta</i>																																
<i>Placamen calophyllum</i>														1	1		1		2							2						
<i>Placamen tiara</i>												2																				
<i>Dosinia deshayesii</i>																	1															
<i>Dosinia cf. juvenilis</i>																																
<i>Dosinia cf. subalata</i>																																
<i>Callista cf. roseotincta</i>																																
<i>Tawera laticostata</i>												1																				
<i>Paphia gallus</i>																																
<i>Paphia semirugata</i>																																
<i>Circe scripta</i>																									1							
<i>Pitar sp.</i>																																
<i>Pitar cf. trevori</i>		1																														
<i>Lioconcha fastigiata</i>																																
<i>Tapes platyptycha</i>																																
<i>Callista planatella</i>																																
<i>Irus irus</i>																																
<i>Corbula crassa</i>			1																													
<i>Corbula macgillivrayi</i>																10																

Bivalvia	Stations																																
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	65	66	67	
<i>Leionucula superba</i>					1		3									1					2											1	
<i>Arca avellana</i>																	1																
<i>Arca navicularis</i>																	1														1		
<i>Arca ventricosa</i>																																	
<i>Anadara hubbardi</i>			3	23		8	4						1								1		1			11				3	5	4	
<i>Barbatia cf. foliata</i>				1		2	1		2															1									
<i>Barbatia cf. bistrigata</i>																																	
<i>Trisidos semitorta</i>					1	21		4											1					1	1				502	209	1		
<i>Acar plicata</i>													1			1									1					7			
<i>Acar cf. riculata</i>	2																																
<i>Cucullaea labiata</i>				1																													
<i>Tucetona angusticosta</i>	1								2					1																			
<i>Tucetona odhneri</i>	1																																
<i>Melaxinaea vitrea</i>		27		163		131	7	3		1		1				2			1	1				3	31	6			4	1	38	200	
<i>Limopsis multistriata</i>									2					1	1			1		1	10												
<i>Stavelia subdistorta</i>					1																												
<i>Modiolus cf. barbatus</i>																																1	
<i>Modiolus philippinarum</i>						1																									2		
<i>Modiolatus elongatus</i>					1						1																1						
<i>Septifer bilocularis</i>										1																							
<i>Musculus cf. cumingianus</i>																															2	1	
<i>Botula silicula</i>																																	
<i>Gregariella otteri</i>																																	
<i>Lithophaga lima</i>																																	
<i>Lithophaga malaccana</i>							1	2								2										3							
<i>Lithophaga teres</i>	1																														1		
<i>Pteria cookei</i>													1					1															
<i>Pteria falcata</i>																2																	
<i>Pteria lata</i>																															1	5	
<i>Pteria penguin</i>																															1		
<i>Pteria sp.</i>																	1															1	
<i>Pinctada maxima</i>																																1	
<i>Electroma spadicea</i>																																	
<i>Pterelectroma physoides</i>												2																					
<i>Malleus albus</i>	1				30	13										1	1					2								1	2		
<i>Malvufundus regula</i>										1																						1	
<i>Vulsella vulsella</i>																															8		
<i>Isognomon legumen</i>																									1						1		
<i>Atrina pectinata</i>																																1	
<i>Pinna sp.</i>																								1								1	
<i>Annachlamys flabellata</i>																												1					1

<i>Decatopecten strangei</i>																			2	
<i>Complicachlamys dringi</i>																				1
<i>Mimachlamys "scabricostata"</i>			1	1						1										3
<i>Cryptopecten nux</i>			1																	
<i>Hemipecten forbesianus</i>																				
<i>Spondylus albibarbatus</i>																				1
<i>Spondylus eastae</i>																				
<i>Spondylus wrightianus</i>	1																		1	2
<i>Spondylus sp. B</i>																				
<i>Lima nimbifer</i>																				3
<i>Limaria fragilis</i>																				
<i>Limaria sp.</i>																				
<i>Hytissa hyotis</i>																			1	
<i>Dendrostrea folium</i>																				3
<i>Planostrea cf. pestigris</i>																				3
<i>Plicatula australis</i>																				
<i>Plicatula chinensis</i>	1	1																		
<i>Monia sp.</i>				1																
<i>Placuna lobata</i>																				2
<i>Neotrigonia bednalli</i>																				
<i>Neotrigonia uniophora</i>				1																1
<i>Lamellolucina pilbara</i>		1																		1
<i>Cardiolucina pisiformis</i>																				1
<i>Diplodonta cf. holosphaera</i>																				
<i>Scintilla cf. aurantia</i>																				2
<i>Scintilla spp</i>																				
<i>Galeomma sp.</i>																				2
<i>Ephippodonta sp.</i>																				
<i>Lepton sp.</i>																				1
<i>Talabrica ziczac</i>																				9
<i>Eucrassatella pulchra</i>																				1
<i>Salaputium rhomboides</i>																				1
<i>Venericardia cardioides</i>	4			2																1
<i>Cardita crassicosta</i>																				4
<i>Cardita incrassata</i>				2	2															3
<i>Cardita variegata</i>																				
<i>Chama asperella</i>																				1
<i>Chama lazarus</i>																				3
<i>Chama pacifica</i>																				1
<i>Chama sp.</i>																				1
<i>Vepricardium multispinosum</i>																				
<i>Nemocardium bechei</i>																				
<i>Ctenocardia fornicata</i>																				1
<i>Acrosterigma biradiatum</i>																				1
<i>Acrosterigma dampierense</i>																				1
<i>Acrosterigma rosemariensis</i>																				1

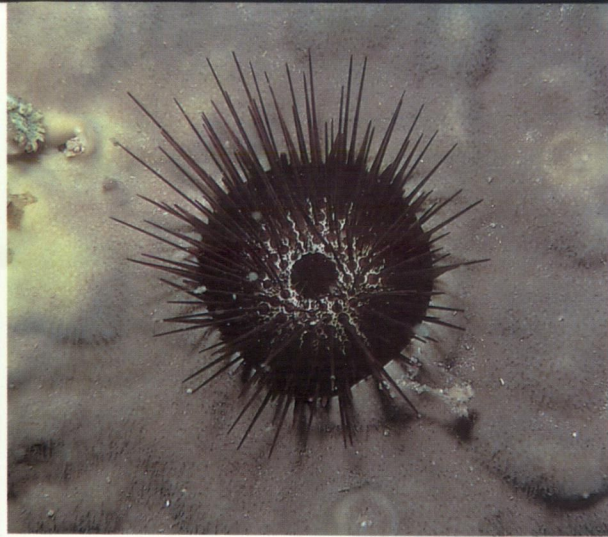
Bivalvia	Stations																																		
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	65	66	67			
<i>Lunulicardia retusa</i>									1																								1		
<i>Maetra incarnata</i>									1																										
<i>Coralliophaga coralliophaga</i>																																			
<i>Arcopella</i> cf. <i>isseli</i>	1																															1			
<i>Arcopaginula inflata</i>										1																									
<i>Clathrotellina elegantissima</i>						1						1														2						12			
<i>Clathrotellina pretium</i>																				1															
<i>Tellinella verrucosa</i>																																			
<i>Tellinella asperrima</i>								1												2	1														
<i>Tellinides ovalis</i>																				1															
<i>Pinguitellina casta</i>																																			
<i>Semele casta</i>	1									4										1													2		
<i>Gari amethystus</i>														1																					
<i>Gari anomala</i>					1			1																									2		
<i>Gari maculosa</i>	2																																		
<i>Gari pulcherrima</i>																																			
<i>Gari rasilis</i>															1																				
<i>Ensiculus cultellus</i>						1																													
<i>Solen</i> sp.																																			
<i>Solen siphons</i>																																	6	1	
<i>Antigona lamellaris</i>																				1							2						1		
<i>Sunetta contempta</i>									1					2																					
<i>Placamen calophyllum</i>		17	1	4		18	14																		16	16	4				2		6		
<i>Placamen tiara</i>									2					1																					
<i>Dosinia deshayesii</i>									1																										
<i>Dosinia</i> cf. <i>juvenilis</i>														1																					
<i>Dosinia</i> cf. <i>subalata</i>																																			
<i>Callista</i> cf. <i>roseotincta</i>	5																																		
<i>Tawera laticostata</i>															1																				
<i>Paphia gallus</i>				1																													5		
<i>Paphia semirugata</i>		1	2			1		1								1		1															1		
<i>Circe scripta</i>			1			3	2																1			1							5	1	
<i>Pitar</i> sp.														1																					
<i>Pitar</i> cf. <i>trevori</i>																																	1		
<i>Lioconcha fastigiata</i>	2													2																		2	1		
<i>Tapes platyptycha</i>																																			
<i>Callista planatella</i>										1																									
<i>Irus irus</i>																																			
<i>Corbula crassa</i>		35	15	29	2	45	26	1							2										7		1	1			9		54		
<i>Corbula macgillivrayi</i>																											1								

Bivalvia	Stations																																											
	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	98	99	100												
<i>Leionucula superba</i>																				1			3		1		1																	
<i>Arca avellana</i>										2								1						1																				
<i>Arca navicularis</i>					2	1	1		1																													1						
<i>Arca ventricosa</i>																	1																						1					
<i>Anadara hubbardi</i>	6	1																								2																		
<i>Barbatia cf. foliata</i>						2			1			1		1			1	4						3															1					
<i>Barbatia cf. bistrigata</i>					1																																							
<i>Trisidos semitorta</i>																								2	50	500	50										150							
<i>Acar plicata</i>					1				3									10																						2				
<i>Acar cf. riculata</i>																																												
<i>Cucullaea labiata</i>																																												
<i>Tucetona angusticosta</i>						1	1			1														1																				
<i>Tucetona odhneri</i>				2		3	45																	1																				
<i>Melaxinaea vitrea</i>	21	35	1						1							1					2	1																						
<i>Limopsis multistriata</i>																1										20	1	1										2	37					
<i>Stavelia subdistorta</i>				1																																								
<i>Modiolus cf. barbatus</i>																																												
<i>Modiolus philippinarum</i>																																												
<i>Modiolatus elongatus</i>			1																																									
<i>Septifer bilocularis</i>																																										1		
<i>Musculus cf. cumingianus</i>																																										1		
<i>Botula silicula</i>	1		2		1																																							
<i>Gregariella otteri</i>					7																																							
<i>Lithophaga lima</i>																	3							1																		6		
<i>Lithophaga malaccana</i>				3		5																																				3		
<i>Lithophaga teres</i>						8					1							1																								7		
<i>Pteria cookei</i>																																												
<i>Pteria falcata</i>																		1																										
<i>Pteria lata</i>	1								1							1																										1		
<i>Pteria penguin</i>									2																																			
<i>Pteria sp.</i>																																												
<i>Pinctada maxima</i>										1																																1		
<i>Electroma spadicea</i>																																										1		
<i>Pterelectroma physoides</i>																																												
<i>Malleus albus</i>				7				2								1																										1		
<i>Malvofundus regula</i>									1																																	4		
<i>Vulsella vulsella</i>																																										1		
<i>Isognomon legumen</i>											1							1																								1		
<i>Atrina pectinata</i>																											1																	
<i>Pinna sp.</i>																																											1	
<i>Annachlamys flabellata</i>			1				2	1																																				

<i>Decatopecten strangei</i>								1			1
<i>Complicachlamys dringi</i>											
<i>Mimachlamys "scabricostata"</i>							1				
<i>Cryptopecten nux</i>											
<i>Hemipecten forbesianus</i>		1									
<i>Spondylus albibarbatus</i>											
<i>Spondylus eastae</i>							2				
<i>Spondylus wrightianus</i>		1		1	2	1	1	1		2	1
<i>Spondylus</i> sp. B											
<i>Lima nimbifer</i>				1	5			2			
<i>Limaria fragilis</i>		1						1			1
<i>Limaria</i> sp.						2					
<i>Hytissa hyotis</i>								1			
<i>Dendrostrea folium</i>		1								1	
<i>Planostrea</i> cf. <i>pestigris</i>											
<i>Plicatula australis</i>											
<i>Plicatula chinensis</i>					2						1
<i>Monia</i> sp.											
<i>Placuna lobata</i>		1					1		3		
<i>Neotrigonia bednalli</i>						1					
<i>Neotrigonia uniophora</i>											1
<i>Lamellolucina pilbara</i>		1	1								
<i>Cardiolucina pisiformis</i>											
<i>Diplodonta</i> cf. <i>holosphaera</i>											
<i>Scintilla</i> cf. <i>aurantia</i>											
<i>Scintilla</i> spp					1	1	1				
<i>Galeomma</i> sp.											2
<i>Ephippodonta</i> sp.											
<i>Lepton</i> sp.											
<i>Talabrica ziczac</i>						4					
<i>Eucrassatella pulchra</i>											
<i>Salaputium rhomboides</i>											
<i>Venericardia cardioides</i>		4	4	24		1	1	2	1		
<i>Cardita crassica</i>				1						1	1
<i>Cardita incrassata</i>			1	4				1			
<i>Cardita variegata</i>								1			
<i>Chama asperella</i>		2		2						2	2
<i>Chama lazarus</i>		3				3					14
<i>Chama pacifica</i>			1	2	1			1			
<i>Chama</i> sp.		3		1	1					3	
<i>Vepricardium multispinosum</i>									1		
<i>Nemocardium bechei</i>											
<i>Ctenocardia fornicata</i>						1					
<i>Acrosterigma biradiatum</i>						1					
<i>Acrosterigma dampierense</i>										1	
<i>Acrosterigma rosemariensis</i>		1		1		1					

Bivalvia	Stations																																				
	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	98	99	100					
<i>Lunulicardia retusa</i>						1																	5														
<i>Mactra incarnata</i>							2																														
<i>Coralliophaga coralliophaga</i>																																					
<i>Arcopella cf. isseli</i>																									6	2			5								
<i>Arcopaginula inflata</i>				1																				1					2	1							
<i>Clathrotellina elegantissima</i>	1	6				1																							3								
<i>Clathrotellina pretium</i>																																					
<i>Tellinella verrucosa</i>																																					
<i>Tellinella asperrima</i>																																					
<i>Tellinides ovalis</i>																																					
<i>Pinguitellina casta</i>							1																							1							
<i>Semele casta</i>							4																														
<i>Gari amethystus</i>																																					
<i>Gari anomala</i>							1																														
<i>Gari maculosa</i>																																					
<i>Gari pulcherrima</i>																																					
<i>Gari rasilis</i>																																					
<i>Ensiculus cultellus</i>	1			1																																4	
<i>Solen sp.</i>																																					
<i>Solen siphons</i>							5																	1												2	
<i>Antigona lamellaris</i>												1																									
<i>Sunetta contempta</i>												1																									
<i>Placamen calophyllum</i>				1																																	
<i>Placamen tiara</i>	1																																				
<i>Dosinia deshayesii</i>							1	1																													
<i>Dosinia cf. juvenilis</i>																																					
<i>Dosinia cf. subalata</i>																																					
<i>Callista cf. roseotincta</i>																																					
<i>Tawera laticostata</i>																																					
<i>Paphia gallus</i>	1																																				
<i>Paphia semirugata</i>																																					
<i>Circe scripta</i>	1	1	1				1	1																													
<i>Pitar sp.</i>																																					
<i>Pitar cf. trevori</i>																																					
<i>Lioconcha fastigiata</i>				1																																	
<i>Tapes platyptycha</i>																																					
<i>Callista planatella</i>																																					
<i>Irus irus</i>																																					
<i>Corbula crassa</i>	3	12					1	1																													
<i>Corbula macgillivrayi</i>	2																																				

<i>Corbula taheitensis</i>																																							
<i>Corbula tunicata</i>	2				16	3									1	3	2																						
<i>Parapholas quadrizonata</i>									2																														
<i>Jouannetia cumingi</i>					9																																		
<i>Gastrochaena dentifera</i>																																						1	
<i>Gastrochaena gigantea</i>				4	16										1																						3		
<i>Spengleria plicatilis</i>																																							
<i>Cucurbitula cymbium</i>																																							
<i>Hiatella australis</i>																2	2																					4	
<i>Sphenia rueppellii</i>																																							
<i>Laternula cf. anatina</i>																																							
<i>Myadora pavimenta</i>																																						1	
<i>Cleidothaerus plicifera</i>	1																																				1		
<i>Brechites vaginiferus australis</i>																																					1		
Total bivalves	47	62	34	2	65	126	14	21	16	7	15	10	0	1	0	4	33	8	0	5	9	2	5	25	98	519	64	43	23	198	23	0							
Scaphopoda																																							
<i>Laevidentalium longitrorsum</i>																																							2
<i>Dentalium exmouthensis</i>																																							1
<i>Dentalium cf. octangulatum</i>																																							
Polyplacaphora																																							
<i>Rhyssoplax</i> sp.						1																																2	
<i>Notoplax jaubertensis</i>																																						2	
<i>Callistochiton</i> sp.																																						1	
Chitons unidentified																																						1	

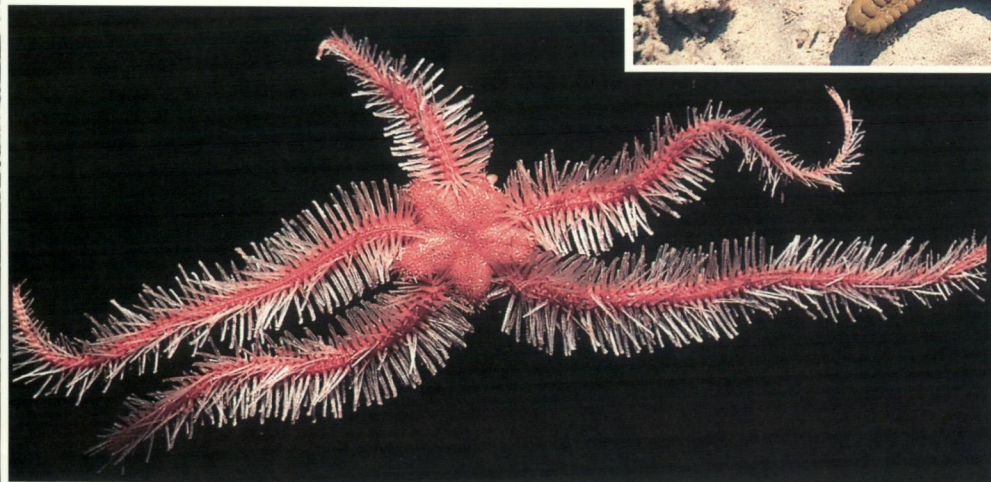


A rare seastar, *Echinaster superbis*, is known from few specimens taken between Barrow Island and the Kimberley. Photograph: Loisetete Marsh, WA Museum.

A rock or coral boring sea urchin, *Echinostrephus molaris*, feeds at its burrow entrance, trapping drift algae with its spines and long tube feet. Photograph: Barry Wilson, WA Museum.



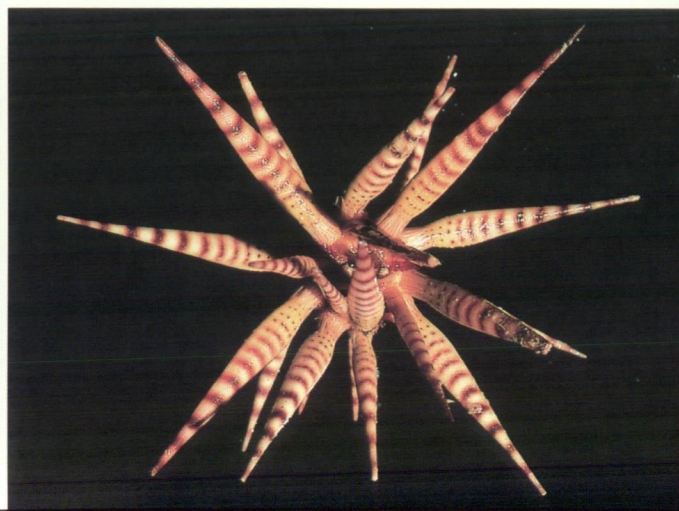
This oreasterid seastar, *Protoreaster nodulosus*, is only found in northwestern Australia where it is common in some areas. Photograph: Clay Bryce, WA Museum.

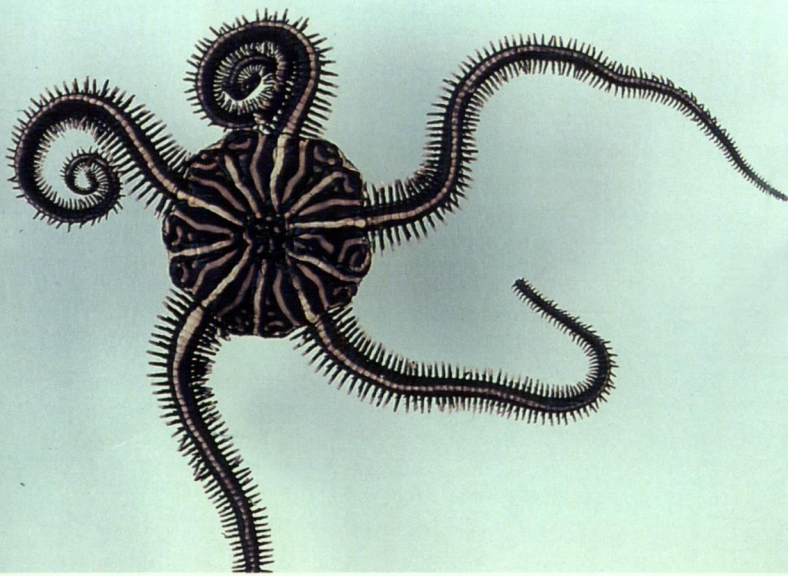


A common, small Indo-Pacific brittlestar, *Ophiothrix ciliaris*, is abundant in the cavities of sponges in Dampier waters. Photograph: Loisetete Marsh, WA Museum.

A feather star, *Zygotetra microdiscus*, clings to a sea whip in one of the deep channels between islands. Photograph: Susan Morrison, WA Museum.

A widespread Indo-Pacific urchin, *Prionocidaris baculosa*, was dredged from the deeper parts of the Dampier Archipelago. Photograph: Loisetete Marsh, WA Museum.





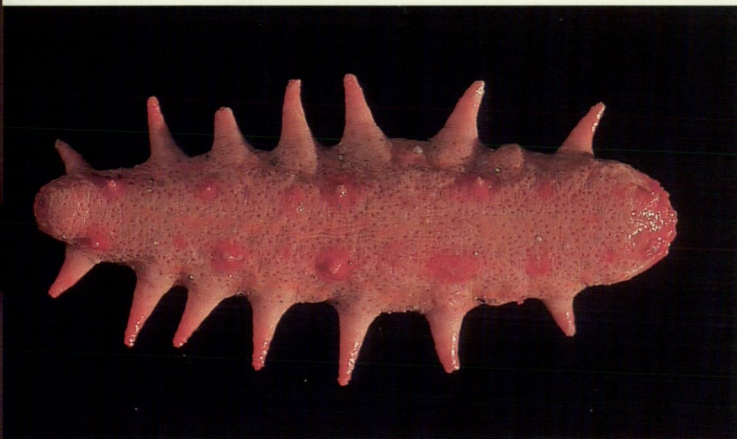
Ophiomaza cacotica lives entwined among the arms of its host feather star, stealing food from the grooves on the arms. Photograph: Clay Bryce, WA Museum.



One of the 11 species of heart urchin found in the Dampier Archipelago, *Lovenia elongata*, burrows under the sand surface. Photograph: Barry Wilson, WA Museum.

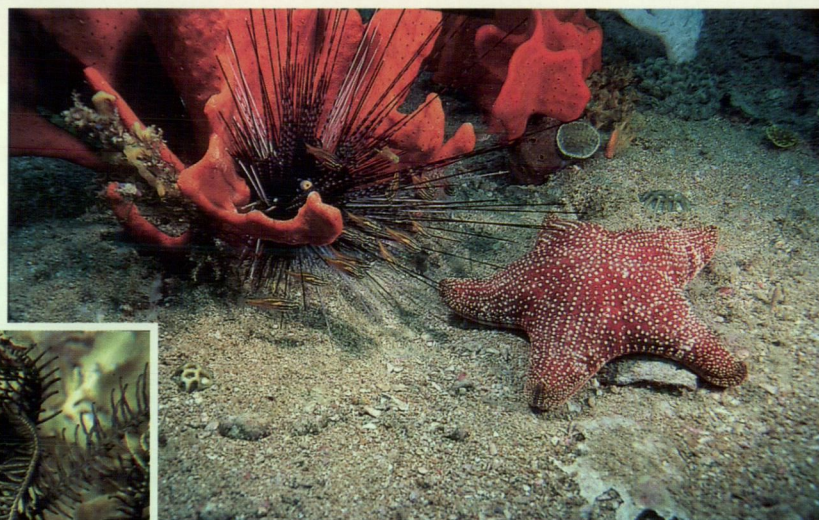


One of the most easily recognised, widespread, tropical sea cucumbers, *Pseudocolochirus violacens*, is found on silty substrates where it spreads its tentacles in the water column to catch plankton. Photograph: Clay Bryce, WA Museum.



This distinctive genus and species, *Loisettea amphictena*, was first described from the North West Shelf in 1985 and is only known from northwestern Australia. Photograph: Loisette Marsh, WA Museum.

A feather star, *Clarkcomanthus littoralis*, has its arms protectively curled during the day; it will expand them to feed at night. Photograph: Susan Morrison, WA Museum.



Spectacular associations may be seen in the sponge gardens in deeper parts of the Dampier Archipelago. An echinoid, *Diadema setosum*, nestles in a sponge (family Axinellidae) with a seastar, *Anthenea conjugens*, nearby. Photograph: Clay Bryce, WA Museum.

