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# The biodiversity and biogeography of shallow-water flora and fauna of the Western Indian ocean:
# with special reference to the Polychaeta, Mollusca and Echinodermata

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# THE BIODIVERSITY AND BIOGEOGRAPHY OF SHALLOW-WATER FLORA AND FAUNA OF THE WESTERN INDIAN OCEAN, WITH SPECIAL REFERENCE TO THE POLYCHAETA, MOLLUSCA AND ECHINODERMATA

by

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A thesis submitted in fulfilment of requirements for the degree of Philosophiae Doctor in the University of Wales - Bangor.

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December 1998

**This thesis is dedicated to my Parents**

# ACKNOWLEDGMENTS

I must begin by thanking most of all Dr. Dave Jones, my supervisor during this work, for his encouragement to pursue the task of preparing this thesis and for his valuable comments on the drafts. Much of the work in preparation of this thesis, and the resulting *Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands* was conducted in Zanzibar from where I gratefully acknowledge the University of Dar es Salaam for providing me the privilege of working at the Institute of Marine Sciences, and DR. Magnus Ngoile (then Director) for his guidance of those years. Zuleha A. Salim, Sandra Canares, P. Ndilahomba and E.M. Machamu are thanked for their valuable field assistance in collection and sorting of the benthos samples on Zanzibar, and John Coppock is acknowledged for his valuable assistance for identification of much of the polychaete material used in Chapter 3. Many of those involved in the preparation of the above filed guide have already been acknowledged, though I take this opportunity to thank them all once more, but here I will restrict myself mainly to those individuals that have helped provide me with energy and inspiration to complete this task.

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## SUMMARY

The biodiversity and biogeography of the western Indian Ocean shallow-water marine flora and fauna was examined with special emphasis on Polychaeta, Mollusca (excluding Opisthobranchia) and Echinodermata. A collection of predominantly eulittoral polychaetes from Zanzibar and Mafia (Tanzania) revealed a minimum of 91 species, of which 29 % are reported to occur across the Indian Ocean to the West Pacific, and 21 % are regarded as 'cosmopolitan'. Taxonomic problems associated with this taxon are discussed. Over 3,200 species of shelled Mollusca have been reported from the region, though the overall diversity of the groups are likely to be less due to the presence of many synonyms within the taxa which remain to be resolved. Of those families which have been taxonomically reviewed, it appears that the western Indian Ocean supports up to 15-20 % endemism, with noticeable differences in species diversity between the mainland of Africa and the western Indian Ocean islands, especially among bivalves. A total of 419 species of echinoderms are now known from this region, with 107 species (25 %) endemic. About 84 % of the non-endemic species are reported from several localities across the Indian Ocean to the West Pacific. Differences in the diversity of this group between mainland Africa-Madagascar and the western Indian Ocean islands are shown and possible reasons discussed.

Origins of the marine macro-invertebrate taxa in the western Indian Ocean include the maintenance of ancient Tethyan Sea fauna and larval (or adult) dispersal across the northern Indian Ocean. The possibility of species diversity being a function of coastline length was briefly investigated.

The preparation of *A Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands*, describing over 1,600 species, forms part of the work of this thesis and provides a baseline of taxonomic information for macrofauna and flora. From the latter, together with predictions provided by specialists, an estimate of about 10,000 species of shallow-water marine macrofauna and flora are found in this region. It is acknowledged that taxonomic problems affect many invertebrate taxa which require additional attention before estimates can be defined more precisely. Continued taxonomic research and dissemination of biodiversity findings are considered priorities to help stem the degradation and misuse of marine resources of this region resulting from human exploitation which is expected to increase considerably over the coming decades.

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# CHAPTER 1

# THE WESTERN INDIAN OCEAN

# INTRODUCTION

It has become widely accepted that the rate of human development, especially in the coastal zone, has resulted in a threat to the very existence of the marine communties on which much of that human development depends (e.g. Safina, 1995, Gaston & Spicer, 1998). The coastal nations of the world agreed in 1992 at the Conference on Environment and Development (UNCED) in Rio de Janeiro that the protection of coastal environments to ensure sustainable use of natural resources was a priority. However, before the coastal environment can be effectively managed and preserved, the biological diversity has to be documented (Ziegler & Krupp, 1996). Assessments of biodiversity, be they measured as species numbers or as the sum of all species interaction, require considerable taxonomic experience, access to biological collections and literature, and specialist equipment. Documenting the effects of human impacts on marine habitats and species is vital, as the potential for habitat destruction and species extinctions are high. Information on the biological, ecological, geological and oceanographic characteristics and processes of marine environments must be gathered if coastal zone management is to be successful. Unfortunately, the economic realities facing many developing countries means very that little of the needed research is being undertaken (Holthus & Maragos, 1995).

Taxonomic studies began in Europe and developed rapidly after the establishment of the *System Naturae* by the Swedish naturalist Carl Linnaeus in 1753. Over the following 200 years exploratory voyages and expeditions by natural scientists generated a vast wealth of information regarding species diversity and biogeography of marine taxa. By the mid 1900's continued studies depended on the newly emerging countries maintaining links with the European scientific institutions which had visited earlier. For many parts of the tropics these links dwindled and only in a few tropical countries has the local scientific base grown to continue the research. Only 6 % of the world's taxonomists are presently located in tropical developing countries, yet these countries hold by far the greatest number of species (May, 1994). For much of Africa, the south Pacific Ocean islands, south east Asia and south and central America, inventories of marine habitats with accurate taxonomic descriptions of contained species have ceased to develop. Consequently, in large parts of the tropics a lack of knowledge on much of the biota present forms a severe constraint to tropical marine biodiversity management, both for decision makers and the general public. This is also true

of terrestrial ecosystems but more extreme with respect to marine systems. Without detailed knowledge of what constitutes a pristine habitat or community, assessement and monitoring of changes imposed through human development cannot be made and there is an increasing danger of the acceptance of modified marine habitats and communities as the normal baseline. The present loss of biodiversity globally is thus of great concern. This is particularly true within the western Indian Ocean which forms the focus of this study.

The main aims of this study are:

1. The establishment of an inventory of the characteristic western Indian Ocean intertidal and shallow subtidal flora and fauna.

2. The description of the geographical distribution of the above flora and fauna.

3. A comparison of the shallow-water marine biodiversity of the western Indian Ocean with that from other marine regions.

4. The production of an illustrated field guide to the common and representative intertidal and shallow subtidal flora and fauna of the region to promote awareness and aid further taxonomic and ecological research.

The remainder of this introductory section includes a definition of the region, a description of the geomorphological characteristics, followed by a summary of the knowledge of the biological aspects and species diversity, and finally a synopsis of the human activities in the region which affect the coastal zone. These topics are further expanded in the introduction, appendix and bibliography of the field guide (Richmond, 1997) which forms part of this thesis.

While the present author (Matthew D. Richmond) is responsible for this thesis and for much of the research contributing to the field guide, completion of the latter would have been impossible without contributions by specialists to many of the taxonomic groups. Grateful acknowledgements are given at the start of the guide and under each section as well as in Chapter 2 of this thesis to clarify the contributions by this author.

## DEFINITION OF THE WESTERN INDIAN OCEAN

Although defining regions on the global surface is largely an arbitrary exercise, it is viewed as essential to provide a focus on a given area. The area defined as the western Indian Ocean (WIO) for the purpose of this study is shown in Figure 1. This region stretches from about central Somalia (5°N) to Natal in South Africa (at 30°S) and embraces the islands of Madagascar, Comoros, Réunion, Mauritius (the latter two also referred to as the Mascarenes) and the Seychelles. The total area within the region is about 15 million $km^2$. With the exclusion of South Africa, this region is also defined by the United Nations Environment Programme (UNEP) as 'Eastern Africa'. For reasons which will be explained below, this region is also characterised by certain geomorphological, oceanographical and biological features which partially separates it from neighbouring seas.

## GEOMORPHOLOGY OF THE REGION

The total length of the coastline within the WIO region defined above is 11,612 km, based on data from Couper (1989). The shoreline of Madagascar extends for 4,828 km in length; that of the WIO islands (Mascarenes and Seychelles) extends to only 858 km, and that of mainland Africa, from central Somalia to Durban, to 5,586 km. The width of the continental shelf, defined as the distance to the 200 m depth contour, varies greatly within this region and is not related to coastline length. In general the shelf of mainland Africa and Madagascar is narrow, rarely extending more than 15-30 km from shore. The Mascarene islands are of volcanic origin and have virtually no continental shelf with the shore dipping steeply to 2000 m within 10-20 km from shore. The Seychelles are unique in that they reside on a wide, shallow continental shelf, greatly disproportionate to the length of the coastlines of these islands (see Figure 2). This plateau, known as the Seychelles Plate is of ancient geological origin, mostly granitic, and associated with the breakup of Godwanaland during the Cretaceous Period (70-135 million years ago). The Seychelles are also unique as continental islands in an oceanic situation. In addition to the few granitic islands, the Seychelles also include another 74 islands which are of limestone (carbonate) origin, principally of coral rock on the tops of more recent, submerged volcanoes. One other area of submerged shelf which is also unique to the Indian Ocean is the Saya de Malha Bank,

Figure 1. The Indian Ocean, with 'Area covered' representing the western Indian Ocean.

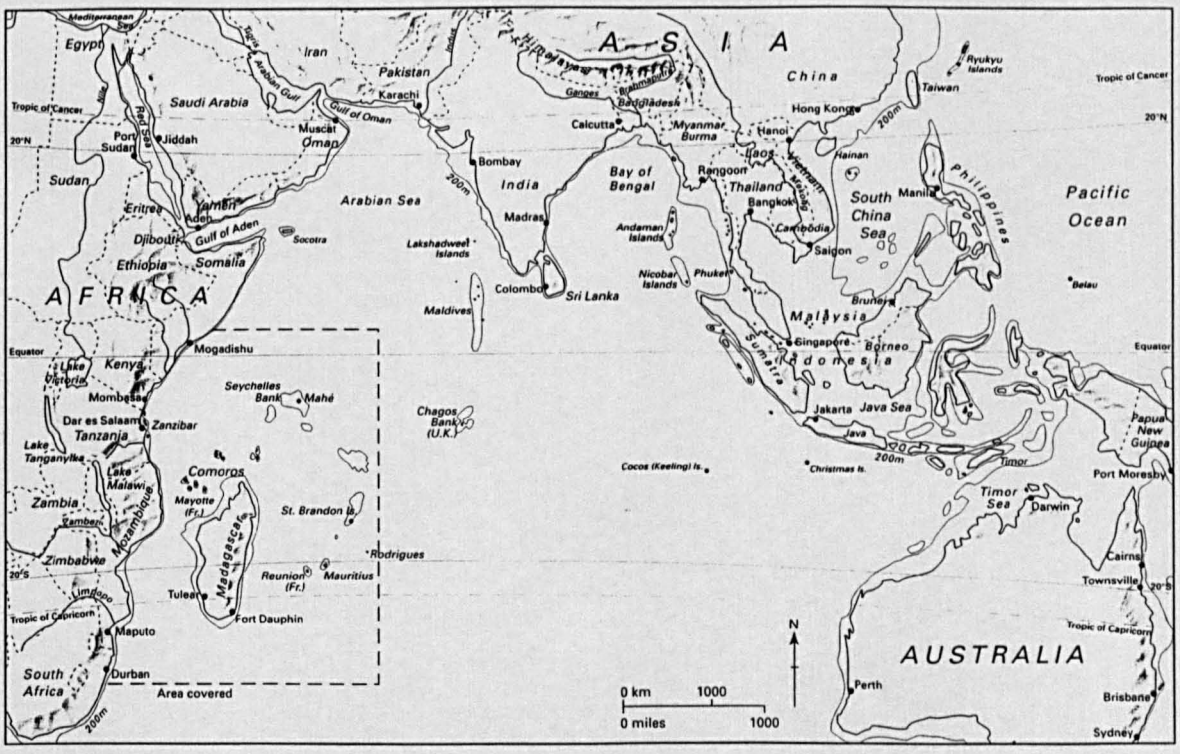
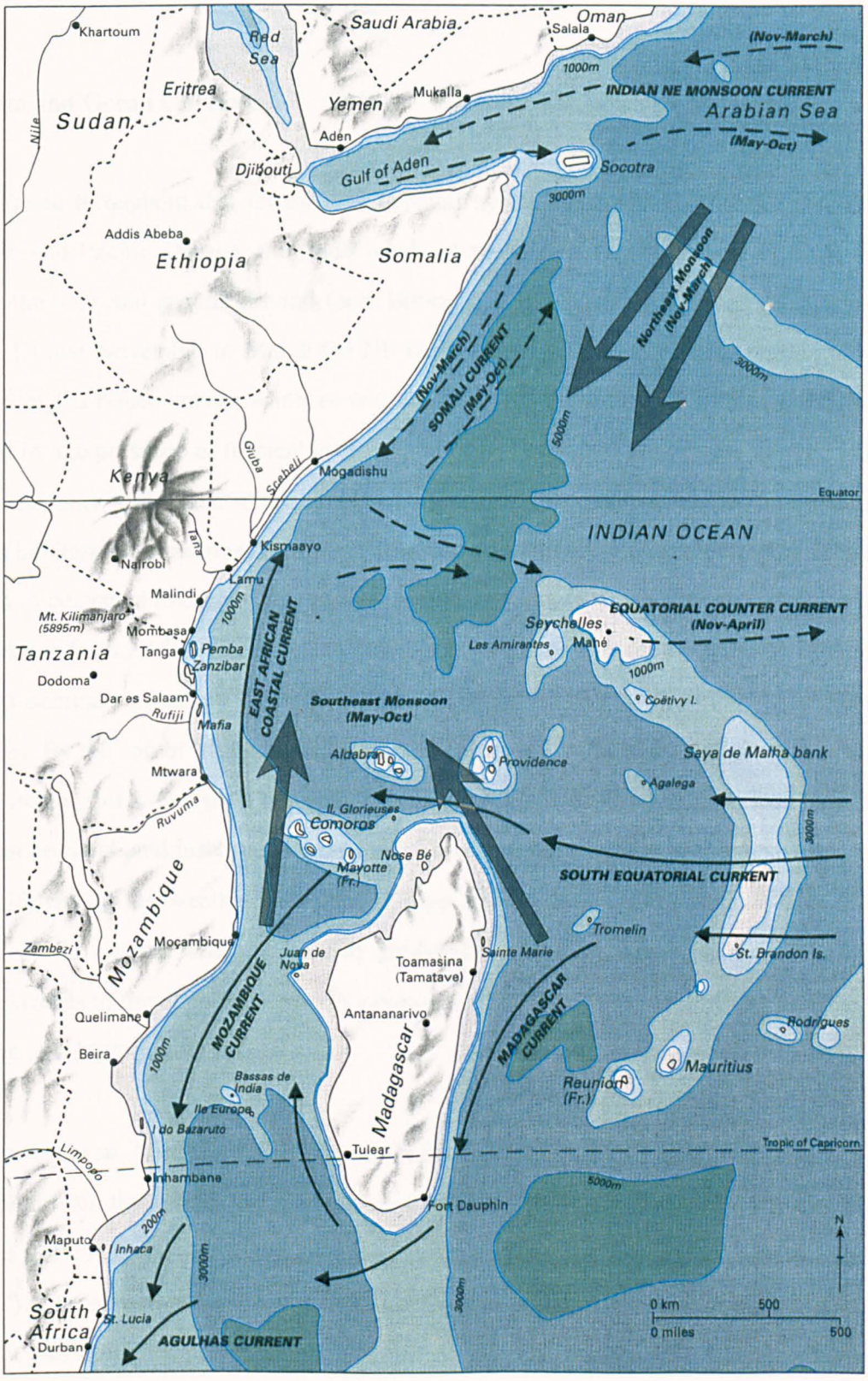


Figure 2. Ocean currents, monsoon winds and water depths prevalent in the western and northwestern Indian Ocean.



part of the Mascarene Ridge. This large bank stretches from north of Mauritius almost to the Seychelles Plate, but unlike the latter, is believed to be composed of coralline sediments on top of volcanic rock (Francis & Shor, 1966).

**Climate and Ocean Currents**

The climate throughout this region is dominated by the trade winds. Unlike those of the Atlantic and Pacific Oceans, the trade winds of the Indian Ocean reverse their direction during the year and are the driving force behind the two monsoon seasons (McClanahan, 1988). During November to March the NE monsoon winds blow, bringing warm moist air to most of the region. In the southern and northern fringes of the WIO, this period is also marked by the presence of tropical cyclones. Winds of over 100 km $hr^{-1}$ are not uncommon during cyclones and the resulting waves of 14 m or more can have devasting impacts on coastal habitats and human settlements. Following the NE Monsoon is a period of about 3-4 months of persistent rain and light, variable winds, associated with a general reduction in air temperature from 29-33° C to 23-27° C . During this period inshore waters may experience a sharp decrease in salinty from the usual 35 ppt to 10 ppt or less close to large river estuaries. By the end of May the winds have swung round to the south and the SE monsoon blows steady and strong until November. This period is usually cooler and less humid but seas can be rough and inshore turbidity high. The changing direction of the monsoons, apart from influencing the weather and rainfall, also affects coastal currents and thus inshore mixing of the region. The regular and predictable monsoon winds have also permitted sailing vessels to travel up and down this region and northwards to Arabia with relative ease over the last 2,000 years.

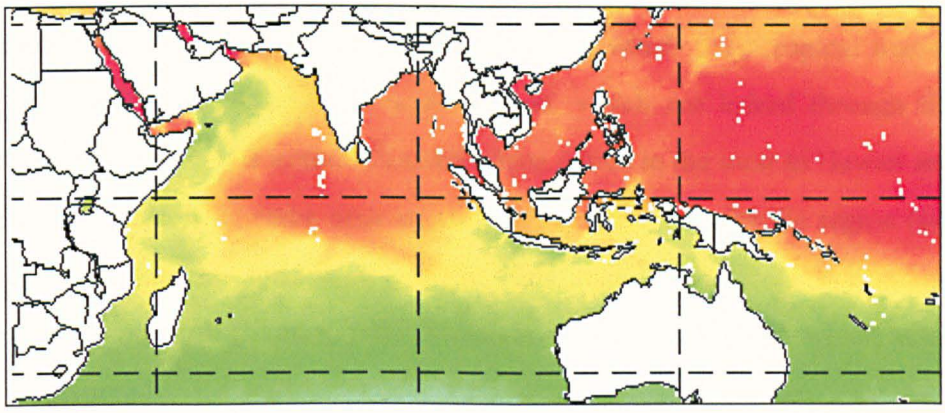
The main ocean current of the central Indian Ocean is the Equatorial Current, with movement from the eastern Indian Ocean towards East Africa at about 10-15°S (see Figure 2). This current divides and then continues north forming the East Africa Coastal Current (EACC) and south forming the Moçambique Current which passes down the Moçambique Channel and into the colder waters off South Africa. The northward EACC is affected by the monsoon winds and its extension towards Arabia is dependent on the season. During the SE monsoon period the EACC extends as far as northern Somalia where it diverts

eastwards and then follows a clockwise movement through the Arabian Sea. During the NE monsoon the EACC meets the southerly Somali Current at about 3°S, but the latter may extend as far south as Zanzibar, at about 6°S, depending on the strength of the NE monsoon winds (Leetman & Truesdale, 1972). During this season the confluence of these opposing currents results in the Equatorial Counter Current which extends eastwards across the Indian Ocean from about 2°N-5°S depending on the strength of the NE monsoon.

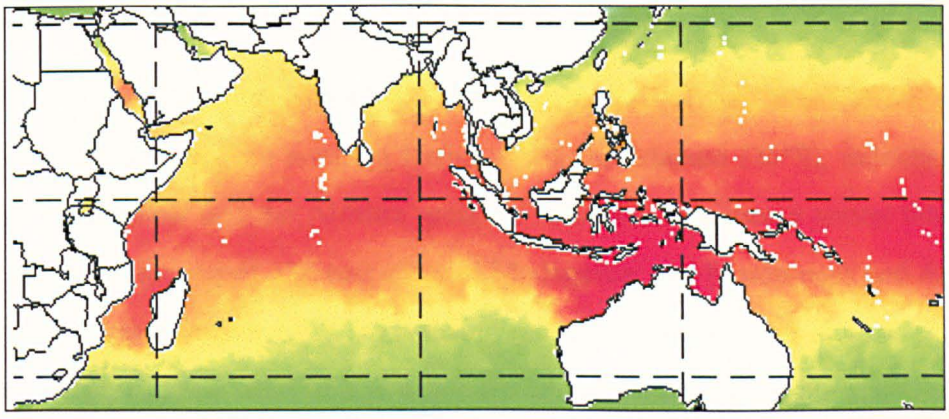
The net result of the coastal currents in this region is that they encourage the continental distribution of species arising on the African coast (Taylor, 1971). The exchange of surface waters between the WIO Islands would appear to be predominantly from east to west with a seasonal eastward exchange only around the Equator. On the whole however, there is surprisingly little detailed, factual information about large scale mixing in the Indian Ocean (Sheppard, *in press*).

Sea water temperature is also influenced by the changing direction of the monsoonal winds. During the cooler SE monsoon season (May-October), surface temperatures throughout most of the WIO are 23-27° C (see Figure 3). A noticeable feature of the northwest Indian Ocean during this season is an area of upwelling off NE Somalia and southern Oman which brings cool, nutrient-rich waters to the surface, reducing sea surface temperatures in that area to about 17° C (Smith, 1983; Sheppard *et al.*, 1992) as shown in Figure 3. This area acts a temperature barrier at the northern extreme of the WIO. Sea surface temperatures increase from August to summer maximums during the NE monsoon of 25-32° C throughout the WIO. At the southern extreme of the region, around the port of Natal in South Africa, sea surface temperatures rarely exceed 24° C and drop to about 20° C in the winter forming a southern temperature barrier, in an area which can be regarded as a transition zone between tropical and temperate regimes.

Figure 3. Mean monthly (night-time) sea surface temperature for the Indian Ocean and adjacent waters, for months of the two monsoon periods. Source: NOAA website Sea Surface Temperature (SST) (NOAA, 1998).



August 1994



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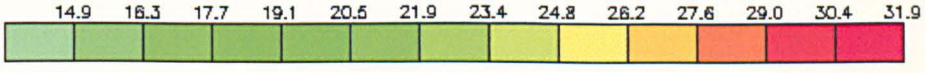


Key to temperature (C)

Sea surface temperatures not only help define the northern and southern limits of the WIO, but are critical to the development of coral reefs and associated marine biota. The limiting temperature to coral reef growth is about 16° C, with an ideal range of 20-27° C. The upwelling of cool waters off Somalia mentioned above prevents the development of typical tropical biotopes such as coral reefs (Debelius, 1993). The 20° C isotherm is widely accepted as demarcating the extent of the world's waters in which truly tropical marine biota can develop. Across the Indian and Pacific Ocean, which are linked through the Malay-Indonesian archipelagos, this isotherm extends from Africa in the west to Hawaii and French Polynesia in the east. This entire area is referred to as the Indo-Pacific region (see Figure 4). Also known as the Indo-West Pacific, this region represents the largest biogeographic province on earth (Ekman, 1953; Gosliner *et al.*, 1996) within which many marine taxa are widespread.

**Tides**

Tides in the WIO are mostly semi-diurnal but tidal ranges are of two quite different magnitudes. Most localities between northern Kenya (1°S) and Maputo (26°S), including the west coast of Madagascar and the Aldabra group of islands, experience a spring tidal range of between 2-4 m. In contrast, the east coast of Madagascar, the Mascarenes and the Seychelles experience much smaller tides, with spring ranges of only a metre or less (see Table 1). Of note is that the local times of low water are virtually the same for the mainland Africa and Madagascar coasts which experience similar tidal ranges, as shown in Table 1. The resulting coastline length, which is therefore subjected to very similar tidal patterns, extends for approximately 8,500 km, or about 73 % of the total coastal length of the region.

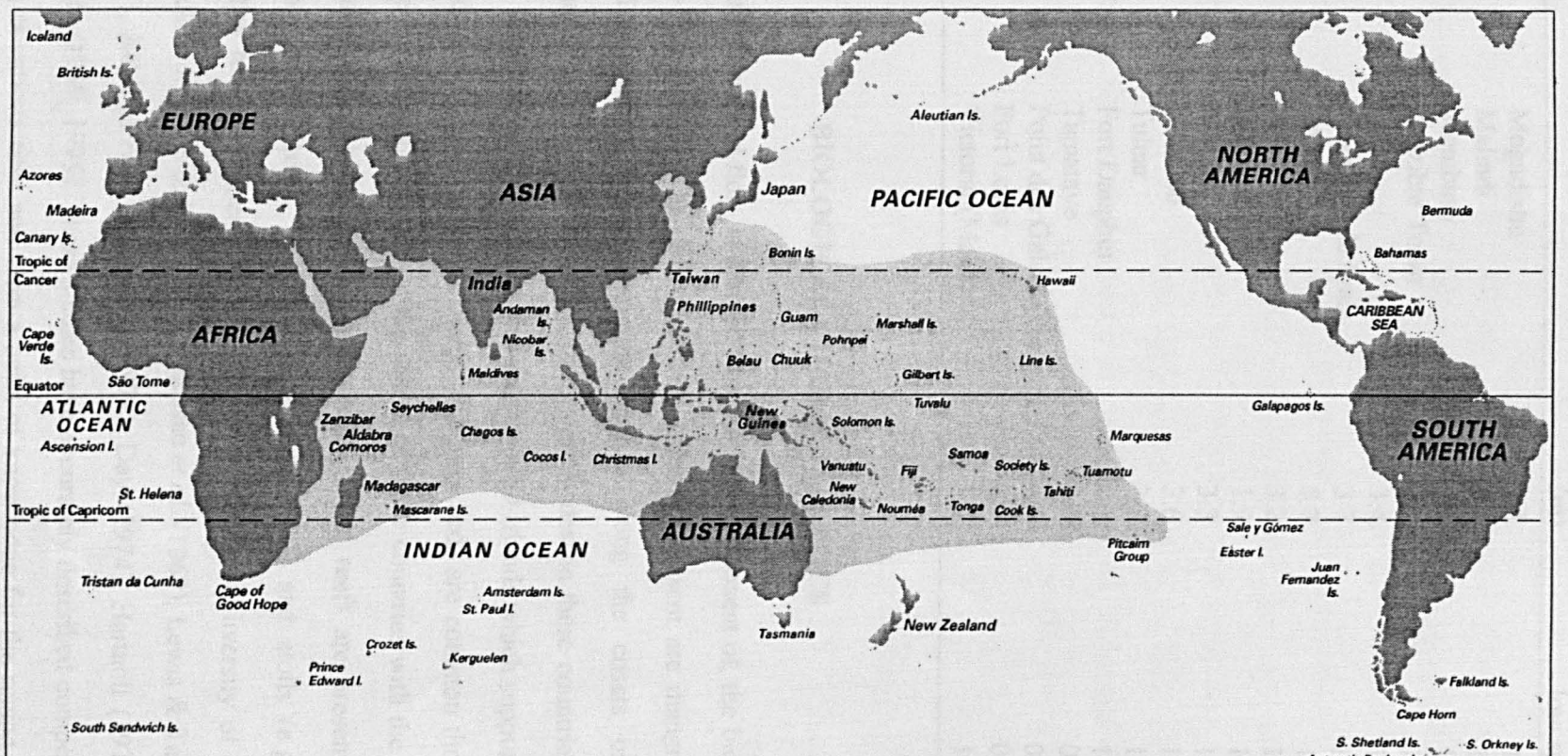


Figure 4. Major oceans and islands of the Indo-Pacific region (shaded area).

Table 1. Approximate spring tidal ranges and local times of low spring tides for selected ports in the western Indian Ocean.

| Country | Port | Spring tidal range (m) | Mean local time of low spring time |
|---|---|---|---|
| Somalia | Mogadishu | 2.1 | 10:45 |
| Kenya | Malindi | 3.1 | 10:40 |
| | Mombasa | 3.6 | 10:30 |
| Tanzania | Zanzibar Town | 3.6 | 10:40 |
| | Lindi | 3.4 | 10:50 |
| Moçambique | Mocimbo da Praia | 3.7 | 11:30 |
| | Beira | 5.7 | 11:40 |
| | Maputo | 3.2 | 11:10 |
| South Africa | Durban | 1.9 | 10:40 |
| Comoros | Moroni | 3.3 | 11:00 |
| Madagascar | Nose Bé | 3.6 | 10:40 |
| | Tulear | 2.7 | 11:30 |
| | Fort Dauphin | 0.7 | 15:20 |
| | Tamatave | 0.6 | 08:45 |
| Réunion | Point des Galets | 0.4 | 08:45 |
| Mauritius | Port Louis | 0.5 | 08:00 |
| Seychelles | Victoria (Mahe) | 1.2 | 11:00 |

## BIOLOGICAL CHARACTERISTICS

The WIO coastal fauna and flora is derived from, or is a component of, the biodiversity of the huge Indo-Pacific region, as defined above. Typically present are mangrove forests, especially well-developed in the estuarine regions along the coasts of Tanzania, Moçambique and Madagascar. Intertidal expanses are widest in these countries due to the relatively large tidal ranges, compared to the smaller WIO islands which support only small mangrove stands and narrow intertidal shores. Seagrass beds are common throughout the region, with the best developed beds on the shores of those countries with the largest tidal ranges. Subtidal seagrass beds are also widespread. Coral reefs are present in various forms, including fringing reefs, small patch or island reefs and atolls (e.g. Aldabra). Numerous studies have examined components of the marine biodiversity of parts of the WIO. These include Macnae & Kalk (1969), Baissac *et al.* (1962), Lewis & Taylor (1966), Stoddart (1967), Jones (1970), Thomassin (1971), Day (1974), Hartnoll (1976), Jassund (1976), and Kalk (1959, 1995). These studies have accurately described components of the flora and fauna at various sites and form a basis of knowledge for the region as a whole. However, no study has yet attempted to combine the existing knowledge with updated taxonomy and recent findings.

## ANTHROPOGENIC INFLUENCES

Coastal and marine ecosystems are of critical importance to the peoples, cultures and economies of the WIO. The coastal and nearshore marine areas of many of the islands in the WIO, of Madagascar and the mainland states of Kenya, Tanzania and Moçambique are the location of the vast majority of human habitation, supporting a coastal population of over 30 million people. Human impacts are growing and likely to continue at ever increasing rates, especially on the mainland countries of Kenya, Tanzania, Moçambique as well as Madagascar where population growth rates indicate that populations will double in 20 years (see Table 2). The fact that the majority of this population resides on the coast is of great concern as much of the coastal land along the shores of the WIO is of limited agricultural use and resident populations rely heavily on marine resources for their existence.

Table 2. Populations of the main countries of the WIO. Data from World Bank (1995); Shah (1995) and Kamuzora (1995).

| Country | Area ($km^2$) | Percentage of population living on coast | Annual growth rate (%) | Population 1994 | Population 2000 (estimate) |
|---|---|---|---|---|---|
| Somalia | 640,061 | 38 | 2.9 | 9,950,000 | 11,800,000 |
| Kenya | 588,045 | 6 | 4.1 | 25,840,000 | 32,870,000 |
| Tanzania | 942,654 | 25 | 3.6 | 28,390,000 | 34,890,000 |
| Moçambique | 789,508 | 34 | 2.8 | 16,600,000 | 19,600,000 |
| Comoros | 2,030 | 100 | 3.1 | 630,000 | 750,000 |
| Madagascar | 592,797 | 37 | 2.8 | 13,050,000 | 15,400,000 |
| Réunion | 2,036 | 100 | 0.8 | 640,000 | 670,000 |
| Mauritius | 1,328 | 100 | 1.3 | 1,100,000 | 1,180,000 |
| Seychelles | 210 | 100 | 1.1 | 70,000 | 76,000 |

These coastal areas are also the focus of subsistence and commercial fisheries (as discussed below) and the target of most economic development (e.g. tourism, light and heavy industry). This combination of factors is accelerating the degradation and restriction of coastal habitats, the overexploitation of natural resources, and conflicts in coastal resource use. The most important marine resources currently exploited include mangroves (predominantly for building material or firewood); living coral for building materials, and seaweeds (mostly for export). Crustaceans, molluscs, echinoderms, fish and reptiles are caught for food or for export using assorted techinques. The exploitation of all these resources is having serious effects on the coastal integrity of marine habitats in parts of the region (Linden, 1995). Coastal tourism contributes to local economies, but brings with it

added pressure to the coastal zone (Shah, 1995). The aquarium industry is in its infancy and may potentialy bring added pressure to inshore reef areas. Pollution of the coastal zone is reported to be increasing, both from domestic sources and oil (Ferrari, 1995).

Following General Approach and Methods (Chapter 2), this thesis contains three taxonomic chapters, examining in detail the Polychaeta, Mollusca and Echinodermata of the region. The methodology employed for each varies, reflecting the variation in knowledge for each group, with full details given in each chapter. In Chapter 3 the biodiversity of the Polychaeta is considered, based on the results from extensive collecting and taxonomic analysis from intertidal soft substratum surveys from Zanzibar (Tanzania). The material provides a basis for the analysis of this taxon, and is combined with relevant literature to compare observed distribution and abundance with other studies from within and outside of the WIO. In Chapter 4 a summary of the molluscan fauna (excluding Opisthobranchia) for the region is provided, focusing mainly on existing literature, but including some limited sampling and new collections. Chapter 5 compares the Echinodermata, based on new regional collections with the published literature on distribution and diversity of this group from other areas. Chapter 6 presents a general discussion on the biodiversity of the WIO and its biogeography in the light of information gathered from other taxa and other parts of the Indo-Pacific. The preparation of the field guide for the common and representative marine life of Eastern Africa and the western Indian Ocean island took 6 years, culminating in its publication in December 1997. The importance of such guides has been emphasised (e.g. Taylor, J.D. in Sharabati, 1984) as they stimulate an increased awareness and knowledge of local marine life to a wider audience, an essential prerequisite for effective conservation programmes.

# CHAPTER 2

# GENERAL APPROACH AND METHODS

## GENERAL

In January 1992, the author was awarded the position of Associate Research Fellow at the Institute of Marine Sciences (University of Dar es Salaam), on Zanzibar, Tanzania. The purpose of this position was to gather material for the current study, focusing mainly on the preparation of the marine life guide. To this end a working base with laboratory facilities was established in Zanzibar and relevant published material on marine taxonomy and biogeography of the WIO and adjacent regions was collated. From this base, visits were made to most parts of the region to conduct brief field surveys, liase with regional specialists and examine taxonomic collections.

In addition to the brief field sampling and surveys, quantitative sampling of soft substrata was conducted in Zanzibar (Tanzania) and eastern Saudi Arabia (Arabian Gulf). Brief surveys and collections were undertaken in western Saudi Arabia (Red Sea), Watamu and Mombasa (Kenya), Mafia and Pemba islands (Tanzania), Inhaca Island (Moçambique), northern Natal (South Africa), Tulear (SW Madagascar), Nose Be (NW Madagascar), Moroni (Comoros), La Digue and Mahe islands (Seychelles) and SE Papua New Guinea (Solomon Sea/Coral Sea).

## PREPARATION OF THE FIELD GUIDE

All material for every taxonomic group to be included was collected, catalogued and in many cases shipped to relevant specialists. Taxonomic collections were maintained in Zanzibar, and, where necessary, deposited or exchanged with other institutions. Currently accepted taxonomic methodology is used in the identification of material collected and numerous specialists (see Table 1) provided assistance with identification. For the following taxa (Cirripedia, Nudibranchia, Ascidiacea, Holothuria, Amphipoda, Porifera, and Octocorallia) new species have been identified and are either being described or awaiting final examinations.

The name for each species was researched from the existing literature up to 1997 and the earliest valid name has been adopted. In attempting to provide a baseline text, earlier but still commonly used synonyms were also included. These allow the user to compare previous records with others or their own. Illustrations of species for the guide were made

from numerous sources depending on the taxa. Seaweeds for example were illustrated from dried collection material; molluscs were illustrated from specimens either recently collected from the region or material from regional museum collections; preserved specimens of crustaceans and polychaetes were also used. Fish were mainly illustrated from photographs of live specimens taken by the author, who co-authored book sections on seaweeds, hydrozoans, stomatopods, lobsters, molluscs, echinoderms, fish and birds. In December 1995 the final stage of editing of the various contributions was initiated at the School of Ocean Sciences (University of Wales – Bangor) and in December 1997 the illustrated field guide was published (see Richmond, 1997).

Table 1. Details of taxonomists and institutions that assisted in the preparation of *A Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands* (Richmond, 1997).

| Institution/address | Name | Taxonomic specialty |
|---|---|---|
| Institut Halietique et des Sciences Marines, B.P. 141, Tulear, Madagascar | Dr. Rachel Rabesandratana<br>Dr. Dieudonne Rabesandratana | macroalgae<br>molluscs |
| Centre National de Recherche Oceanographiques, B.P. 68 (207), Nosy Be, Madagascar | Dr. Jean Maharavo | echinoderms |
| National Museum of Kenya, P.O.Box 40658, Nairobi, Kenya | Dr. Leon Bennun<br>Dr. Helida Oyieke | coastal birds<br>macroalgae |
| Kenya Wildlife Service, Mombasa Marine Park, P.O.Box 82144, Kenya | Dr. George M. Wamukoya | macroalgae |
| Kenya Marine Fisheries Research Institute, P.O.Box 81651 Mombasa, Kenya | Dr. Ezekiel Okemwa | zooplankton |
| University of Nairobi, Zoology Dept., P.O. Box 30197, Nairobi, Kenya | Prof. Victor Jaccarini<br>Dr. Micheni Ntiba | echiurans<br>fish |
| Universidade Eduardo Mondlane - Dept. Biological Sciences, P.O. Box 257, Maputo, Moçambique | Mr. Almeida Guissamulo<br>Mr. Salomão Bandeira | mammals<br>seagrasses |
| University of Dar es Salaam - Botany Dept., P.O. Box 35060, Dar es Salaam, Tanzania | Mr. Leonard Mwasumbi<br>Prof. Aldelaide Semesi | shore plants<br>mangroves |
| University of Dar es Salaam – Zoology Dept. P.O. Box 35064, Dar es Salaam, Tanzania | Prof. Kim Howell | reptiles |
| University of Dar es Salaam - Institute of Marine Sciences, P.O. Box 668, Zanzibar, Tanzania | Mr. Amani Ngusaru<br>Dr. Simon Ndaro<br>Dr. Jude Shunula | geology<br>meiobenthos<br>lichens |
| National Museums of Tanzania, Shaaban Robert St., Dar es Salaam, P.O. Box 511, Tanzania | Dr. Nobert A. Kayombo | molluscs |
| University of Witwatersrand - Dept. of Botany, Private Bag 3, 2050, Johannesburg, South Africa | Dr. Simone Silva | blue-greens |
| Oceanographic Research Institute, P.O.Box 10712, Marine Parade, Durban 4056, KwaZulu Natal, South Africa | Dr. Michael Schleyer<br>Dr. Rudy Van der Elst | coelenterates<br>fish |
| South African Museum, P.O. Box 61 Cape Town, South Africa | Dr. Leonard Compagno<br>Dr. Peter Best | fish<br>mammals |
| The Marine Laboratory, Uni. Portsmouth, Ferry rd., Hayling Is., PO11 ODG, Hampshire, UK | Dr. Yvonne Chamberlain | coralline algae |
| The Natural History Museum, Cromwell rd., London SW7 5BD, UK | Dr. Paul Cornelius<br>Dr. David Galloway<br>Dr. Michelle Kelly-Borges | jellyfish/hydroids<br>lichens<br>sponges |
| Kew Gardens, London, UK | Ms. Diane Bridson | shore plants |
| Scottish Association for Marine Research, P.O. Box 3, Oban, Argyll, PA34 4AD Scotland, UK | Dr. Bill Burnett | zooanthids |
| School of Biological Sciences, Liverpool John Moores Uni., Byrom St., Liverpool, L33AF, UK | Dr. Ray Gibson | nemerteans |
| University of Wales - Bangor, School of Ocean Sciences, Menai Bridge, LL59 5EY, N.Wales, UK | Dr. David A. Jones<br>Mr. John Coppock<br>Dr. Eifion Jones<br>Dr. Lewis LeVay | crabs<br>polychaetes<br>macroalgae<br>crustaceans |
| Yr Aelwyd, Cambria rd., Menai Bridge, Anglesey LL59 5EY, UK | Mr. Hugh Knott | coastal birds |
| Bryniau Duon, Old Llandegfan, Anglesey LL59 5PW, UK | Mr. Martin Esseen | fish |

Table 1. (continued)

| Institution/address | Name | Taxonomic specialty |
|---|---|---|
| National Museum of Wales - Cardiff, Cathays Park, Cardiff, CF1 3NP, UK | Dr. Andy Mackie<br>Dr. Malcom Luxton<br>Dr. Graham Oliver | polychaetes<br>coastal mites<br>molluscs |
| Zoology Dept., Swansea Uni. Singleton Park, Swansea, SA2 8PP, UK | Dr. Peter Hayward<br>Dr. Natalie Yonow<br>Prof. John S. Ryland | bryozoans<br>opisthobranchs<br>zooanthids |
| Goldbrook Boarding Kennels, Nuttery Vale, Cross St., Hoxne, Suffolk, IP21 5BB, UK | Dr. Frank Rowe | echinoderms |
| University of York, Biology Dept., P.O. Box 373, York Y015YW, UK | Dr. Peter Hogarth | porcellanids |
| University College Cork – Dept. Zooloy, Lee Maltings, Prospect Row, Cork, Ireland | Prof. Alan Myers | amphipods |
| Universiteite Gent, V.M.S. Ecologie, Lab.Plantkunde, K.L. Ledeganckstraat 35, B 9000 Gent, Belgium | Prof. Eric Coppegans<br>Mr. Olivier DeClerck | macroalgae |
| National Board of Fisheries, Institute of Marine Science, Box 445321 Lysekil, Sweden | Dr. Vidar Oresland | zooplankton |
| University of Nijmegen, Holland | Mr. Thomas Lymo | phytoplankton |
| National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, Holland | Dr. Leen P. van Ofwegen<br>Dr. Koos DenHartog | octocorals<br>anemones |
| Amsterdam University Museum, Holland | Dr. Rob van Soest | sponges |
| Senckenberg Institute, Senckenberganlage 25, D-60325, Frankfurt a.m., Germany | Dr.Wolfgang Schneider | coastal insects |
| Zoologisk Museum, Copenhagen Uni., Universitetsparken 15, DK 2100 Copenhagen, Denmark | Dr. Niel L.Bruce | isopods |
| Stockhom Universitet - Zoologisk Institutionen, 10691, Stockholm, Sweden | Dr. Emil Olafsson | meiobenthos |
| Muséum National d'Histoire Naturelle 55 Rue Buffon, F - 75005, Paris, France | Dr. Francoise Monniot<br>Dr. Claude Monniot<br>Dr. Alain Crosnier<br>Nguyen Ngoc-Ho | tunicates<br>tunicates<br>crustaceans<br>thallasinids |
| Zoological Museum of the University of Florence, "La Specola", via Romana 17, 50125 Firenze, Italy | Dr. Marco Vannini | crustaceans |
| American Museum of Natural History, Central Park W at 79th St., New York, USA | Dr. Alan Harvey | porcellanids |
| Western Washington Uni., Shannon Point rd., Anacortes, WA 98221-4042, USA | Dr. Patsy MacLaughlin | hermit crabs |
| Museum of Natural History, Smithsonian Institution, Institute of Zoology, MDC 163, Washington DC 20560, USA | Dr. Leslie Newman | flatworms |
| Western Australia Museum, Francis St., Perth, WA 6000 Australia | Dr. Diana Jones<br>Ms. Leslie Brooker | barnacles<br>polyplacophorans |
| Queensland Museum, Crustacea Section, P.O.Box 3300, Brisbane,QLD 4101, Australia | Dr. Sandy Bruce | shrimps |

# CHAPTER 3

# DIVERSITY OF THE SOFT-SUBSTRATUM POLYCHAETE FAUNA OF ZANZIBAR AND MAFIA ISLANDS, TANZANIA

# INTRODUCTION

## POLYCHAETE RESEARCH IN THE WESTERN INDIAN OCEAN

The study of the polychaete fauna of the western Indian Ocean and adjacent waters began almost 150 years ago, with the first records made by Peters (1854) on collections from the coast of Moçambique. From a little further south, along the Natal coast, Kinberg (1857-1910) described some of the fauna, and Schmarda (1861) described material from numerous localities he visited during that period, from southern Africa to Sri Lanka. The Red Sea fauna was first examined in detail by Grube (1868-69), and later by Gravier (1900-08). The fauna of Sri Lanka then received attention by Grube (1874) and others (e.g. Michaelson, 1892; Willey, 1905), while during the same period, the polychaetes of eastern Africa were being examined for the first time by Crossland (1903-04) who included material from Zanzibar, and later, from the Maldives (Crossland, 1904). Subsequent Indian Ocean studies were conducted on material from expeditions and scattered locations (e.g. Potts 1909a,b; Fauvel, 1918-19; Crossland, 1924) and on Arabian Gulf collections (Fauvel, 1911). On the eastern side of the Indian Ocean Augener (1913-14) examined south west Australian polychaetes. India and Sri Lanka, however, were to become a focus of polychaete knowledge beginning with the contributions of Augener (1926) and Gravely (1927) and concluding with the numerous studies of Fauvel (1928-40), resulting in the comprehensive volume on Indian polychaetes (Fauvel, 1953) describing 450 species. This figure he estimated to represent barely more than half of the numbers to be expected.

Other studies from that period which contributed to the knowledge of the polychaete fauna of the region include the examination of the John Murray Expedition material (Monro, 1937), and the early studies in Moçambique and southern Africa by Day (1951). Day later examined material from several parts of the western Indian Ocean, with several new records for Mauritius, Dar es Salaam and Mombasa (Day, 1962). Additional studies were conducted on material from Natal and Moçambique (Day, 1957) and he further contributed to the knowledge of the fauna of southern Africa with a monograph on southern African polychaetes (Day, 1967), describing about 750 species, including many new species. Polychaete taxonomic research around India continued (e.g. Banse, 1959; Pillai, 1960, 1971; De Silva, 1961; Tampi & Rangarajan, 1964) and an examination of Indian collections

and those made by the 1963-64 International Indian Ocean Expedition led Hartman (1974a) to conclude that the polychaete fauna of the Indian Ocean is the largest known tropical polychaete fauna. Further analysis of collections from India revealed a total of 883 species (Hartman, 1974b). More recent studies from specific localities on the shores of India include Srikrishnadhas *et al.*, (1987) and Bharati Goswami (1992), and from adjacent waters to the Indian Ocean region, Mohammed (1970-80) from the Arabian Gulf and Ong (1995) from Malaysia. The most recent publications on polychaetes from the western Indian Ocean is Knight-Jones (1972) describing a new species of Serpulidae from the shallow sublittoral in northern Kenya, and Hartmann-Schröder & Hartmann (1974) from southern Africa, including sites in Moçambique. The ecological study by Hughes & Gamble (1977) on soft substrata biota of Aldabra also includes an analysis of the polychaete component of the fauna.

## BIOGEOGRAPHICAL PROBLEMS

One feature common to many of the above broad polychaete studies is that a significant proportion of the species encountered are regarded as widespread in their geographical distribution, not only throughout the Indo-Pacific, but also in the Mediterranean and the Atlantic Ocean. Fauvel (1953) stated that of the 450 species he reports from India, 108 are also European species (approximately 25 %). Ekman (1953) in his comprehensive zoogeographical analysis stated that "the polychaetes which are to a large extent cosmopolitan and therefore generally do not throw much light on regional zoogeography" This observation has received support (e.g. Hartman, 1974) and a general statement now commonly associated with polychaete biogeography is that the fauna is widespread, even cosmopolitan, contrary to the known patterns of biogeography demonstrated by other marine taxa (e.g. fish, molluscs, echinoderms) which show clear regional affinities.

The question of cosmopolitanism has begun to prompt debate (see Gambi *et al.*, 1990; Mackie, 1996). One of the problems facing polychaete taxonomists today is the lack of precise and thorough descriptions of the species in the early literature, combined with inadequately preserved and catalogued type specimens. Claparède (1867) for example was firm in his belief that studies on preserved specimens were "positively useless, and that the

Annelida can only be well studied at the seaside and by means of living individuals"! A further problem faced by taxonomists is the use of 'out of area' reference material. As Mackie (1996) explains, the use of taxonomic keys which were designed for one particular area (e.g. Day, 1967; Fauvel, 1927; Fauvel 1953) when used in other areas (out of area) can result in erroneous identifications. For example, the use of Day (1967) to identify a specimen from Europe may result in a new record of that species outside of the southern Africa region. Mackie states that this in itself is not a serious matter, but when the description of the southern African species is expanded to accomodate the European one, this then represents the first step to that species becoming 'cosmopolitan'. Clearly the use of taxonomic keys has limitations, some associated with the region, and some with the definitions and points in the keys themselves used to define the species. The interpretation of biogeographic distributions of particular species suffers as a result of these limitations. Mackie (1996) suggests that use of tables of species versus characters may provide a superior method of identifying taxa, allowing all characters for each taxon to be compared directly without loss of information. In addition, the tabular approach has the benefit of providing a suitable framework for future cladistic analyis.

The aims of the present study are:

1. to establish a collection of new polychaete specimens from Tanzania, focusing primarily on littoral species;

2. to identify the specimens and use these findings as a basis of a chapter on the polychaetes of the western Indian Ocean for the Field Guide (see Chapter 1);

3. to establish the geographical distribution of the species encountered in Tanzania and examine the existence of 'cosmopolitan' species;

4. provide a basis for further taxonomic research on polychaetes of the western Indian Ocean by making material available for further examination.

## METHODS

Between September 1993 and April 1997 material was collected from the shores around the island of Unguja (main island of Zanzibar, and hereafter referred to as Zanzibar) and from two sites on the island of Mafia (see Fig. 1). Sites were chosen to cover the broad range of littoral habitats and deposits, including coarse mineral sand of wave exposed beaches, fine muds and silts associated with mangrove forests and coarse shelly sand associated with sublittoral fringe seagrass beds. Quantitative sampling and sorting of samples were undertaken by the author with the assistance of first-year undergraduates of the University of Dar es Salaam (P. Ndilahomba and E.M. Machamu) as part of their field studies programme and by a visiting student Sandra Canares. Material was collected from $0.1m^2$ cores, to a depth of 15 cm (as per similar studies in the Arabian Gulf, see Richmond (1994)). Sediments were sieved with a 1 mm plastic sieve and fixed with 15 % formalin solution in the field and later sorted. Non-quantitative sampling was also conducted at numerous additional sites on Zanzibar and on Mafia Island.

Taxa were separated and only the polychaete component is considered here. Preliminary identification of material was conducted by the author and students in Zanzibar, and later by Mr. J. Coppock at the University of Wales – Bangor in January-March 1996. Details of the taxonomic reference material used to identify the fauna are included in the Bibliography. Of particular relevance to the fauna from this area is the work by Day (1967) which included material from southern Moçambique. Other works of particular relevance include Crossland (1903, 1904, 1924) and Fauvel (1919). Assistance with identification was also provided by Dr. A.S.Y. Mackie (Zoology Department, National Museum of Wales – Cardiff). Material was maintained in formalin solution so as to preserve existing colours as much as possible, since these would subsequently be used as a basis for the illustrations depicting species in the contribution of the Field Guide (see Coppock, 1997). Subsequent analysis and sorting of the collection was conducted by the author for this chapter. Specimens of most species are deposited at the National Museum of Wales – Cardiff, with the remainder of the collection to be returned to the Institute of Marine Sciences (University of Dar es Salaam).

## DESCRIPTION OF SITES AND SAMPLING DATES

Sampling for polychaetes was conducted at numeorus sites on the islands of Unguja and Mafia. At four sites on Unguja, transects were established from the upper eulittoral to the sublittoral fringe. Transects were aimed at being re-locatable for future sampling and thus precise details of the bearing and upper shores features of each transect were noted, as were the distances between stations. Sites varied in the number of stations and the number of replicate core samples taken at each. From July-September 1993, 5 soft-substratum transects were established (T1-T4) at the Mazizini Bay (MZ) site, along which 4-5 stations were sampled with 3 replicate cores taken at each. At the Zanzibar Harbour (HB) site a single transect was established in July 1994 and sampled at 4 stations at which 3 replicate cores were taken. In August 1994 on Bawe Island the single transect was sampled at 5 stations, each with 3 replicate core samples. At Nungwi (NG) during July 1994 a single tansect was established with 5 stations and 3 replicate core samples collected at each. At the mangrove sites of Kisakasaka (KS), Mbweni (MB) and Makoba (MK) (all visited between July-August 1995) 5 replicate core samples were taken at a single station, among the mangrove trees, at approximately the mean high water level. All stations have been grouped into approximate tidal heights, as shown in Table 1.

Additional sites sampled are: Chwaka (middle-eulittoral sandy mud); Mtoni (middle-eulittoral sandy mud); Chumbi Is. (middle-eulittoral sandy rubble); Mafia - Utende (middle to lower eulitttoral sand beach); Mafia - Kinasi (middle - upper sublittoral sand-mud among mangroves *Avicennia* and *Sonneratia*). The location of all sites are shown on Figure 1.

Table 1. Details of sampling stations on Zanzibar from which 0.1 $m^2$ cores samples were taken. Details are divided by tidal levels, hence MHWS (Mean Hgh Water Springs); MHW (Mean High Water); MHWN (Mean High Water Neaps); MTL (Mean Tide Level); MLWN (Mean Low Water Neaps) and MLWS (Mean Low Water Springs).

| Site name, stations and codes | No. cores | Approx. tidal height | Substrate | Epifauna/flora |
|---|---|---|---|---|
| Mazizini MZT1S1 | 3 | MHWS | medium sand (beach) | none. |
| Mazizini MZT2S1 | 3 | MHWS | medium/fine sand (beach) | none. |
| Mazizini MZT3S1 | 3 | MHWS | medium/fine sand (beach) | none. |
| Harbour HBS1 | 3 | MHWS | medium sand (beach) | none. |
| Kisakasaka KS | 5 | MHW | fine sand/mud | mangroves (*Sonneratia*). Numerous *Uca*. |
| Mkoba MK | 5 | MHW | mud | mangroves (*Avicennia* and *Sonneratia*); numerous *Uca*. |
| Mazizini MZT1S2 | 3 | MHW | medium/coarse sand | mostly bare, some seagrasses (*Halodule* and *Halophila*). |
| Mazizini MZT2S2 | 3 | MHW | fine sand | none. |
| Mbweni MB | 5 | MHW | medium/fine sand | mangroves (*Avicennia* and *Sonneratia*); *Clypeomorus* and *Uca* common. |
| Nungwi NGS1 | 3 | MHWN | fine sand | mostly bare (some *Halodule*). |
| Harbour HBS2 | 3 | MHWN | medium sand | none (anoxic below 10 cm). |
| Bawe Is. BWS1 | 3 | MHWN | coarse sand and rubble | mostly bare (some *Padina*). |
| Mazizini MZT3S2 | 3 | MHWN | fine sand | seaward of mangroves (*Avicennia* and *Sonneratia*); mostly bare (some *Uca*). |
| Bawe BWS2 | 3 | MTL | medium sand and rubble | partly dominated by *Sargassum* and *Halodule*. |
| Mazizini MZT1S3 | 3 | MTL | medium shelly sand | mostly seagrasses (*Cymodocea* and *Halodule*); some hermit crabs (*Calcinus*), holothurians. |
| Nungwi NGS2 | 3 | MTL | fine sand and rubble | mostly bare; some *Halodule* and *Sargasssum*. |

Table 1. (continued)

| Site name, station and codes | No. cores | Approx. tidal height | Substrate | Epifauna/flora |
|---|---|---|---|---|
| Mazizini MZT2S3 | 3 | MTL | medium sand | mostly seagrasses (*Cymodocea* and *Halodule*); few holothurians. |
| Mazizini MZT3S3 | 3 | MTL | fine sand | mostly bare; some *Halodule*; numerous burrows and hermit crabs (*Calcinus* spp.). |
| Nungwi NGS3 | 3 | MTL | fine sand | mostly bare, some seagrasses (*Cymodocea* and *Halodule*). |
| Bawe Is. BWS3 | 3 | MTL | sandy mud over rock | mostly seagrasses (*Cymodocea* and *Thalassia*). |
| Harbour HBS3 | 3 | MTL | sand | loose *Ulva* on surface; sand anoxic below 10 cm. |
| Mazizini MZT1S4 | 3 | MLWN | shelly sand | mostly seagrasses (*Cymodocea*, *Halodule*, *Thalassia*); some *Pinna* echinoderms and scleractinians. |
| Mazizini MZT2S4 | 3 | MLWN | shelly sand | mostly seagrasses (*Syringodium*, *Cymodocea*, *Thalassia*); some echinoderms, scleractinians, *Pinna*. |
| Mazizini MZT3S4 | 3 | MLWN | shelly sand | mostly seagrasses (*Cymodocea*, *Halodule*, *Thalassia*, *Halophila*); some *Nassarius*, *Pinna*. |
| Bawe Is. BWS4 | 3 | MLWN | sand and rubble | mostly *Sargasssum*. |
| Bawe Is. BWS5 | 3 | MLWN | sand and rubble | mostly bare; some seagrassses (*Cymodocea*, *Thalassia*, *Syringodium Thalassodendron*,) and *Sargasssum*. |
| Nungwi NGS4 | 3 | MLWN | fine sand | mostly bare; some seagrasses (*Cymodocea*, *Halodule*, *Thalassia*) and *Sargasssum*. |
| Nungwi NGS5 | 3 | MLWN | fine sand | mostly bare; some seagrasses (*Cymodocea*, *Halodule*, *Thalassia*) and *Sargasssum*. |
| Mazizini MZT2S5 | 3 | MLWS | shelly sand | mostly seagrassses (*Cymodocea*, *Thalassodendron*, *Syringodium*); some echinoderms, scleractinians. |
| Mazizini MZT3S5 | 3 | MLWS | shelly sand | mostly seagrasses (*Halodule*, *Thalassia*); some macroalgae plus bivalves (*Anadara*), asteroids. |
| Harbour HBS4 | 3 | MLWS | medium sand | none (anoxic below 5 cm). |

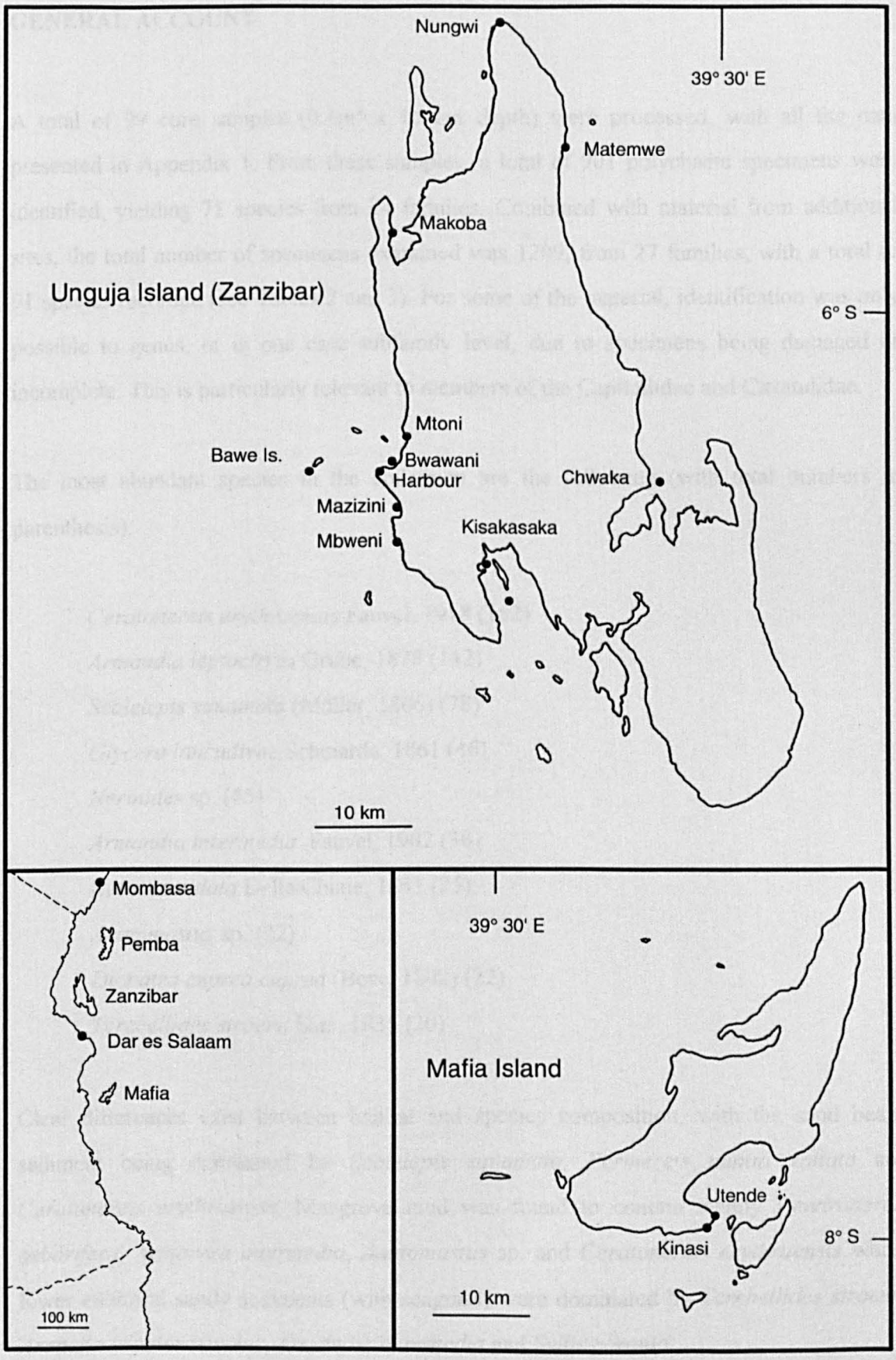


Figure 1. The islands of Zanzibar and Mafia showing locations of sampling sites (•). Note: the southernmost sites at Kisakasaka is situated in a mangrove channel which was not sampled quantitatively.

# RESULTS

## GENERAL ACCOUNT

A total of 99 core samples ($0.1m^2$ x 15 cm depth) were processed, with all the data presented in Appendix 1. From these samples, a total of 901 polychaete specimens were identified, yielding 71 species from 24 families. Combined with material from additional sites, the total number of specimens examined was 1209, from 27 families, with a total of 91 species recorded (see Tables 2 and 3). For some of the material, identification was only possible to genus, or in one case subfamily level, due to specimens being damaged or incomplete. This is particularly relevant to members of the Capitellidae and Cirratulidae.

The most abundant species in the collection are the following (with total numbers in parenthesis):

*Ceratonereis erythraensis* Fauvel, 1918 (152)
*Armandia leptocirrus* Grube, 1878 (142)
*Scolelepis squamata* (Müller, 1806) (78)
*Glycera lancadivae* Schmarda, 1861 (46)
*Nerinides* sp. (45)
*Armandia intermedia* Fauvel, 1902 (30)
*Nereis caudata* Delle Chiaje, 1841 (25)
*Anatomastus* sp. (22)
*Diopatra cuprea cuprea* (Bosc, 1802) (22)
*Terebellides stroemi* Sars, 1835 (20)

Clear differences exist between habitat and species composition, with the sand beach sediment being dominated by *Scolelepis squamata*, *Perinereis nuntia vallata* and *Ceratonereis erythraensis*. Mangrove mud was found to contain mainly *Dendronereis arborifera*, *Armandia intermedia*, *Anatomastus* sp. and *Ceratonereis erythraensis* whilst lower eulittoral sandy sediments (with seagrass) were dominated by *Terebellides stroemi*, *Arabella iricolor iricolor*, *Armandia intermedia* and *Syllis cornuta*.

Table 2. List of polychaete families and species recorded from Zanzibar and Mafia Islands, with numbers recorded from core samples and additional sites together with the total numbers for each species.

| FAMILY | SPECIES | No. (cores) | No. (add. sites) | No. total |
|---|---|---|---|---|
| APHRODITIDAE | *Aphrogenia* sp. | 7 | - | 7 |
| POLYNOIDAE | Harmothoinae sp. | 1 | - | 1 |
| | *Gastrolepidia clavigera* Schmarda, 1861 | - | 2 | 2 |
| | *Iphione* cf. *muricata* (Savigny, 1818) | 1 | 1 | 2 |
| | *Lepidonotus temisetosus* (Gravier, 1901) | - | 4 | 4 |
| SIGALIONIDAE | *Sthenelais boa* (Johnston, 1839) | 4 | - | 4 |
| AMPHINOMIDAE | *Chloeia* sp. | - | 1 | 1 |
| | *Eurythoe complanata* (Pallas, 1766) | - | 54 | 54 |
| | *Notopygos* sp. | - | 1 | 1 |
| PHYLLODOCIDAE | *Phyllodoce* cf. *capensis* Day, 1960 | 1 | - | 1 |
| | *Phyllodoce* cf. *castanea* (Marenzeller, 1879) | 2 | - | 2 |
| | *Phyllodoce* sp. | 8 | - | 8 |
| PILARGIDAE | *Ancistrosyllis parva* Day, 1963 | 2 | - | 2 |
| SYLLIDAE | *Opisthosyllis* sp. | - | 3 | 3 |
| | *Pharyngeovalvata natalensis* Day, 1951 | 1 | - | 1 |
| | *Syllis* cf. *amica* Quatrefages, 1865 | 1 | - | 1 |
| | *Syllis bouvieri* Gravier, 1900 | 5 | - | 5 |
| | *Syllis cornuta* Rathke, 1843 | 8 | - | 8 |
| | *Syllis* cf. *gracilis* Grube, 1840 | 1 | - | 1 |
| | *Syllis* cf. *prolifera* Krohn, 1852 | 2 | 1 | 3 |
| | *Syllis variegata* Krohn, 1852 | - | 3 | 3 |
| | *Syllis* sp. juv. | 1 | - | 1 |
| NEREIDAE | *Ceratonereis erythraensis* Fauvel, 1918 | 152 | 9 | 161 |
| | *Ceratonereis mirabilis* Kinberg, 1866 | 4 | - | 4 |
| | *Dendronereis arborifera* Peters, 1854 | 78 | 4 | 82 |
| | *Namalycastis indica* (Southern, 1921) | 1 | - | 1 |
| | *Nereis caudata* Delle Chiaje, 1841 | 25 | 1 | 26 |
| | *Nereis coutieri* Gravier, 1899 | 3 | - | 3 |
| | *Nereis persica* Fauvel, 1911 | 1 | 4 | 5 |
| | *Nereis unifasciata* Willey, 1905 | 8 | 1 | 9 |
| | *Perinereis nigropunctata* (Horst, 1889) | - | 7 | 7 |
| | *Perinereis nuntia vallata* (Grube, 1857) | 15 | 21 | 36 |
| | *Platynereis isolita* Gravier, 1901 | 12 | 1 | 13 |
| | *Platynereis pulchella* Gravier, 1901 | 3 | - | 3 |
| | *Platynereis* sp. | 4 | - | 4 |
| GLYCERIDAE | *Glycera convoluta* Keferstein, 1862 | - | 7 | 7 |
| | *Glycera lancadivae* Schmarda, 1861 | 46 | - | 46 |
| EUNICIDAE | *Eunice antennata* (Savigny, 1820) | 4 | 4 | 8 |
| | *Eunice indica* Kinberg, 1865 | 2 | - | 2 |
| | *Lysidice collaris* Grube, 1870 | 1 | - | 1 |
| | *Marphysa bifurcata* Kott, 1951 | 1 | - | 1 |
| | *Marphysa mossambica* (Peters, 1854) | 12 | 21 | 33 |
| | *Nematoneries unicornis* (Grube, 1840) | 4 | - | 4 |
| OENONIDAE | *Arabella iricolor iricolor* (Montagu, 1804) | 13 | 4 | 17 |
| | *Drilonereis monroi* Day, 1960 | - | 3 | 3 |
| | *Notocirrus australis* Day, 1960 | 3 | - | 3 |
| | *Oenone fulgida* (Savigny, 1818) | - | 1 | 1 |
| | *Oenone* sp. | 2 | 1 | 3 |
| LUMBRINERIDAE | *Lumbrineris latreilli* Audouin & M. Edwards, 1834 | 7 | - | 7 |
| ONUPHIDAE | *Diopatra cuprea cuprea* (Bosc, 1802) | 22 | 1 | 23 |

Table 2. (continued)

| FAMILY | SPECIES | No. (cores) | No. (add. sites) | No. total |
|---|---|---|---|---|
| SPIONIDAE | *Aonides oxycephala* (Sars, 1862) | 6 | - | 6 |
| | *Malacoceros indicus* (Fauvel, 1928) | 4 | - | 4 |
| | *Nerinides* sp. | 45 | 3 | 48 |
| | *Prionospio* cf. *convexa* Imajima, 1990 | 5 | - | 5 |
| | *Prionospio malmgreni* Claparéde, 1870 | 4 | - | 4 |
| | *Prionospio sexoculata* Augener, 1918 | 2 | - | 2 |
| | *Scolelepis squamata* (Müller, 1806) | 55 | 2 | 57 |
| | *Spio* sp. | 1 | - | 1 |
| MAGELONIDAE | *Magelona* sp. | 1 | - | 1 |
| POECILOCHAETIDAE | *Poecilochaetus serpens* Allen, 1904 | 1 | - | 1 |
| CIRRATULIDAE | *Caulleriella* sp. | 4 | - | 4 |
| | *Cirratulus* sp. | 14 | - | 14 |
| | *Cirriformia* sp. | 3 | 14 | 17 |
| ORBINIDAE | *Naineris laevigata* (Grube, 1855) | - | 3 | 3 |
| | *Scoloplos capensis* Day, 1961 | 1 | 1 | 2 |
| | *Scoloplos* cf. *uniramus* Day, 1961 | 4 | 1 | 5 |
| | Orbinidae sp. juv. | 4 | - | 4 |
| PARAONIDAE | *Paraonis* sp. | 1 | - | 1 |
| OPHELIDAE | *Armandia intermedia* Fauvel, 1902 | 30 | 12 | 42 |
| | *Armandia leptocirrus* Grube, 1878 | 142 | - | 142 |
| | *Armandia melanura* Gravier, 1905 | 8 | 1 | 9 |
| | *Polyophthalmus pictus* (Dujardin, 1839) | 2 | - | 2 |
| CAPITELLIDAE | *Anatomastus* sp. | 22 | - | 22 |
| | *Capitella* cf. *capitata* (Fabricius, 1780) | 5 | - | 5 |
| | Capitellid sp. | 14 | 19 | 33 |
| | *Dasybranchus caducus* (Grube, 1846) | 5 | - | 5 |
| | *Heteromastides* sp. | 1 | - | 1 |
| | *Mediomastus* sp. | 7 | 2 | 9 |
| | *Notomastus latericeus* Sars, 1851 | 2 | - | 2 |
| OWENIIDAE | *Owenia fusiformis* Delle Chiaje, 1844 | - | 2 | 2 |
| AMPHARETIDAE | *Amphicteis gunneri* (Sars, 1835) | 2 | - | 2 |
| TEREBELLIDAE | *Loimia medusa* (Savigny, 1820) | - | 9 | 9 |
| | *Nicolea venustula africana* Augener, 1918 | 14 | - | 14 |
| | *Terebella pterochaeta* Schmarda, 1861 | - | 1 | 1 |
| | *Thelepus plagiostoma* (Schmarda, 1861) | - | 1 | 1 |
| | *Thelepus setosus* (Quatrefages, 1865) | - | 1 | 1 |
| | Terebellid sp. 1 | 2 | 1 | 3 |
| | Terebellid sp. 2 | - | 1 | 1 |
| TRICHOBRANCHIDAE | *Terebellides stroemi* Sars, 1835 | 20 | - | 20 |
| SABELLIDAE | *Branchioma violacea* (Schmarda, 1861) | - | 73 | 73 |
| | *Jasmineira elegans* Saint-Joseph, 1894 | 2 | - | 2 |
| SERPULIDAE | *Hydroides* cf. *heteroceros* (Grube, 1868) | - | 1 | 1 |
| | Totals | 901 | 308 | 1209 |

Table 3. Summary of number of genera and species for the 27 families of polychaetes collected from Zanzibar and Mafia, Tanzania.

| FAMILY | Genera | Species |
|---|---|---|
| Aphroditidae | 1 | 1 |
| Polynoidae | 4 | 4 |
| Sigalionidae | 1 | 1 |
| Amphinomidae | 3 | 3 |
| Phyllodocidae | 1 | 3 |
| Pilargidae | 1 | 1 |
| Syllidae | 3 | 8 |
| Nereidae | 6 | 13 |
| Glyceridae | 1 | 2 |
| Eunicidae | 4 | 6 |
| Oenonidae | 4 | 5 |
| Lumbrineridae | 1 | 1 |
| Onuphidae | 1 | 1 |
| Spionidae | 6 | 8 |
| Magelonidae | 1 | 1 |
| Poecilochaetidae | 1 | 1 |
| Cirratulidae | 3 | 3 |
| Orbinidae | 3 | 4 |
| Paraonidae | 1 | 1 |
| Ophelidae | 2 | 4 |
| Capitellidae | 7 | 7 |
| Oweniidae | 1 | 1 |
| Ampharetidae | 1 | 1 |
| Terebellidae | 6 | 7 |
| Trichobranchidae | 1 | 1 |
| Sabellidae | 2 | 2 |
| Serpulidae | 1 | 1 |
| Totals | 67 | 91 |

Of the 27 families included in the collection, the Nereidae comprised the largest number of species (13) from 6 genera. Other families with high numbers of genera were the Spionidae (6), Capitellidae (7), Terebellidae (6). Twelve families were represented by single species.

The densities of individual species varied greatly, with highest values recorded for *Armandia leptocirrus* which occured at the greatest densities (up to 131 per $0.1m^2$) in fine sand in the middle eulittoral on the north coast of Zanzibar at Nungwi. In general, species numbers were lowest at the stations highest on the shore, and increased from the upper shore to the middle eulittoral (MTL) then dropped slightly towards the sublittoral fringe (MLWS), as shown below (Table 4).

Table 4. Numbers of species and mean abundance (0.1 $m^{-2}$) at each tidal level with numbers of replicate cores taken at each level.

| Tidal level | MHWS | MHW | MHWN | MTL | MLWN | MLWS |
|---|---|---|---|---|---|---|
| Total no.species | 6 | 20 | 13 | 40 | 32 | 28 |
| Mean abundance of individuals | 5.08 | 10.43 | 10.67 | 14.39 | 2.9 | 11.2 |
| No. replicate cores | 12 | 21 | 12 | 23 | 21 | 9 |

## ANALYSIS OF SPECIES DISTRIBUTIONS

Of the 91 species recorded in this study, 27 (29 %) occur at localities between eastern Africa and the west Pacific or beyond. An additional 20 species (22 %) are recorded from littoral or shallow sublittoral localities in the Indo-Pacifc region as well as localities in the Atlantic, and are considered to be 'cosmopolitan' (see Table 5). Fuller zoogeographical records are given in the Systematic Account (see below).

Table 5. List of species recorded from the present study and considered to be 'cosmopolitan' in distribution.

Family SYLLIDAE
*Syllis* cf. *amica* Quatrefages, 1865
*Syllis* cf. *gracilis* Grube, 1840
*Syllis* cf. *prolifera* Krohn, 1852
*Syllis variegata* Krohn, 1852
Family NEREIDAE
*Nereis caudata* Delle Chiaje, 1841
Family GLYCERIDAE
*Glycera convoluta* Keferstein, 1862
Family LUMBRINERIDAE
*Lumbrineris latreilli* Aud. & M. Ed. 1834
Family SPIONIDAE
*Aonides oxycephala* (Sars, 1862)
*Prionospio malmgreni* Claparéde, 1870
*Scolelepis squamata* (Müller, 1806)
Family POECILOCHAETIDAE
*Poecilochaetus serpens* Allen, 1904
Family OPHELIDAE
*Polyophthalmus pictus* (Dujardin, 1839)
Family CAPITELLIDAE
*Capitella* cf. *capitata* (Fabricius, 1780)
*Notomastus latericeus* Sars, 1851
Family OWENIDAE
*Owenia fusiformis* Delle Chiaje, 1844
Family AMPHARETIDAE
*Amphicteis gunneri* (Sars, 1835)
Family TEREBELLIDAE
*Loimia medusa* (Savigny, 1820)
*Thelepus plagiostoma* (Schmarda, 1861)
*Thelepus setosus* (Quatrefages, 1865)
Family TRICHOBRANCHIDAE
*Terebellides stroemi* Sars, 1835

## SYSTEMATIC ACCOUNT

Records indicate numbers of specimens (in parenthesis) from all sites and stations sampled. Abbreviations used: T1-T3 specific transects at Mazizini; S1-S5 stations along specific transects; C1-C5 replicate core samples. Details of all sampling stations are provided in Table 1. Distribution information is mostly based on Day (1967) with the following symbols indicating level on shore: i – intertidal; e – estuarine; s –shallow; d – deep; vd – very deep; a – abyssal. Additional distribution data with sources are included. The abbreviation NHM refers to zoogeographic records from specimens held at the Natural History Museum (London). Numbers of specimens deposited with the National Museum of Wales – Cardiff follows the abbreviation NMW.

### Family APHRODITIDAE

*Aphrogenia* sp.

Records: Zanzibar – Mazizini:T2S4C2 (1), T3S4C3 (1), T2S5C2 (2), T2S5C1 (2); Bawe S4C1 (1).

Number of specimens: 7.

Habitat: lower eulittoral in shelly sand and seagrass.

Note: specimen T3S4C3 (1) deposited with NHM.

### Family POLYNOIDAE

**Harmothoinae** sp.

Records: Zanzibar – Mazizini:T2S5C1 (1).

Number of specimens: 1.

Habitat: sublittoral fringe in sand and seagrass.

Note: specimen lacking elytra.

*Gastrolepidia clavigera* Schmarda, 1861

Records: Zanzibar – Mazizini, on *Holothuria atra* sea cucumber (2).

Number of specimens: 2.

Habitat: commensal on holothurian lower eulittoral.

Distribution: Indo-Pacific.

*Iphione* cf. *muricata* (Savigny, 1818)

Records: Zanzibar – Bawe S4C1 (1), Bawe (1)

Number of specimens: 2. NMW (1).

Habitat: mid-eulittoral sand mud (mangroves).

Distribution: Indo-Pacific and Mombasa Day (1962); Aldabra (Hughes & Gamble, 1977).

*Lepidonotus tenuisetosus* (Gravier, 1901)

Records: Zanzibar – Kisakasaka (4).

Number of specimens: 4. NMW (1).

Habitat: mangrove channel.

Distribution: Indo-Pacific.

## Family SIGALIONIDAE

*Sthenelais boa* (Johnston, 1839)

Records: Zanzibar – Mazizini:T3S5C3 (1), T3S5C1 (1), T3S5C2 (1), T2S4C2 (1).

Number of specimens: 4. NMW (1).

Habitat: lower eulittoral and sublittoral fringe in sand (seagrass).

Distribution: Day (1967) recorded: SW Africa (i,s), Cape (i,s) to Natal (i), Moçambique (i), Madagascar (s) "fairly common in sand among stones"; Aldabra (Hughes & Gamble, 1977); Australia (Day & Hutchings, 1977).

## Family AMPHINOMIDAE

*Chloeia* sp.

Records: Zanzibar – off Harbour, 15 m: (1).

Number of specimens: 1.

Habitat: sublittoral (15 m) on sand. Caught in baited (fish) trap with funnel entrance set for isopods.

Note: specimen photographed live, and despite species identifications largely based on colour pattern. None of the descriptions of patterns of existing species fit this specimen. Collected by Dr. Neil Bruce.

***Eurythoe complanata*** (Pallas, 1766)

Records: Zanzibar – Kisakasaka (51); Chumbi (2); Matemwe (1).

Number of specimens: 54.

Habitat: mangrove channel among algae (Kisakasaka), mid-eulittoral on sand (Chumbi) and reef crest (Matemwe).

Distribution: Circumtropical.

Note: entire Kisakasaka sample comprised of juveniles 5-30 mm in length. Reef crest specimen from Matemwe 200 mm in length. At the latter site this species is commonly encountered during spring-low tide, often seen dragging foliaceous green alagae (*Ulva* sp.) into burrows.

***Notopygos*** sp.

Zanzibar – Chumbe (1).

Number of specimens:1.

Habitat: mid-eulittoral sandy gravel.

Note: *N. variabilis* (Potts) recorded from Aldabra (Hughes & Gamble, 1977).

## Family PHYLLODOCIDAE

***Phyllodoce*** cf. ***capensis*** Day, 1960

Records: Zanzibar – Nungwi S2C2 (1).

Number of specimens: 1.

Habitat: mid-eulittoral in fine sand.

Distribution: Day (1967) recorded: Cape (s).

***Phyllodoce*** cf. ***castanea*** (Marenzeller, 1879)

Records: Zanzibar – Bawe S5C3 (2).

Number of specimens: 2. NMW (1).

Habitat: mid-eulittoral in mud (mangroves).

Distribution: Indo-Pacifc.

***Phyllodoce*** sp.

Records: Zanzibar – Mazizini:T3S2C3 (1), T3S2C1 (1), T3S3C2 (1); Nungwi S2C3 (3); Harbour S3C2 (1); Bawe S5C3 (1).

Number of specimens: 8. NMW (1).

Habitat: mid-eulittoral to sublittoral fringe in fine and coarse sand (seagrass).

## Family PILARGIDAE

***Ancistrosyllis parva*** Day, 1963

Records: Zanzibar – Mazizini:T2S4C2 (1), T3S4C3 (1).

Number of specimens: 2. NMW (1).

Habitat: lower eulittoral in sand (seagrass).

Distribution: Day (1967) recorded: Cape (s), Natal (s,d).

## Family SYLLIDAE

***Opisthosyllis*** sp.

Records: Mafia – Utende (3).

Number of specimens: 3. NMW (1).

Habitat: mid-eulittoral in medium sand.

Note: *O. laevis* Day recorded from Aldabra (Hughes & Gamble, 1977).

***Pharyngeovalvata natalensis*** Day, 1951

Records: Zanzibar – Bawe S2C1 (1).

Number of specimens: 1.

Habitat: mid-eulittoral in mud (mangrove).

Distribution: Day (1967) recorded: Cape (s), Natal (i).

***Syllis*** cf. ***amica*** Quatrefages, 1865

Records: Zanzibar – T1S4C1 (1).

Number of specimens: 1.

Habitat: lower eulittoral in sand (seagrass)

Distribution: Day (1967) recorded: Natal (i). Plus Ireland, English Channel, Madeira, Mediterranean (i,s).

***Syllis bouvieri*** Gravier, 1900

Records: Zanzibar – Mazizini:T3S5C1 (4), T2S4C1 (1).

Number of specimens: 5. NMW (1).

Habitat: lower eulittoral and sublittoral fringe in coarse sand (seagrass).

Distribution: Day (1967) recorded: Madagascar (i). Plus: Gulf of Aden. Day (1962) Mauritius.

***Syllis cornuta*** Rathke, 1843

Records: Zanzibar - Mazizini:T2S4C2 (1), T2S5C2 (1), T2S4C1 (1), T2S5C1 (4), T3S5C1 (1).

Number of specimens: 8. NMW (3).

Habitat: lower eulittoral and sublittoral fringe in sand (seagrass).

Distribution: Day (1967) recorded: Cape (i,d), Natal (i), Moçambique (i) fairly common.

***Syllis*** cf. ***gracilis*** Grube, 1840

Records: Zanzibar – T1S4C1 (1).

Number of specimens: 1.

Habitat: lower eulittoral in sand (seagrass).

Distribution: Cosmopolitan.

***Syllis*** cf. ***prolifera*** Krohn, 1852

Records: Zanzibar – Chumbi (1); Bawe S4C2 (1), S2C2 (1).

Number of specimens: 3. NMW (1).

Habitat: mid-eulittoral in medium sand and mud (mangroves).

Distribution: Cosmopolitan, including Aldabra (Hughes & Gamble, 1977).

***Syllis variegata*** Grube, 1860

Records: Zanzibar – Kisakasaka (3).

Number of specimens: 3. NMW (1).

Habitat: mangrove channel.

Distribution: Cosmopolitan, including Aldabra (Hughes & Gamble, 1977).

*Syllis* sp. (juv.)

Records: Zanzibar – Bawe S3C1 (1).

Number of specimens: 1.

Habitat: mid-eulittoral in mud (mangroves).

**Family NEREIDAE**

***Ceratonereis erythraensis*** Fauvel, 1918

Records: Zanzibar – Mazizini:T1S1C2 (13), T1S2C3 (2), T3S1C3 (2), T3S3C2 (22), T1S2C1 (1), T2S2C1 (22), T3S2C1 (4), T3S2C3 (8), T1S2C2 (6), T3S3C3 (7), T2S2C2 (12); Mbweni C1 (33), C2 (16); Chwaka (2); Bawe S4C2 (3); Harbour S3C1 (1); Mafia – Utende (9).

Number of specimens: 161. NMW (10;4).

Habitat: upper to mid-eulittoral in medium sand (seagrass), organically enriched sand, and mud (mangrove).

Distribution: SW Africa and Indo-Pacific.

***Ceratonereis mirabilis*** Kinberg, 1866

Records: Zanzibar – Mazizini:T1S3C2 (1), T2S5C1 (1); Bawe S3C1 (1), S4C2 (1).

Number of specimens: 4.

Habitat: mid-eulittoral to sublittoral fringe in sand (seagrass) and mud (mangrove).

Distribution: Indo-Pacific; Mombasa (Day, 1962); Aldabra (Hughes & Gamble, 1977)

***Dendronereis arborifera*** Peters, 1854

Records: Zanzibar – Mazizini:T1S2C1 (5), T1S2C2 (3), T2S2C2 (2), T2S4C2 (1), T3S2C1 (25), T3S2C3 (6); Mbweni C5 (1), C4 (1), C2 (10), C1 (13); Makoba C4 (6), C2 (1); Bwawani: (2); Harbour S3C2 (4); Mafia – Utende: (2).

Number of specimens: 82. NMW (5;5).

Habitat: mid-to lower eulittoral in sand (seagrass), sand (organically enriched), mud (mangroves).

Distribution: Day (1967) recorded: Eastern Cape (e), Natal (e), Moçambique (e) – common in black mud among mangroves. Plus: Moçambique (e), Madagascar (e).

*Namalycastis indica* (Southern, 1921)

Records: Zanzibar – Makoba C1 (1).

Number of specimens: 1.

Habitat: mid-eulittoral mud (mangroves).

Distribution: Day (1967) recorded: Natal (e) to Moçambique (e) – few specimens in muddy sand of estuaries. Plus: India (e), Macassar (e), Andamans (e).

*Nereis caudata* Delle Chiaje, 1841

Records: Zanzibar – Harbour S3C1 (25); Mafia – Kinasi (1).

Number of specimens: 26. NMW (5).

Habitat: mid-eulittoral in fine sand (mangrove) and medium sand (organically polluted).

Distribution: Day (1967) recorded: Cape (i,s) "rare"; plus N Atlantic (i,s), Mediterranean, S California (s), Mexico, Tasmania, New Zealand (s); Aldabra (Hughes & Gamble, 1977); Australia (Day & Hutchings, 1977).

*Nereis coutieri* Gravier, 1899

Records: Zanzibar – Bawe S2C1 (2); Nungwi S1C3 (1).

Number of specimens: 3. NMW (1).

Habitat: upper to mid-eulittoral in fine sand and mud (mangrove).

Distribution: Day (1967) recorded: Natal (i), Moçambique (i) – occasional specimens on rocky shores.

*Nereis persica* Fauvel, 1911

Records: Zanzibar – Harbour S1C3 (1); Yacht 'Starfish' (4).

Number of specimens: 5. NMW (1).

Habitat: mid-eulittoral in medium sand (organically enriched) and shallow sublittoral (fouling on vessel which had sailed from South Africa to Zanzibar within 2 months prior to sampling).

Distribution: Day (1967) recorded: Cape (s), Natal (s), Moçambique (s), Madagascar (s). Plus: Red Sea and Indo-Pacific (i,s). Hartman (1974): Arabian Sea (55-72 m).

*Nereis unifasciata* Willey, 1905

Records: Zanzibar – Harbour (1); Mazizini:T2S1C1 (8).

Number of specimens: 9. NMW (1).

Habitat:upper eulittoral in medium sand.

Distribution: Indo-Pacific.

*Perinereis nigropunctata* (Horst, 1889)

Records: Zanzibar – Bawe S2C1 (3); Kisakasaka (4).

Number of specimens: 7. NMW (2).

Habitat: mid-eulittoral in mud (mangroves).

Distribution: Indo-Pacific. Day (1962): Mombasa.

*Perinereis nuntia vallata* (Grube, 1857)

Records: Zanzibar – Chwaka (4); Harbour S1C3 (1); Mbweni C4 (4); Mazizini (1); Mazizini: T1S1C1 (3), T1S1C3 (1), T3S1C2 (1), T2S1C3 (5); Mafia – Utende (16).

Number of specimens: 36. NMW (5;5).

Habitat: upper to mid-eulittoral in sand (seagrass) and mud (mangroves).

Distribution: Day (1967) recorded: SW Africa (i), Cape (i,e), Moçambique (e) – fairly common under stones near high tide mark. Plus: Red Sea, Indian Ocean, S Pacific, New Zealand (e,i), Chile (i).

*Platynereis isolita* Gravier, 1901

Records: Zanzibar – Mazizini:T1S2C2 (2), T1S2C1 (6), T2S5C1 (1), T2S3C3 (1); Chumbi (1); Bawe S4C2 (1); S1C1 (1).

Number of specimens: 13. NMW (2).

Habitat: mid-eulittoral to sublittoral fringe in sand (seagrass) and mud (mangrove).

Distribution: Day (1967) recorded: Moçambique (i,e), Madagascar (s). Plus: Red Sea (i), Sri lanka, Madras, Andaman Is.; Aldabra (Hughes & Gamble, 1977); Austalia (Day & Hutchings, 1977).

*Platynereis pulchella* Gravier, 1901

Records: Zanzibar – Mazizini:T2S5C2 (1), T2S5C3 (1), T1S3C2 (1).

Number of specimens: 3.

Habitat: mid-eulittoral to sublittoral fringe in sand (seagrass).

Distribution: Red Sea, Arabian Gulf, Arabian Sea, Indo-China (Day, 1967).

***Platynereis*** sp.

Records: Zanzibar – Mazizini:T3S5C1 (1), T2S5C2 (1); Nungwi S5C3 (1), S3C2 (1).

Number of specimens: 4.

Habitat: mid-eulittoral to sublittoral fringe in sand (seagrass).

## Family GLYCERIDAE

***Glycera convoluta*** Keferstein, 1862

Records: Zanzibar – Chwaka (1); Mafia – Utende (6).

Number of specimens: 7. NMW (2).

Habitat: mid-eulittoral in medium sand.

Distribution: Cosmopolitan.

***Glycera lancadivae*** Schmarda, 1861

Records: Zanzibar – Nungwi: S3C2 (3), S1C3 (2), S1C1 (1), S2C2 (4), S3C1 (3), S4C1 (2), S2C3 (2); Bawe S4C3 (1), S2C2 (1), S1C3 (1); Mazizini:T2S4C3 (1), T2S5C1 (4), T1S4C1 (1), T1S3C3 (4), T2S3C1 (2), T3S3C1 (1), T2S3C2 (2), T1S3C1 (4), T3S3C3 (1), T3S5C3 (1), T2S2C2 (1), T3S2C3 (1), T1S3C2 (1), T2S2C3 (2).

Number of specimens: 46. NMW (3;3).

Habitat: upper-eulittoral to sublittoral fringe in mud (mangroves) from fine to coarse sand.

Distribution: Day (1967) recorded Madagascar (i). Plus: tropical Indian Ocean (i,s), New Caledonia (i); Aldabra (Hughes & Gamble, 1977); Cook Islands, "found in the lagoon, in a wide range of deposits" (Gibbs, 1972); Australia (Day & Hutchings, 1977).

## Family EUNICIDAE

***Eunice antennata*** (Savigny, 1820)

Records: Zanzibar – Bawe S4C2 (1), S4C3 (2), S5C2 (1); Kisakasaka (4).

Number of specimens: 8. NMW (2).

Habitat: mid-eulittoral to sublittoral fringe, in medium to fine sand and mud (mangroves).

Distribution: Day (1967) recorded: Cape (i), Natal (i), Moçambique (i) and Madagascar (i). Plus: Gulf of Suez (i), Red Sea (i,s), tropical Indo-Pacific (i,s), southern California, Senegal (s), North Carolina (s); NHM: New Zealand, Arabian Gulf. Crossland (1904) recorded in Chwaka Bay (Zanzibar) as very common.

***Eunice indica*** Kinberg, 1865

Records: Zanzibar – Mazizini:T3S5C3 (1); Harbour S3C3 (1).

Number of specimens: 2.

Habitat: mid-eulittoral to sublittoral fringe in sand (and seagrass), including organically enriched.

Distribution: Day (1967) recorded: Moçambique, Madagascar (i). Plus Red Sea (i,s) and tropical Indo-Pacific (i,s,d,vd). Crossland (1904) recorded Chwaka Bay (Zanzibar).

***Lysidice collaris*** Grube, 1870

Records: Zanzibar – Mazizini: T1S3C1 (1).

Number of specimens: 1.

Habitat: mid-eulittoral in sand (seagrass).

Distribution: Cape and Indo-Pacific.

***Marphysa bifurcata*** Kott, 1951

Records: Zanzibar – T2S5C3 (1).

Number of specimens: 1.

Habitat: sublittoral fringe sand (seagrass).

Distribution: Day (1967) recorded: Moçambique (s). Plus: SW Australia.

***Marphysa mossambica*** (Peters, 1854)

Records: Zanzibar - Harbour S3C1 (3), S3C2 (1), S3C3 (3); Mbweni C4 (1); Mbweni C2 (2); Mazizini:T2S2C3 (1), T4S2Q1 (1); Chwaka (8); Bwawani (3). Mafia – Utende (10).

Number of specimens: 33. NMW (1;1).

Habitat: mid to upper eulittoral, in medium sand and fine mud (mangroves).

Distribution: Indo-Pacific, including Aldabra (Hughes & Gamble, 1977).

Note: regularly used as fish bait on Zanzibar. Crossland (1903) states '..occurs abundantly in Chuaka Bay, Zanzibar... well above low-water mark.' He also noted their use as fish bait.

*Nematoneries unicornis* (Grube, 1840)

Records: Zanzibar – Mazizini:T2S5C1 (3); Mazizini:T3S5C2 (1).

Number of specimens: 4. NMW (2).

Habitat: sublittoral fringe in sand (seagrass).

Distribution: Day (1967) recorded: Natal (i) and Madagascar (e); plus North Atlantic, Morocco, Mediterranean, Suez Canal, Indo-Pacific.

## Family OENONIDAE

*Arabella iricolor iricolor* (Montagu, 1804)

Records: Zanzibar - Mazizini:T3S5C1 (4), T3S5C2 (5), T3S5C3 (3), T2S5C1 (1); Mafia - Utende (4).

Number of specimens: 17. NMW (5)

Habitat: mid-eulittoral to sublittoral fringe, in medium to shelly sand and seagrass.

Distribution: Cosmopolitan temperate and tropical.

*Drilonereis monroi* Day, 1960

Records: Mafia – Kinasi (3).

Number of specimens: 3. NMW (1).

Habitat: mid-eulittoral in medium to fine sand, among mangroves.

Distribution: Day (1967) recorded: SW Africa (s), Cape (s,d). Plus: Tristan da Cunha (d). Hartman (1974a): Arabian Sea (92-95 m).

*Notocirrus australis* Day, 1960

Records: Zanzibar – Mazizini:T3S3C3 (1), T3S3C1 (1), T2S2C1 (1).

Number of specimens: 3. NMW (1).

Habitat: mid-eulittoral in medium sand.

Distribution: Day (1967) recorded: False Bay, South Africa – single record (s).

***Oenone fulgida*** (Savigny, 1818)

Records: Mafia – Utende (1).

Number of specimens: 1.

Habitat: mid eulittoral in medium sand and seagrass.

Distribution: Day (1967) recorded: Natal (i), Moçambique (i,e,s) and Madagascar (i,s). Plus Suez (i), Red Sea (i,s) and Indo-west-Pacific Sea (i,s). NHM: British East Africa.

***Oenone*** sp.

Records: Zanzibar – Mbweni C4 (1), C1 (1); Mafia – Kinasi (1).

Number of specimens: 3. NMW (2).

Habitat: mid to upper eulittoral in fine sand and mud (mangrove).

Note: possibly juveniles of *O. fulgida* but with long narrow gills.

## Family LUMBRINERIDAE

***Lumbrineris latreilli*** Audouin & Milne Edwards, 1834

Records: Zanzibar – Mazizini:T2S5C2 (2), T3S5C1 (1), T3S5C2 (1), T3S5C3 (1), T3S2C1 (1), T2S3C3 (1).

Number of specimens: 7. NMW (3).

Habitat: mid-eulittoral to sublittoral fringe, in medium to shelly sand and seagrass.

Distribution: Day (1967) recorded: Moçambique (i) – fairly common in sand. Cosmopolitan in temperate and tropical seas (i,s,d); Aldabra (Hughes & Gamble, 1977).

Note: Hartman (1974a) recorded *L. inhacae* Hartman, 1970 off NW Madagascar (34 m), off Madras (15-23 m depth) and in the Bay of Bengal (37 m depth).

## Family ONUPHIDAE

***Diopatra cuprea cuprea*** (Bosc, 1802)

Records: Zanzibar - Harbour S3C3 (5), S4C2 (1), S3C2 (4), S3C1 (7), S4C3 (3); MTL (1); Mazizini:T3S3C1 (1), T3S3C2 (1).

Number of specimens: 23. NMW (1).

Habitat: mid-eulittoral, in medium/coarse sand (organic enriched).

Distribution: Day (1967) recorded: Natal (s), Moçambique (i,e,s). Plus: USA east coast (i), Brazil (i), tropical west Africa (s), tropical Indian Ocean (i,s,d).

## Family SPIONIDAE

***Aonides oxycephala*** (Sars, 1862)

Records: Zanzibar – Mazizini:T3S3C2 (1), T1S2C2 (1), T1S3C1 (4).

Number of specimens: 6.

Habitat: mid-eulittoral in sand (seagrass).

Distribution: Day (1967) recorded: Cape (e,s), Moçambique (i), Madagascar (s). Plus: N. Atlantic, English Channel (i,e), Morocco (s), Mediterranean; Aldabra (Hughes & Gamble, 1977); Australia (Day & Hutchings, 1977); Cook Islands (Gibbs, 1976).

***Malacoceros indicus*** (Fauvel, 1928)

Records: Zanzibar – Mbweni C5 (3), C4 (1).

Number of specimens: 4.

Habitat: mid-eulittoral in mud (mangroves).

Distribution: Day (1967) recorded: Natal (i), Moçambique (i,e). Plus: India (i,e), New Caledonia; Aldabra (Hughes & Gamble, 1977); Cook Islands "found in extremely dense numbers in the eulittoral" (Gibbs, 1972).

***Nerinides*** sp.

Records: Zanzibar - Harbour S2C3 (2), S2C2 (41); Mazizini:T1S3C1 (1), T3S4C3 (1); PL20 (3).

Number of specimens: 48. NMW (5).

Habitat: mid-eulittoral in medium sand (seagrass) and sand (organically enriched).

***Prionospio*** cf. ***convexa*** Imajima, 1990

Records: Zanzibar – Mazizini:T2S4C2 (3), T2S5C1 (1), T3S5C1 (1).

Number of specimens: 5. NMW (1).

Habitat: lower eulittoral in sand (seagrass).

Distribution: Imajima (1990) recorded: Japan (25-57 m).

***Prionospio malmgreni*** Claparède, 1870

Records: Zanzibar – Mazizini:T1S2C3 (2), T1S2C1 (1), T1S3C1 (1).

Number of specimens: 4. NMW (1).

Habitat: mid-eulittoral in medium sand (seagrass)

Distribution: Cosmopolitan.

***Prionospio sexoculata*** Augener, 1918

Records: Zanzibar – Mazizini:T3S5C1 (1), T3S4C3 (1).

Number of specimens: 2.

Habitat: lower eulittoral and sublittoral fringe in sand (seagrass).

Distribution: Day (1967) recorded: SW Africa (s), Cape (s), Natal (e). Endemic.

***Scolelepis squamata*** (Müller, 1806)

Records: Zanzibar – Mazizini: T3S5C2 (1), T3S1C3 (24), T3S1C2 (1), T2S3C2 (1), T3S4C3 (2); Harbour: S2C2 (3), S2C1 (8), S2C3 (15), Harbour: MLWN (2).

Number of specimens: 57. NMW (5).

Habitat: upper eulittoral to sublittoral fringe in fine to coarse sand (seagrass) and organically enriched sand.

Distribution: Cosmopolitan, including Aldabra (Hughes & Gamble, 1977).

***Spio*** sp.

Records: Zanzibar – Mazizini:T3S3C2 (1).

Number of specimens: 1.

Habitat: lower eulittoral in shelly sand (seagrass).

Note: hooks starts on setiger 8; gills start on setiger 3.

## Family MAGELONIDAE

***Magelona*** sp.

Records: Zanzibar – Mazizini:T2S4C2 (1).

Number of specimens: 1.

Habitat: lower eulittoral in sand (seagrass).

Note: specimen not intact.

## Family POECILOCHAETIDAE

***Poecilochaetus serpens*** Allen, 1904

Records: Zanzibar – Nunwgi S3C3 (1).

Number of specimens: 1.

Habitat: mid-eulittoral in fine sand.

Distribution: Day (1967) recorded: Cape (s,d,vd), Natal (s,d). Plus: North East Atlantic to Morocco (i,s) and Mediterranean. NHM: Kuwait, Israel; Aldabra (Hughes & Gamble, 1977).

## Family CIRRATULIDAE

***Caulleriella*** sp.

Records: Zanzibar – Mazizini:T3S3C2 (1), T3S3C3 (3); Bawe S5C3 (1).

Number of specimens: 4.

Habitat: mid-eulittoral in sand.

***Cirratulus*** sp.

Records: Zanzibar – Bawe S1C1 (1); S2C3 (11), S5C3 (2).

Number of specimens: 14.

Habitat: mid-eulittoral in mud (mangrove).

***Cirriformia*** sp.

Records: Zanzibar – Bawe S1C1 (1), S4C1 (1); Mazizini:T1S3C1 (1); Mafia – Utende (14).

Number of specimens: 17. NMW (6).

Habitat: mid-eulittoral in mud (mangrove).

Note: *C. tentaculata* (Montagu, 1808) abundant in muddy *Cymodoce* seagrass beds, Nyali, Mombasa (Day, 1962).

## Family ORBINIDAE

***Naineris laevigata*** (Grube, 1855)

Records: Mafia - Kinasi (3).

Number of specimens: 3. NMW (1).

Habitat: mid-eulittoral in fine sand and mud (mangroves).

Distribution: Day (1967) recorded: SW Africa (i,s), Cape (i,s), Natal (i), Moçambique (i). Plus: warm and tropical Atlantic (i), SE Australia (i), Mediterranean, Arabian Gulf, Sri Lanka, Japan. Day (1977): Perth (W Australia); Augener (1926-27): New Zealand.

***Scoloplos*** cf. ***capensis*** Day, 1961

Records: Zanzibar – Harbour S4C2 (1); Harbour on yacht 'Starfish' (1).

Number of specimens: 2.

Habitat: lower eulittoral in medium sand (organically enriched) and sublittoral, on vessel which had sailed from South Africa to Zanzibar within 2 months prior to sampling.

Distribution: Day (1967) recorded: Cape (s,d). Endemic.

***Scoloplos*** cf. ***uniramus*** Day, 1961

Records: Zanzibar – Mazizini:T1S2C2 (2), T1S2C3 (1), T2S4C2 (1); Mafia – Utende (1).

Number of specimens: 5. NMW (2).

Habitat: mid- to lower eulittoral in fine and medium sand (seagrass).

Distribution: Day (1967) recorded: Cape (s,d), Natal (s). Note: Day (1977) synonomised *S. uniramous* with *S. johnstonie* Day, 1934 and gives the distribution as: S Australia, Solomon Is, differing from allied species *S. fimbriatus* in having 6 branchiate setigers, as opposed to 7 in the former.

**Orbiniid** sp. juv.

Records: Zanzibar – Bawe S2C1 (4).

Number of specimens: 4. NMW (2).

Habitat: mid-eulittoral in mud (mangrove).

## Family PARAONIDAE

***Paraonis*** sp.

Records: Zanzibar – Mazizini:T3S3C3 (1).

Number of specimens: 1.

Habitat: mid-eulittoral in sand and seagrass.

## Family OPHELIIDAE

***Armandia intermedia*** Fauvel, 1902

Records: Zanzibar – Mazizini: T3S5C1 (4), T3S5C3 (1), T3S2C1 (1), T2S5C1 (1); Bawe S2C3 (1); Mbweni C1 (10), C4 (10); Kisakasaka C2 (1); Harbour S4C3 (1); Mafia –Kinasi (12).

Number of specimens: 42. NMW (10;3).

Habitat: mid-eulittoral to sublittoral fringe, in coarse sand (and seagrass), fine sand and mud (mangroves).

Distribution: Day (1967) recorded: Cape (i,s), Natal (i). Plus: Senegal (s), Ghana (s), Angola, Indo-Pacific, Japan; Aldabra (Hughes & Gamble, 1977).

***Armandia leptocirrus*** Grube, 1878

Records: Zanzibar – Mazizini:T2S5C1 (1), T3S5C2 (2); Nungwi S5C3 (3), S2C3 (2), S2C2 (3), S4C1 (2), S2C1 (131).

Number of specimens: 142.

Habitat: sublittoral fringe, in coarse sand (and seagrass).

Distribution: Day (1967) recorded: Cape (s), Moçambique (i,e,s). Plus: Indo-Pacific (Red Sea and Arabian Gulf (i), to Andaman Is. (i) and New Caledonia).

***Armandia melanura*** Gravier, 1905

Records: Zanzibar – Mazizini:T3S2C1 (3),T3S5C2 (1); Chwaka (1); Mbweni C5 (4).

Number of specimens: 9. NMW (2).

Habitat: sublittoral fringe in shelly sand (seagrass).

Distribution: Gibbs (1972): Gulf of Aden, Cook Islands.

***Polyophthalmus pictus*** (Dujardin, 1839)

Records: Zanzibar – Bawe S2C3 (1); Nungwi S5C3 (1).

Number of specimens: 2.

Habitat: mid-eulittoral in fine sand and mud (mangroves).

Distribution: Cosmopolitan, including Aldabra (Hughes & Gamble, 1977).

## Family CAPITELLIDAE

***Anatomastus*** sp.

Records: Zanzibar – Mbweni C3 (15); Kisakasaka C5 (7).

Number of specimens: 22. NMW (3).

Habitat: mid-eulittoral in mud (mangroves).

***Capitella*** cf. ***capitata*** (Fabricius, 1780)

Records: Zanzibar – Harbour S3C2 (1), S3C3 (4).

Number of specimens: 5. NMW (2).

Habitat: mid-eulittoral, in medium sand (organically enriched).

Distribution: Cosmopolitan.

**Capitellid** sp.

Records: Mafia - Kinasi (10), Utende (9); Zanzibar - Mazizini:T3S3C1 (2), T3S1C3 (1), T3S5C3 (3), T3S3C3 (2), T2S5C2 (1), T1S3C1 (1), T1S2C3 (1); Harbour S3C1 (1), S3C2 (1); Mbweni C1 (1).

Number of specimens: 33. NMW (2;2;2).

Habitat: mid-eulittoral in fine sand (mangrove); sublittoral fringe in medium sand (seagrass).

***Dasybranchus caducus*** (Grube, 1846)

Records: Zanzibar – Mazizini:T3S5C2 (1), T2S5C1 (2); Nungwi S3C2 (1); Mbweni C1 (1).

Number of specimens: 5.

Habitat: mid to lower eulittoral in sand and mud (mangroves).

Distribution: Day (1967) recorded: Natal (i), Moçambique (i,e), and states: records confused, certainly present in Mediterranean (i), Red Sea (i), tropical Indian Ocean south to Madagascar (i,s); Aldabra (Hughes & Gamble, 1977); Australia (Day & Hutchings, 1977).

*Heteromastides* sp.

Records: Zanzibar – Nungwi S3C2 (1).

Number of specimens: 1.

Habitat: mid eulittoral in sand.

*Mediomastus* sp.

Records: Zanzibar – Kisakasaka (2); Mazizini:T3S4C3 (7).

Number of specimens: 9. NMW (2).

Habitat: lower eulittoral and shallow sublittoral (mangrove channel).

Distribution: Day (1967) recorded: *M. capensis* Day, 1961: SW Africa (s), Cape (s,d), Natal (s,d). Endemic.

*Notomastus latericeus* Sars, 1851

Records: Zanzibar – Mazizini:T3S5C1 (2).

Number of specimens: 2.

Habitat: sublittoral fringe in coarse shelly sand (seagrass).

Distribution: Cosmopolitan.

## Family OWENIIDAE

*Owenia fusiformis* Delle Chiaje, 1844

Records: Mafia – Kinasi (2).

Number of specimens: 2.

Habitat: mid-eulittoral in fine sand (mangroves).

Distribution: Cosmopolitan.

## Family AMPHARETIDAE

*Amphicteis gunneri* (Sars, 1835)

Records: Zanzibar – Mazizini:T2S4C2 (1), T2S5C1 (1).

Number of specimens: 2. NMW (1).

Habitat: lower eulittoral/sublittoral fringe in sand (seagrass).

Distribution: Day (1967) recorded: SW Africa (s), Cape (s,d), Natal (s). Plus: north and central Atlantic (s,d,vd,a), Mediterranean, tropical Indian Ocean (d,vd), Kerguelen (s); Australia (Day & Hutchings, 1977).

## Family TEREBELLIDAE

***Loimia medusa*** (Savigny, 1820)

Records: Zanzibar – Chwaka (2); Mtoni (1); Mafia – Utende (6).

Number of specimens: 9. NMW (2).

Habitat: mid-eulittoral in medium sand.

Distribution: Cosmopolitan, including Aldabra (Hughes & Gamble, 1977).

***Nicolea venustula africana*** Augener, 1918

Records: Zanzibar – Nungwi S2C3 (7), S2C2 (7).

Number of specimens: 14. NMW (3)

Habitat: mid-eulittoral in fine sand.

Distribution: Day (1967) recorded: not in South Africa. Present: Ivory Coast, Angola (s); New Zealand (Day & Hutchings, 1977); NHM specimens of *Nicolea venustula* (Montagu, 1818) from NE Europe and South Africa.

***Terebella pterochaeta*** Schmarda, 1861

Records: Zanzibar – Mazizini:T4S4Q1 (1).

Number of specimens: 1.

Habitat: lower eulittoral in rock.

Distribution: Day (1967) recorded: SW Africa (i,s), Cape (i,s), Natal (i). Plus: Indo-Pacific.

***Thelepus plagiostoma*** (Schmarda, 1861)

Records: Zanzibar – Kisakasaka (1).

Number of specimens: 1.

Habitat: shallow subllittoral in mangrove channel.

Distribution: Cosmopolitan.

***Thelepus setosus*** (Quatrefages, 1865)

Records: Zanzibar - Mazizini:T4S4Q1 (1).

Number of specimens: 1.

Habitat: lower eulittoral among rocks.

Distribution: Cosmopolitan.

**Terebellid** sp. 1.

Records: Zanzibar – Mazizini:T2S4C2 (2), Bwawani (1).

Number of specimens: 3 NMW (1).

Habitat: mid- to lower eulittoral in sand and mud (mangrove).

**Terebellid** sp. 2.

Records: Zanzibar – Mazizini (1).

Number of specimens: 1.

Habitat: mid-eulittoral in sand.

## Family TRICHOBRANCHIDAE

***Terebellides stroemi*** Sars, 1835

Records: Zanzibar – Mazizini:T2S5C1 (6), T3S5C3 (2), T3S5C1 (5), T1S3C2 (2), T2S5C2 (5).

Number of specimens: 20.

Habitat: mid-eulittoral to sublittoral fringe in sand (seagrass).

Distribution: Cosmopolitan, incuding Aldabra (Hughes & Gamble, 1977).

## Family SABELLIDAE

***Branchioma violacea*** (Schmarda, 1861)

Records: Zanzibar – Harbour, on yacht 'Starfish' (73).

Number of specimens: 73. NMW (10).

Habitat: shallow sublittoral fouling community on vessel which had sailed from South Africa to Zanzibar within 2 months prior to sampling.

Distribution: Day (1967) recorded: SW Africa (i,s), Cape (i,s), Natal (i). Endemic.

***Jasmineira elegans*** Saint-Joseph, 1894

Records: Zanzibar – T2S2C1 (1); Nungwi S2C3 (1).

Number of specimens: 2.

Habitat: mid-eulittoral in sand.

Distribution: Cape (s,d), Natal (s,d). Plus North Atlantic from Scotland (s) to Senegal (i,s), Angola (s).

## Family SERPULIDAE

***Hydroides*** cf. ***heteroceros*** (Grube, 1868)

Records: Zanzibar – Harbour on yacht 'Starfish' (1).

Number of specimens: 1.

Habitat: fouling shallow sublittoral, on vessel which had sailed from South Africa to Zanzibar within 2 months prior to sampling.

Distribution: Day (1967) recorded: Madagascar (s). Plus: tropical Indian Ocean (i,s).

# DISCUSSION

In the present study a collection of predominantly littoral polychaetes has been established with 91 species recorded from 27 families. The quantitative sampling revealed a total of 71 species from 9.9 $m^2$ of substrate sampled to a depth of 15 cm, using a 1 mm sieve. Comparable eulittoral studies within the western Indian Ocean are relatively scarce, though that of Hughes & Gamble (1977) on the intertidal fauna of Aldabra, a distance of 780 km from Zanzibar, is useful for comparison. In their study, Hughes & Gamble sampled 65 $m^2$ to a depth of 40 cm, using a 2 mm sieve and found a total of 69 species from 16 families including 18 species recorded in the present study. The Aldabra study also revealed 10 species which could not be identified beyond genus, thus the number of species common to both studies may be greater. On Aldabra, soft subtrates were sampled from intertidal habitats which are generally dominated by coralline sand, whereas the samples taken in the present study were predominantly taken from low-energy, fine sediment habitats, including those from mangroves and a sheltered bay (Mazizini) which differ from the sites sampled on Aldabra, possibly contributing to the differences in species compositon of the two studies.

Comparison at the species level of the polychaete diversity from the present study, with other areas is ambitious due to difficulties associated with the taxonomy of the group. Comparisons based on genera, considered to be more consistent, especially for polychaetes, can, however, be made. The present study found 67 genera from 27 families. The study from Aladabra by Hughes & Gamble (1977) recorded 54 genera from 16 families. From recent studies in the Pacific region, Bailey-Brock (1995) found that for the Hawaiian fauna 51 genera from 21 families are recorded and Gibbs (1972) recorded 16 genera from 11 families from the Cook Islands. From the Solomon Islands 34 genera from 22 families were recorded (Gibbs 1971). The greater tidal range in Tanzania (ca. 4 m compared to ca. 1 m for Pacific Islands) and the presence of diverse littoral habitats may in part explain the greater diversity of genera.

The given distributions for each species, compiled from the literature, can only be viewed as provisional since the problems of polychaete taxonomy described in the introduction preclude the known distribution of many species from being established with certainty. These problems stem from the early taxonomic work on this class which have resulted in weak morphological definitions of species and the absence of suitable type material for

valid comparisons to be made. Further comparison of the present material with that from other regions is necessary before a true analysis of the biogeographical distribution of each species can be ascertained with confidence. This is particulary true for the 20 'cosmopolitan species' from the present collection (see Table 6). However, such a comparison may result in questioning the validity of species and require the definiton of many new species. The distributions given in the Systematic Analysis for the non-cosmopolitan species found in the present study can be treated with more confidence and reveals that 27 species, or 29 % of the total found, occur at localities between eastern Africa and the west Pacific or beyond, reflecting the occurrence of widespread Indo-Pacific taxa. A study of the Serpulidae of the Seychelles by Hove (1994) found that of the 40 taxa recorded from 1-60 m depth, the majority are known from other Indo-Pacific localities, except for a few probably new species.

Of the 20 'cosmopolitan' species recorded in the present study the only one which has received attention to date is *Owenia fusiformis* Delle Chiaje (Dauvin & Thiebaut, 1992). A single specimen of this species was recorded in the present study. Dauvin & Thiebaut (1992) examined populations from intertidal to 2,325 m depth from the Atlantic, Pacific and Indian Oceans and concluded that this species is truly cosmopolitan. However, the comparison was lacking in a full morphological examination of many characters (e.g. branching of the food-gathering membrane), and this analysis can be regarded as provisional pending a more thorough examination (Mackie *pers. com*). Numerous additional morphological characters, including internal features for many species need to be considered (see Mackie, 1996). Kelly-Borges & DeFelice (*in press*) found that for sponge fauna in Hawaii, the presence of 'cosmopolitan' species has masked the true diversity of that fauna, and following detailed examination, some of the taxa have been shown to include more species.

Despite the present study providing for the first time a comprehensive collection of polychaetes from Zanzibar, there are numerous limitations associated with this investigation which should be addressed if research on this taxa is to continue in Tanzania and other parts of the western Indian Ocean. Firstly, no reliable estimate of the diversity of the polychaetes of this region has been achieved, though a tentative, minimum estimate may be attempted. A total of 91 species was recorded mostly from intertidal habitats in the present study and the

comparison with the Aldabra study by Hughes & Gamble (1977) revealed a possible additional 53 species for the region. The detailed study of Seychelles serpulids by Hove (1994) defined 40 species from shallow depths. Few other studies have examined the shallow sublittoral fauna in the region. As many lower eulittoral species are also present at greater water depths, but additional species certainly also occur, the diversity of the polychaetes from the eulittoral and shallow sublittoral within this region could be expected to be between 300-500 species.

Any study is likely to provide new species depending on the level of investigation. In the Arabian Gulf for example, a study by a single experienced polychaete taxonomist found 61 genera from 23 families with 23 new species records and 8 new genera records for that area (Fiege, 1992). He also found that of the total entities recorded, only 45 could be positively identified to species level, reflecting the widespread lack of a thorough knowledge of this taxon. The study by Fiege (1992) serves also as an example of the 'grey literature' which may be derived from diverse studies (environmental, ecological or consultative reports) which include polychaete species records and taxonomic keys but which fail to become more widely available, despite contributing to the overall understanding of the diversity and zoogeography of this taxonomically difficult group.

Other limitations of this study are listed below. Some of these may be achievable in the short term, whilst others will require the cooperation of numerous research institutions and individual specialists.

1. sampling from hard substrates (limestone rocky and rubble shores);
2. sampling of the sublittoral substrates including coral reefs;
3. better preservation and taxonomic investigation into members of the families Capitellidae and Cirratulidae;
4. sampling of cryptic and commensal species;
5. obtaining higher numbers of individuals, from diverse localities, for many of the species for which few individuals have been found;
6. establishing whether undescribed species exist in the collection;
7. confirming new records for eastern Africa;
8. conducting a thorough scrutiny of the 'cosmopolitan' species;

9. examining the effects of seasonality on species diversity by repeating surveys at the same sites at different times of year.

Considering that polychaetes comprise the greatest percentage of the community of soft substrata and are the most important taxon in these communities (e.g. Knox, 1977; Guerreiro *et al.* 1996) much taxonomic research is required, especially on tropical species before a complete appraisal of the diversity and biogeography of this important taxon is achieved. Major revisions to families are long and laborious processes, but they must be undertaken for those families where needed. Furthermore, revisions of families must be based on material, not descriptions, since interpretation of descriptions frequently is dependent on poorly understood and used terminology, which has obscured species differentiation in the past (see Fauchald, 1977).

Fortunately, some recent collections exist which may allow such research to begin. For example, much of the material collected by Day (1967) is deposited in the Natural History Museum (London), as is the collection from the Cook islands (Gibbs, 1972) which includes 22 littoral species plus additional species from the sublittoral. A selection of the material in this chapter is deposited at the National Museum of Wales - Cardiff with the remainder being returned to the University of Dar es Salaam by the author.

# CHAPTER 4

# ANALYSIS OF THE DIVERSITY OF THE MOLLUSC FAUNA OF THE WESTERN INDIAN OCEAN WITH SPECIAL REFERENCE TO THE PROSOBRANCHIA, BIVALVIA AND POLYPLACOPHORA

# INTRODUCTION

The Mollusca comprise by far the largest taxonomic group of macro-invertebrates in the tropical waters of the Indo-Pacific. Examination of the molluscan fauna of the western Indian Ocean and adjacent waters began over 200 years ago with the pioneering collecting efforts and studies conducted by Pehr Forskål and Linnaeus in the mid 1700's, mostly on material from the Red Sea and Gulf of Aden. Though a complete review of the molluscan studies of the entire western Indian Ocean and adjacent waters is beyond the scope of this introduction, a brief examination of the major contributions forms a background to the knowledge of the fauna today. The Opisthobranchia of the western Indian Ocean have recently been reviewed (see Yonow, 1997) and will be omitted from the present study.

For the 150 years or so following Forskål's travels, taxonomic work tended to be focused, unequally, in different parts of the region. Considerable attention was paid to the northwestern portion of the Indian Ocean where the basis of a comprehensive knowledge for that area today was derived largely from the studies of Smith (1877-1906), Sowerby (1895a,b) and Melvill (1893-1928). In the southeastern corner of the western Indian Ocean at about the same time, the molluscan fauna of Mauritius received attention from Leinard (1877), Möbius *et al.* (1880) and Viader (1937). Smith (1888), Dautzenberg (1893) and von Martens (1903) documented molluscs from the Seychelles but the most comprehensive studies on those islands were only conducted later by the Percy Sladen Trust Expedition of 1905 with results summarised by Gardiner (1936) and by the individual collection made by Winckworth (1940). Southern Africa experienced a great deal of interest from numerous professional naturalists beginning in the mid 1700's, though most of these collected in the cooler waters of the Cape. It was C.F.F. Krauss who was probably the first to explore and collect on the tropical shores of northern Natal during the 1840's. Much of his specimens were later examined by L. Reeve and G.B. Sowerby, though his work on the molluscs of South Africa (Krauss, 1848) can be considered to be the first comprehensive treatise of the fauna. Numerous subsequent accounts of South African molluscs followed but these tended to omit the tropical elements. In Madagascar, Dautzenberg (1906-32) provides the most comprehensive account of the fauna of that island.

Over the last forty years, the knowledge of the western Indian Ocean mollusc fauna continued to develop, again with a regional bias. Knowledge of the Arabian Sea fauna has benefitted from the comprehensive studies of Biggs (1958-73), Smythe (1972-1988) and Bosch & Bosch (1982-89), resulting in a comprehensive analysis of the eastern Arabian fauna by Dance (1995). The Red Sea fauna is also reasonably well known and summarised by Sharabati (1984) and Oliver (1992), the latter exclusively examining the bivalve component which tends to be omitted by most workers. In South Africa, the studies by Barnard (1958-69) and Kilburn & Rippey (1982) provide a reasonably complete coverage of the fauna of those shores, though as Kilburn & Rippey (1982) admit, the tropical component of the fauna remains to be examined thoroughly. For Mauritius, the volume by Drivas & Jay (1988) covers the bulk of the prosobranch fauna, and the two short volumes by Spry (1961, 1964) cover the common fauna of the shores of Dar es Salaam (Tanzania). With the exception of several short accounts of specific mollusc families, notably Cypraeidae from Kenya (e.g. Copley, 1945; Verdcourt, 1954-60 and Liversidge, 1963) and bivalves from southern Moçambique (Boshoff, 1965), few taxonomic studies of the mollusc fauna of the western Indian Ocean have been undertaken recently.

Though the malacological history of the western Indian Ocean, and indeed the entire Indo-Pacific region has been an active one over the last 200 years, and has benefitted from the involvement of hundreds of amateur naturalists, shell collectors and professional malacologists, the true extent of the knowledge of the fauna remains incomplete (see Oliver, 1992; Kay, 1995). Whilst, undoubtedly, museum collections (mostly in Europe) have grown as a result of the enthusiasm and interest in shells by so many individuals who have collected material from remote corners of the region, the enormous numbers of species which have been described as a result have, in many cases, been described in isolation, i.e. without due regard to similar forms from other parts of the region. Consequently a species may have many synonyms. The major tasks facing malacologists today are establishing which are the synonyms of the valid species, what are the geographical limits of the species and what are the ecological boundaries within which the species exists. For most species within the Indo-Pacific, this information is not known, though progress is being made and new species continue to be described throughout the Indo-Pacific at an average of twenty-four new species each year between 1990-95 for the tropical Pacific alone (Kay, 1995).

In the light of the recent comprehensive works mentioned above which examine the mollusc fauna of the waters adjacent to the western Indian Ocean (Arabian Sea, Red Sea and South African coasts), it seems appropriate that a detailed examination of the fauna of the East African region and western Indian Ocean islands be undertaken. Such an analysis would now benefit from the sound taxonomic base which has been established by these studies in adjacent waters.

The objectives of this study are:

1. to examine the diversity of molluscs of the western Indian Ocean by compiling a preliminary species checklist for the region;

2. to summarise the above into an illustrated chapter for the Field Guide;

3. to examine the biogeography of western Indian Ocean prosobranch and bivalve molluscs.

## METHODS

### Field Surveys

Collections of molluscs were made in several parts of the western Indian Ocean between January 1992 and June 1997. Detailed quantitative sampling of intertidal soft substrates were undertaken in Zanzibar, Tanzania (as described in Chapter 3), and Jubail (Saudi Arabia) in the Arabian Gulf (see Richmond, 1994), combined with brief collections and field surveys in other parts of the region. Sites where brief field surveys were conducted include Watamu (Kenya), Mafia Island (Tanzania), Inhaca Island (Moçambique), Durban and northern Natal (South Africa), Gran Comores (Comoros), Tulear (SW Madagascar), Nose Be (NW Madagascar), Mahé and La Digue Islands (Seychelles), Yanbu (Saudi Arabia, NE Red Sea) and SW Papua New Guinea.

Most survey and collecting efforts were concentrated in the littoral zone, though shallow coral reefs and sublittoral seagrass beds were also examined. Field annotations and

photographs accompany much of the collection. Specimens were preserved dry and catalogued, with the bulk of the material collected deposited at the Institute of Marine Sciences (University of Dar es Salaam). Material at the Institut Halietique et des Sciences Marines, Tulear, Madagascar was also examined. The identification of parts of the collection made in Zanzibar were verified by staff at the Natural History Museum (London) and National Museum Wales – Cardiff, where specimens were also deposited. Collections from the two latter institutions were also examined. Taxonomic assistance was provided by Dr. D. Rabesandratana (Tulear, Madagascar) and Dr. G. Oliver (National Museum of Wales - Cardiff).

**Preparation of the Preliminary Species Checklist**

The list is based on the compilation of 72 publications and reports dating from 1932 to 1997, unpublished collection lists and the species list of the material held by the National Museum of Wales, which holds the Melvill-Tomlin collection including many species from Mauritius as well as other parts of the western Indian Ocean. Where possible, emphasis was placed on records from revisionary works (of genera, sub-families or families) in at attempt to establish synonyms and valid species. The findings of more general works and ecological studies from the region were also considered. Comments on the bivalve section by Dr. Graham Oliver (National Museum of Wales - Cardiiff) have been incorporated.

The species checklist is arranged by family with the genera and species listed alphabetically. Vaught's *A classification of living Mollusca* (1989) was followed as regards the arrangement of the families. Her classification has also permitted junior synonyms for genera to be identified and these have been replaced by senior genera. In addition, Vaught (1989) allowed sub-genera to be identified, and in most cases sub-genera have been replaced by the senior genus. This was done because it became clear that in several cases different authors use either the senior genus or the subgenus, or both, leading to a great deal of confusion and replication. Furthermore, with the exception of only a few well-established cases, the use of subspecies has been omitted. Where the species in question has not itself been reported for the region the species and subspecies are listed. Other distinctions, e.g. varieties (*var*) and forms (*forma*) have not been considered. The authority for each species

is given where possible with the year. However, for many sources the year, and in a few cases the authority are absent. Where obvious mispellings exist, these species have been combined.

The list can only be regarded as preliminary since the material was not examined, and some families which are not popular with collectors and have not been recently revised are probably underestimated (see Wells, 1990). For these reasons the diversity of some families should be considered to be only relative.

# RESULTS

The preliminary species checklist (included at the end of this section) includes a minimum of 2,550 species of gastropod prosobranchs from 75 families, 39 species of polyplacophorans representing 6 families and a minimum of 667 species of bivalves from 49 families.

A summary of the numbers of genera and species numbers for each family is presented in Tables 1-3. For some of the families in Tables 1 and 3 an additional species number is presented in parenthesis. This refers to the possible maximum should synonyms based on instances where different but closely related genera support the same species name and authority prove to be in fact different species. Since one of the major difficulties in this endeavour is establishing correct synonyms without examining the material, only the figure considered as the minimum species number is used for further analysis in this chapter. While accepting that there will be errors, these are as low as possible.

The most diverse families are the Mitridae with 210 species, Conidae (198), Muricidae (187), Turridae (180), Cypraeidae (97), Trochidae (92), Terebridae (88), Columbellidae (87), Fasciolaridae (78), Nasariidae (77), Costellariidae (69) and Cerithidae (69). Together these 12 families have 1,432 species, 56 % of the total recorded. Of the remainder, several families included in the checklist are considered little known. These tend to include families whose members are smaller than 10 mm, from deep water or from cryptic or parasitic habitats (e.g. living in sponges, or on echinoderms). Such families include the following: Scissurellidae, Delphinulidae, Rissoidae, Litiopidae, Diastomatidae, Cerithiopsidae, Triphoridae, Siliquariidae, Trichotrophidae, Pediculariidae, Lamellaridae, Triphoridae, Epitoniidae, Eulimidae, Stiliferidae and Marginellidae. For these families, positive identification of species is particularly complex and, pending further revision, ambitious at best. These families however, include 327 species from the present checklist, thus comprising about 13 % of the total. Analysis of distribution, diversity or ecology of these species cannot be undertaken at present.

The chitons, though few in number, are relatively well-known, thus the diversity reported can be considered to be a reliable measure of the true diversity of this group. Dominant

species in the region are the upper eulittoral *Acanthopleura* species, of the family Chitonidae, which are conspicious in their presence on limestone cliffs.

The bivalve fauna for the western Indian Ocean has been less well documented than the prosobranch fauna. Few detailed studies of bivalves exist and the checklist was compiled from only 30 sources compared to 72 used in preparing the prosobranch checklist. The most diverse families are the Veneridae with 101 species, Tellinidae (68), Pectinidae (51), Cardiidae (47), Arcidae (37) and Mytilidae (35). Together these 6 families comprise 339 species, 51 % of the total recorded.

Table 1. Summary of number of genera and species for western Indian Ocean prosobranchs.

| **Family** | **Genera** | **Species no.** | **Family** | **Genera** | **Species no.** |
|---|---|---|---|---|---|
| Scissurellidae | 2 | 2 | Ovulidae | 10 | 27 |
| Haliotidae | 1 | 11 | Triviidae | 4 | 20 |
| Fissurellidae | 12 | 40 | Pediculariidae | 1 | 3 |
| Lottiidae | 1 | 2 | Lamellariidae | 1 | 3 |
| Patellidae | 2 | 14 | Naticidae | 7 | 63 |
| Delphinulidae | 2 | 4 | Tonnidae | 2 | 17 |
| Trochidae | 27 | 92 (100) | Ficidae | 1 | 5 |
| Turbinidae | 6 | 33 | Cassidae | 4 | 14 |
| Phasianellidae | 3 | 15 | Ranellidae | 6 | 65 (67) |
| Neritidae | 4 | 24 | Bursidae | 3 | 34 |
| Septariidae | 1 | 1 | Triphoridae | 2 | 56 |
| Neritopsidae | 1 | 1 | Epitoniidae | 5 | 48 |
| Phenacolepadidae | 1 | 3 | Janthinidae | 2 | 9 |
| Littorinidae | 6 | 22 | Eulimidae | 6 | 25 (26) |
| Rissoidae | 6 | 63 | Thycidae | 1 | 1 |
| Assimineidae | 1 | 1 | Stiliferidae | 2 | 5 |
| Tornidae | 1 | 1 | Muricidae | 25 | 187 (203) |
| Fossariidae | 1 | 3 | Coralliophilidae | 4 | 34 |
| Planaxidae | 4 | 11 | Buccinidae | 9 | 66 (68) |
| Modulidae | 1 | 3 | Columbellidae | 4 | 87 |
| Cerithiidae | 5 | 69 | Nassaridae | 4 | 77 |
| Cerithiopsdiae | 2 | 6 | Melongenidae | 3 | 3 |
| Triphoridae | 1 | 49 | Fasciolaridae | 7 | 78 |
| Dialidae | 1 | 2 | Volutidae | 2 | 5 |
| Litiopidae | 1 | 1 | Harpidae | 2 | 13 |
| Diastomatidae | 3 | 17 | Vasidae | 2 | 4 |
| Potamididae | 2 | 2 | Olividae | 5 | 65 |
| Turritellidae | 2 | 9 (10) | Marginellidae | 6 | 38 |
| Siliquariidae | 1 | 4 | Mitridae | 8 | 210 |
| Vermetidae | 3 | 14 | Costellariidae | 3 | 69 |
| Strombidae | 4 | 27 | Cancellariidae | 3 | 11 |
| Hipponicidae | 2 | 19 | Conidae | 1 | 198 |
| Vanikoridae | 1 | 16 | Turridae | 31 | 180 (194) |
| Crepidulidae | 1 | 1 (2) | Terebridae | 5 | 88 |
| Capulidae | 1 | 5 | Architectonicidae | 3 | 15 |
| Trichotrophidae | 1 | 2 | Pyramidellidae | 7 | 29 (30) |
| Xenophoridae | 1 | 7 | Amathinidae | 1 | 5 |
| Cypraeidae | 1 | 97 | | | |
| | | | (75 families) Totals | 303 | 2,550 (2,596) |

Table 2. Summary of number of genera and species for western Indian Ocean polyplacophorans.

| Family | Genera | Species no. |
|---|---|---|
| Leptochitonidae | 2 | 3 |
| Ischnochitonidae | 5 | 10 |
| Mopaliidae | 1 | 3 |
| Chitonidae | 5 | 14 |
| Acanthochitonidae | 4 | 8 |
| Cryptoplacidae | 1 | 1 |
| Totals | 18 | 39 |

Table 3. Summary of number of genera and species for western Indian Ocean bivalves.

| Family | Genera | Species no. | Family | Genera | Species no. |
|---|---|---|---|---|---|
| Nuculidae | 2 | 5 | Cardiidae | 9 | 47 (51) |
| Solemyidae | 1 | 4 | Tridacnidae | 2 | 3 |
| Arcidae | 4 | 37 | Mactridae | 4 | 16 (17) |
| Noetiidae | 4 | 5 | Mesodesmatidae | 2 | 3 |
| Cucullaiedae | 1 | 1 | Solenidae | 1 | 7 |
| Limopsidae | 1 | 1 | Cultellidae | 3 | 6 |
| Glycymeridae | 3 | 12 | Tellinidae | 8 | 68 |
| Mytilidae | 11 | 35 (38) | Donacidae | 1 | 21 |
| Pteriidae | 2 | 17 (18) | Solecurtidae | 1 | 1 |
| Malleidae | 3 | 7 | Psammobiidae | 6 | 14 (15) |
| Isognomonidae | 3 | 11 | Semelidae | 6 | 17 |
| Pinnidae | 3 | 6 | Trapeziidae | 2 | 9 |
| Limidae | 2 | 10 | Vesicomyidae | 2 | 3 |
| Ostreidae | 5 | 19 | Veneridae | 33 | 101 (114) |
| Gryphaeidae | 2 | 3 | Petricolidae | 1 | 8 |
| Plicatulidae | 1 | 2 (8) | Myidae | 1 | 1 |
| Pectinidae | 10 | 51 | Corbulidae | 2 | 5 |
| Spondylidae | 1 | 18 | Gastrochaenidae | 1 | 5 |
| Anomidae | 1 | 3 | Pholadidae | 4 | 6 |
| Lucinidae | 8 | 20 (22) | Teredinidae | 6 | 8 |
| Unguliniidae | 2 | 5 | Laternulidae | 1 | 1 |
| Erycinidae | 6 | 17 | Thraciidae | 1 | 1 |
| Sportellidae | 1 | 2 | Cuspidariidae | 1 | 1 |
| Carditidae | 2 | 6 | Clavagellidae | 3 | 3 |
| Chamidae | 2 | 15 | | | |
| | | | (49 families) Totals | 182 | 667 (698) |

One of the functions of the checklist is to establish which species have been most commonly documented, and from which localities within the region, by examining the reference sources. Table 4 below summarises the records from a few of the major sources used to compile the checklist of prosobranchs and bivalves.

Table 4. Comparison of major sources used in preparation of the species checklist.

| **Western Indian Ocean reference sources** | **PROSOBRANCHIA** | **BIVALVIA** |
|---|---|---|
| Checklist totals | 2,550 | 667 |
| Dar es Salaam (Spry, 1961,1964) | 439 | 180 |
| Madagascar (Dautzenberg, 1932 ) | 276 | 120 |
| Mauritius (Viader, 1937) | 1,647 | 251 |
| Mauritius (Drivas & Jay, 1988) | 727 | 71 |
| Natal-Moçambique (Kilburn & Rippey, 1982) | 207 | 109 |
| Natal- Moçambique (Barnard, 1958-69) | 224 | 113 |
| National Museum Wales collection | 612 | 169 |

From the table above it can be seen that the report of Viader (1937) is the most comprehensive for both prosobranchs and bivalves. His study from Mauritius includes a large component of species from families which are regarded as little-known (as discussed above). The study by Drivas & Jay (1988) also derives from Mauritius and Reunion but their coverage of the bivalves is scant. The other studies clearly reveal the lack of comprehensive coverage for western Indian Ocean fauna in general.

A summary of the findings of this chapter are presented by Richmond & Rabesandratana (1997) where they emphasize littoral or shallow sublittoral fauna, describing 162 prosobranch species from 48 families, 91 bivalve species from 37 families and 2 species of polyplacophorans, together with a representative of the Scaphopoda and several represenatatives of the Cephalopoda. Prosobranchs were mainly illustrated from specimens loaned by the Natural History Museum (London) and bivalves from material loaned by the National Museum of Wales - Cardiff. The approach was to depict each shell so as to include features important in its identification. In the case of bivalves, for the majority of species both outer and inner shells were depicted, thus revealing such taxonomically important details as the pallial sinus, position of the muscle scars and details of the hinge. The descriptions of species included size, general morphology, habitat and geographical distribution, together with a

summary of family level diagnoses. This total species checklist is presented in Table 5 together with the list of bibliographic sources, for which full details are presented in the bibliography.

Table 5. Preliminary checklist of western Indian Ocean prosobranch molluscs.
Reference source numbers in italics represent records of synonyms. For details of reference sources see Checklist Sources at end of this section.

| Taxa | Reference sources |
|---|---|
| **SCISSURELLIDAE** | |
| *Pleurotomaris* sp. | 24 |
| *Scissurella* sp. | 15 |
| **HALIOTIDAE** | |
| *Haliotis asinina* L., 1758 | 28 |
| *Haliotis clathrata* Rve., 1846 | 11 |
| *Haliotis ovina* Gm., 1791 | *37* |
| *Haliotis pustulata* Rve., 1846 | 23;1;2;38;37;*22* |
| *Haliotis quecketti* Smith | 3;15 |
| *Haliotis revelata* Des. | 37 |
| *Haliotis spadicea* Donovan 1808 | 20;12;*15* |
| *Haliotis speciosa* Rve. 1846 | 4 |
| *Haliotis squamosa* Gray | 38 |
| *Haliotis unilateralis* (Lam.) Weinkauff | 37 |
| *Haliotis varia* (L., 1758) | 2;37;*22* |
| **FISSURELLIDAE** | |
| *Amblychilepas dubia* (Rve., 1849) | 20 |
| *Amblychilepas scutellum* (Gm., 1791) | 20 |
| *Diodora australis* (Krauss, 1848) | 20 |
| *Diodora calyculata* Sow. | 38 |
| *Diodora crucifera* (Pilsbury, 1890) | 2;20 |
| *Diodora elizabethae* (Smith, 1901) | 20 |
| *Diodora lima* Sow. | 3 |
| *Diodora jukesi* Rve. | 38 |
| *Diodora quadriradiata* (Rve.) | 1;37 |
| *Diodora rueppellii* (Sow., 1834) | 22;1;2;15;37;38 |
| *Diodora singaporensis* (Rve., 1850) | 57;37 |
| *Diodora spreta* (Smith, 1901) | 20;59;37 |
| *Elegidion quadriradiata* (Rve., 1850) | 22 |
| *Emarginula clatharata* Ad. & Rve. | 37 |
| *Emarginula costulata* Des., 1863 | 2;37 |
| *Emarginula decorata* Des., 1863 | 22;2;37 |
| *Emarginula fenestrata* Des. | 37 |
| *Emarginula peasei* Thiele, 1915 | 15 |
| *Emarginula scutellata* Des. | 22;37 |
| *Emarginula spinosa* Des. | 37;38 |
| *Emarginula tenuicostata* Sow. | 59;37 |
| *Emarginula tricarinata* Born | 22 |
| *Fissurella natalensis* Krauss, 1848 | 4;15;20;30;38;*3* |
| *Fissurella mutabilis* Sow. | 15;20 |
| *Hemitoma cumingi* Sow. | 59;*38* |
| *Macrochisma africana* Tomlin, 1931 | 2;26;20 |
| *Macrochisma compressa* A. Ad. | 37;38 |
| *Macrochisma magathura* A. Ad. | 59 |
| *Montfortia brevirimata* Des. | 37 |
| *Montfortia eurythima* Dautz. | 37 |
| *Rimula exquisita* A. Ad., 1851 | 22;59;37 |
| *Scutellastra exusta* Rve., 1854 | 22 |
| *Scutellastra pica* (Rve.) | 15 |
| *Scutus anatinus* (Donovan, 1820) | 30;*1* |
| *Scutus breviculus* (Blain., 1817) | 22 |
| *Scutus corrugatus* Rve. | 37 |
| *Scutus elegans* (Gray) | 15 |
| *Scutus sinensis* (Blain. | 22 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Scutus unguis* (L., 1758) | 2;3;11;15;20;38 |
| *Subemarginula rugosa* Quoy & Gaimard | 38 |
| *Tugali parmophoidea* (Quoy & Gaimard, 1834) | 22 |
| **LOTTIIDAE** (Acmaeidae) | |
| *Patelloida (Acmaea) profunda* (Des., 1863) | 72;2;26;15;22;59;54;1;4;*37*;*71* |
| *Patelloida (Acmaea) saccharina* (L.) | 1 |
| **PATELLIDAE** | |
| *Cellana eucosmia* (Pilsbury, 1891) | 1 |
| *Cellana garconi* (Des., 1863) | 37;31 |
| *Cellana livescens* (Rve., 1855) | 31;22;2;26;*38*;*37* |
| *Cellana radiata capensis* (Gm., 1791) | 3;4;15;20;6;31;*37*;*38* |
| *Cellana radiata radiata* (Born, 1778) | 72;22;*15*;*38*;*37*;*71* |
| *Cellana radiata enneagona* (Rve., 1854) | 31;22 |
| *Cellana vitiensis* Powell, 1973 | 31;*37*;*57*;*59*;*71* |
| *Patella barbara* L., 1758 | 1;2;3;20;37;31 |
| *Patella compressa* L., 1758 | 37;31 |
| *Patella concolor* Krauss, 1848 | 4;31 |
| *Patella exusta* Rve., 1854 | 72;31;*37*;*38*;*26*;*2*;*20*;*37* |
| *Patella flexuosa* Quoy & Gaimard, 1834 | 72;2;*37*;*1*;*38* |
| *Patella granularis* L., 1758 | 31;4;20 |
| *Patella longicosta* Lam., 1819 | 20;31 |
| *Patella miniata* Born, 1778 | 31;5;20 |
| *Patella tabularis* Krauss, 1848 | 38;31 |
| **DELPHINULIDAE** | |
| *Liotia granulosa* Dunker | 37 |
| *Liotia parvissima* Hedley | 37 |
| *Liotia peronii* Keiner | 37 |
| *Mecoliotia iredalei* Bavay | 37 |
| **TROCHIDAE** | |
| *Broderipa cumingi* A. Ad. | 37 |
| *Broderipa eximia* Nevill | 37 |
| *Broderipa iridescens* (Brod., 1834) | 22;27;37 |
| *Broderipa nitidissima* Des., 1863 | 22;37 |
| *Broderipa rosea* (Brod.) | 15;59 |
| *Broderipa subiridescens* Pilsbury | 37 |
| *Calliostoma burnupi* Smith, 1899 | 20 |
| *Calliostoma comptum* A. Ad. | 37 |
| *Calliostoma eucosmia* (Bartsch) | 1 |
| *Calliostoma interruptus* Wd. | 22;1 |
| *Calliostoma jujubinum* Gm. | 37 |
| *Calliostoma ocellatum* Rve., 1863 | 22 |
| *Calliostoma picturatus* (A. Ad.) | 1;72 |
| *Cantharidus fultoni* (Sow.) | 15 |
| *Cantharidus suarezensis* (Fischer, 1878) | 22;20;38 |
| *Chrysostoma paradoxum* Born | 37 |
| *Clanculus clanguloides* (Wd.) | 1 |
| *Clanculus flosculus* Fischer, 1880 | 22;15;59;1 |
| *Clanculus margaritarius* Phil., 1846 | 37;2;2;*26* |
| *Clanculus mauritianus* Melvill, 1909 | 37;22;2 |
| *Clanculus miniatus* (Anton, 1839) | 3 |
| *Clanculus pharaonius* (L., 1758) | 26;37 |
| *Clanculus puniceus* (Phil., 1846) | 1;2;3;4;15;20;45;38 |
| *Clanculus rarus* (Dufo, 1840) | 2 |
| *Clanculus stigmatarius* A. Ad. | 37 |
| *Clanculus tonnerrei* (G. & H. Nevill, 1874) | 41 |
| *Euchelus atratus* (Gm., 1791) | 2 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Euchelus bicinctus* (Phil., 1849) | 1 |
| *Euchelus gemmatus* Gould, 1845 | 15 |
| *Euchelus providentiae* Melvill | 37 |
| *Euchelus planatus* Carpenter | 37 |
| *Gena auricula* Lam. | 37 |
| *Gena fuliginosa* A. Ad. | 37 |
| *Gena lineata* A. Ad. | 37 |
| *Gena lutea* Ad. | 37 |
| *Gena nigra* Quoy | 37 |
| *Gena planulata* (Lam.) | 1;37 |
| *Gena strigosa* A. Ad. | 37 |
| *Gena varia* (A. Ad.) | 37;6;15;*59* |
| *Gibbula capensis* (Gm.) | 1 |
| *Gibbula phasianella* Des. | 37 |
| *Gibbula townsendi* Sow., 1895 | 1;20 |
| *Gibbula tyroni* Pilsbury | 20 |
| *Infundibulops cariniferus* (Rve.) | 1;22 |
| *Infundibulum aemulans* A. Ad., 1855 | 22 |
| *Infundibulum venetus* Rve., 1862 | 22 |
| *Minolia eudeli* Des. | 37 |
| *Minolia singaporensis* Pilsbury | 15;59 |
| *Minolia splendens* (Sow., 1897) | 20 |
| *Minolia tragema* Melvill & Standen | 37 |
| *Minolia variegata* Odhner | 38 |
| *Monilea philippi* A. Ad., 1854 | 22 |
| *Monodonta australis* (Lam., 1816) | 2;4;15;27;15;20;59;37;38 |
| *Monodonta labio* (L.,1758) | 2;15;27;37 |
| *Nevillia lucida* H. Ad. | 37 |
| *Nevillia picta* H. Ad., 1868 | 22;37 |
| *Oxystele tabularis* (Krauss, 1848) | 3;4;20 |
| *Priothrochus chrysolaema* Martens | 22;37 |
| *Priotrochus obscurus* (Wd., 1828) | 15;22;37;*1*;*20*;*3* |
| *Prothalotia lepida* Phil., 1846 | 22 |
| *Pyramidae nodulifera* (Chem.) | 1;*38* |
| *Rossiteria nucleus* Phil., 1849 | 22;37 |
| *Solariella aquamarina* Melvill, 1909 | 22;37 |
| *Solariella incisura* Melvill | 37 |
| *Solariella sayademalhana* Melvill | 37 |
| *Stomatella articulata* A. Ad. | 38;3 |
| *Stomatella concinna* Gould | 37 |
| *Stomatella exquisita* Sow. | 38 |
| *Stomatella impertusa* (Burrow) | 59 |
| *Stomatella montrouzieri* Pilsbury | 37 |
| *Stomatella orbiculata* A. Ad., 1850 | 1;37;*22* |
| *Stomatella pulchella* A. Ad. | 37 |
| *Stomatella stellata* Souverbie | 37 |
| *Stomatella sulcifera* Lam., 1822 | *20*;*38* |
| *Stomatia ivisata* (Dufo) | 15 |
| *Stomatia phymotis* (Helbling, 1779) | 2;37 |
| *Stomatia splendidula* A. Ad. | 59 |
| *Stomatia variegata* H. Ad. | 37 |
| *Stomatollina rubra* (Lam., 1822) | 2; |
| *Synaptocochlea caliginosa* H. & A. Ad., 1864 | 22 |
| *Synaptocochlea concinna* Gould, 1845 | 22 |
| *Tectus concavus* (Gm., 1791) | 2;*37* |
| *Tectus mauritianus* Gm., 1791 | 2;15;22;59;*37*;*38*;*1*;*45* |
| *Tectus pyramis* Born, 1778 | 2;11;22 |
| *Trochus baccatus* Sow. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Trochus cariniferus* Rve. | 2;*38* |
| *Trochus erythraeus* (Broochi, 1823) | 1;45;*59* |
| *Trochus flammulatus* Lam., 1822 | 59;2;15;27;22;37 |
| *Trochus maculatus* (L., 1758) | 59;1;2;15;37;38 |
| *Trochus nigropunctatus* Rve., 1861 | 3;4;15;20 |
| *Trochus niloticus* L. | 37 |
| *Trochus obeliscus* Gm. | 37 |
| *Trochus ochroleucus* Gm. | 2; |
| *Trochus radiatus* Gm., 1791 | 2;37;38 |
| *Trochus tentorium* (Gm.) | 1;45 |
| *Trochus tubiferus* Gm. | 37 |
| *Trochus virgatus* Gm., 1791 | 1;26;37;*2*;*22* |
| *Umbonium elegans* Beck | 37 |
| *Umbonium vestiarium* (L., 1758) | 22;2 |
| **TURBINIIDAE** | |
| *Astraea* (*Cookia*) *cookii* (Gm.) | 1 |
| *Astralium imperator* | 1 |
| *Astralium petrosum* Martyn | 37 |
| *Bolma andersoni* (Smith) | 20 |
| *Leptothyra candida* Pease | 15;59 |
| *Leptothyra filifera* Des. | 21;59;37 |
| *Leptothyra folini* Pilsbury | 37 |
| *Leptothyra gestroi* Caramagna | 38 |
| *Leptothyra laeta* Montrouzier | 37 |
| *Leptothyra purpurata* Des. | 21;37 |
| *Leptothyra roseocincta* Martens | 37 |
| *Leptothyra semilugubris* Des. | 21;37 |
| *Leptothyra viridula* Sow. | 37 |
| *Liotina crenata* Kiener | 59 |
| *Turbo argyrostomus* L., 1758 | 37;59;45;1;3;2;15;*22* |
| *Turbo chrysostomus* L., 1758 | 37;45;2;*22* |
| *Turbo cidaris* Gm. | 27;20 |
| *Turbo coronotus* Gm., 1791 | 72;54;1;3;20;38;*22*;*2*;*4* |
| *Turbo filosus* Kiener | 37 |
| *Turbo histrio* Rve. | 37 |
| *Turbo imperialis* Gm. | 38 |
| *Turbo intercostalis* Menke, 1843 | 2;37 |
| *Turbo japonicus* Rve., 1848 | 2;37 |
| *Turbo margaritaceus* L. | 37 |
| *Turbo marmoratus* L., 1758 | 59;45;1;2;57;37;38 |
| *Turbo natalensis* Krauss | 4 |
| *Turbo petholatus* L. | 3;15;37 |
| *Turbo radiatus* Gm., 1791 | 59;2;37;38 |
| *Turbo reevei* Phil., 1847 | 2 |
| *Turbo setosus* Gm., 1843 | 2;15;26;37 |
| *Turbo spinosus* Gm. | 59 |
| *Turbo splendidulus* | 1 |
| *Turbo ticaonicus* Rve. | 37 |
| **PHASIANELLIDAE** | |
| *Gabrielona pisinna* Roberston, 1973 | 66;25 |
| *Phasianella aethiopica* Phil. | 59;15;27;37;38;72 |
| *Phasianella brougniarti* Audoin | 37 |
| *Phasianella grata* Phil. | 37 |
| *Phasianella jaspidea* Rve. | 15 |
| *Phasianella marmorata* Dufo | 37 |
| *Phasianella nivosa* (Rve.) | 1;37 |
| *Phasianella rubens* Lam. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Phasianella solida* (Born, 1778) | 2;11;37 |
| *Phasianella splendida* Phil. | 37 |
| *Phasianella variegata* Lam., 1822 | 2;1;27;37;38 |
| *Phasianella vitrea* Des. | 37 |
| *Tricolia capensis* (Dunker, 1846) | 4;20 |
| *Tricolia ios* Robertson, 1985 | 67 |
| *Tricolia variabilis* (Pease, 1861) | 67;*37* |
| **NERITIDAE** | |
| *Nerita albicilla* L., 1758 | 54;60;1;2;3;4;15;26;15;20;7;37;38;71;72 |
| *Nerita aterrima* Gm.,1791 | 2;*6* |
| *Nerita atrata* Rve. | 37 |
| *Nerita bensoni* (Rcz.) | *2* |
| *Nerita bisecta* Rve. | 2;37 |
| *Nerita chamaeleon* L., 1758 | 2;27;37 |
| *Nerita costata* Gm., 1791 | 2 |
| *Nerita debilis* Dufo, 1840 | 15;58;72 |
| *Nerita histrio* L. | 37 |
| *Nerita maxima* Gm. | 37 |
| *Nerita ornata* Sow. | 37 |
| *Nerita plexa* Chemn. | 37;38 |
| *Nerita plicata* L., 1758 | 59;54;1;2;72;3;4;15;26;20;7;37;38;71 |
| *Nerita polita* L., 1758 | 55;1;2;*3*;4;15;26;11;20;37;38;71 |
| *Nerita punctata* Quoy & Gaimard | 2;37 |
| *Nerita textilis* Gm., 1791 | 59;1;2;3;4;15;72;20;71 |
| *Nerita umlaasiana* Krauss | 15;20 |
| *Nerita undata* L., 1758 | 54;1;2;7;15;26;20;72;37;38;71 |
| *Neritina longispina* Rcz. | 27 |
| *Neritina mauriciae* (Lesson) | 2 |
| *Neritina gagates* (Lam.) | 2;27 |
| *Smaragdia rangiana* (Rcz.) | 59;60;15;*38* |
| *Smaragdia souverbiana* (Montrouzier, 1863) | 59;12;15;72;*38* |
| *Theodoxus coronatus* (Leach) | 2 |
| **SEPTARIIDAE** | |
| *Septaria borbonic* (Saint-Vincent, 1803) | 2 |
| **NERITOPSIDAE** | |
| *Neritiopsis radula* (L., 1758) | 59;26;27;37 |
| **PHENACOLEPADIDAE** | |
| *Phenacolepas asperulata* H & A Ad. | 15;15;59;37 |
| *Phenacopleas cremulata* (Brod.) | 2 |
| *Phenecolepas galathea* (Lam.) | 2;6 |
| **LITTORINIDAE** | |
| *Bembicium melanostama* Gm | *37* |
| *Bembicium tantillus* Gould | *37* |
| *Bembicium infracostata* Issel | *37* |
| *Littoraria coccinea* (Gm., 1791) | 51;45;*1*;*3*;*37* |
| *Littoraria glabrata* (Phil., 1846) | 7;4;72;20;51;58;49;37;38;*2*;*26*;*71* |
| *Littoraria intermedia* (Phil., 1846) | 4;7;51;37 |
| *Littoraria mauritiana* (Lam., 1822) | 2;26;20;51;37 |
| *Littoraria pallescens* (Phil.,1846) | 7;51 |
| *Littoraria pintado* (Wd., 1828) | 2;26;51;49;37;38 |
| *Littoraria scabra* (L., 1758) | 1;3;2;26;20;4;15;7;51;42;54;59;*37*;*38*;*71* |
| *Littoraria subvittata* Reid, 1986 | 4;7;51;37 |
| *Littoraria undulata* (Gray, 1839) | 51;1;2;57;7;37 |
| *Littorina zebra* Wd. | 37 |
| *Nodilittorina africana* Phil. | 49;4;20;*38* |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Nodilittorina millegrana* (Phil., 1848) | 49;59;7;26 |
| *Nodilittorina natalensis* (Phil., 1847) | 4;20;49;72;59;54;71*1;3;38* |
| *Peasiella* sp. | 15 |
| *Tectarius coronatus* Valenciennes, 1832 | 58 |
| *Tectarius granularis* Gray | 37 |
| *Tectarius malaccanua* Phil. | 38 |
| *Tectarius miliaris* Quoy | 37 |
| *Tectarius tectumpersicum* (L., 1758) | 37 |
| **RISSOIDAE** | |
| *Alvania fenestrata* (Krauss) | 20 |
| *Alvania mauritiana* Martens | 37 |
| *Alvania tiberiana* Issel | *37* |
| *Rissoa deformis* (Sow.) | 1 |
| *Rissoa microthyra* Marten | 37 |
| *Rissoa pulicaria* de Folin | 37 |
| *Rissoina triticea* Pearce | 37 |
| *Rissoina abnormis* Nevill | 37 |
| *Rissoina ambigua* Gould, 1849 | 22;15;59;37 |
| *Rissoina balteata* Pease | 59 |
| *Rissoina bertholleti* (Audoin) Issel | 38 |
| *Rissoina bidentata* Phil. | 37 |
| *Rissoina burgdigaliensis* d'Orbingy | 37 |
| *Rissoina canaliculata* Schwartz | 37 |
| *Rissoina cerithiiformis* (Dunker) | 15 |
| *Rissoina chesneli* Michaud | 37 |
| *Rissoina clathrata* A. Ad., 1853 | 22 |
| *Rissoina concinna* A. Ad. | 37 |
| *Rissoina conifera* Montagu | 21;37 |
| *Rissoina coronata* Rcz. | 37 |
| *Rissoina crassa* Angas | 37 |
| *Rissoina decussata* Montagu | 37 |
| *Rissoina deshayesi* Schwartz | 59 |
| *Rissoina distans* Anton, 1839 | 22 |
| *Rissoina erythraea* Phil. | 37;38 |
| *Rissoina eulimoides* A. Ad. | 37 |
| *Rissoina exasperata* Souverbie | 37 |
| *Rissoina exigna* Dunker | 37 |
| *Rissoina fenestrata* Schwartz | 59;37 |
| *Rissoina funiculata* Souverbie | 38 |
| *Rissoina insignis* A. Ad | 37 |
| *Rissoina insolita* Des. | 37 |
| *Rissoina lateritia* Preston | 21 |
| *Rissoina media* Schwartz | 15 |
| *Rissoina miltozona* Tomlin, 1915 | *22*;37 |
| *Rissoina miranda* A. Ad | 37;38 |
| *Rissoina mohrensteini* Des | 37 |
| *Rissoina monilis* A. Ad | 37 |
| *Rissoina myosoroides* (Rcz.) Schwartz | 38 |
| *Rissoina nesiotes* Melvill & Standen | 37 |
| *Rissoina obeliscus* Rcz. | 15;37 |
| *Rissoina oryza* Garret | 37 |
| *Rissoina percrassa* Nevill | 37 |
| *Rissoina plicata* A. Ad. | 15;59;37 |
| *Rissoina plicatula* Gould | 37 |
| *Rissoina pseudo-bryerea* Nevill | 37 |
| *Rissoina pusilla* Brocchi | 37 |
| *Rissoina reticulata* Sow. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Rissoina rissoi* (Andoin) Weinkauff | 38 |
| *Rissoina rosea* Des | 37 |
| *Rissoina scalariformis* R.B. Adams | 37 |
| *Rissoina seguenziana* Issel | 37 |
| *Rissoina striolata* A. Ad | 37 |
| *Rissoina subangulata* C.B.Adams | 21;37 |
| *Rissoina subdebilis* Weinkauff | 37 |
| *Rissoina tenuis* A. Ad | 37 |
| *Rissoina tenuistrata* Pease | 59 |
| *Rissoina tridentata* Michaud | 37 |
| *Rissoina turricula* Pease | 59;37 |
| *Schwartziella triticea* Pease, 1861 | 22;37 |
| *Setia bizonata* Nevill | 37 |
| *Zebina semiplicata* Pease | 59 |
| *Zebina spirata* | 59 |
| **ASSIMINEIDAE** | |
| *Assiminea ovata* (Krauss, 1848) | 4;20;37 |
| **TORNIDAE** | |
| *Tornus* sp. | 59 |
| **FOSSARIDAE** | |
| *Fossarus ambiguus* L. | 37 |
| *Fossarus capensis* Pilsbury | 16 |
| *Fossarus lamellosus* Montrouzier | 15;58 |
| **PLANAXIDAE** | |
| *Angiola periscelida* Dall, 1926 | 22 |
| *Fissilabia decollata* Lam., 1822 | 22 |
| *Holcostoma piliger* Phil., 1848 | 22 |
| *Holcostoma setigerum* A. Ad | 37 |
| *Planaxis acutus* Krauss | 15;37 |
| *Planaxis ineptus* Gould | 37 |
| *Planaxis lineatus* Gould | 20;38 |
| *Planaxis lineolatus* Gould | 37 |
| *Planaxis nucleus* Lam. | 37 |
| *Planaxis pyramidalis* Gm. | 37 |
| *Planaxis sulcatus* (Born, 1780) | 59;54;22;1;2;3;4:26;27;7;37;38;71;72 |
| **MODULIDAE** | |
| *Modulus duplicatus* | 21 |
| *Modulus obtustatus* Phil. | 37 |
| *Modulus tectum* (Gm., 1791) | 22;1;2;15;26;59;37;38 |
| **CERITHIIDAE** Review refs. 17;66;75 | |
| *Bittium aelomitres* Melvill & Standen, 1896 | 22 |
| *Bittium albocinctum* Melvill & Standen | 37 |
| *Bittium glareosum* Gould | 37 |
| *Bittium granarium* Kiener | 37 |
| *Bittium marileutes* Melvill & Standen | 37 |
| *Bittium tricarinatum* Pease | 37 |
| *Bittium uveanum* Melvill | 37 |
| *Cerithium africanum* Houbrick, 1992 | 17 |
| *Cerithium amirantium* Smith, 1884 | 17 |
| *Cerithium atromarginatum* (Dautz. & Bouge. 1833) | 17;2;59;37;59 |
| *Cerithium caeruleum* Sow., 1855 | 72;17;54;45;22;1;16;7;38 |
| *Cerithium citrinum* Sow., 1855 | 17;1;2;37;38 |
| *Cerithium clypeomorus* Jouss. | 37 |
| *Cerithium columna* Sow., 1834 | 17;22;59;45;1;2;15;26;16;37;38 |
| *Cerithium coralium* (Kiener) | 1;37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Cerithium crassilabrum* Krauss | 17;20 |
| *Cerithium crossei* Des. | 37 |
| *Cerithium dialencum* Phil., 1849 | 17;22;3;26;16;37 |
| *Cerithium echinatum* Lam., 1822 | 17;59;45;22;1;2;15;26;37 |
| *Cerithium egenum* Gould | 17;59;37;*38* |
| *Cerithium eximium* (Sow.) | 1 |
| *Cerithium ferrugineum* Say. | 37 |
| *Cerithium flemischi* Martin, 1933 | 17 |
| *Cerithium gemmatum* Hinds | 37 |
| *Cerithium gloriosum* Houbrick, 1992 | 17 |
| *Cerithium graniferum* Pease | 37 |
| *Cerithium ianthinum* Gould | 59;37 |
| *Cerithium impendens* Hedley | 37 |
| *Cerithium interstriatum* Sow., 1855 | 17;22 |
| *Cerithium lissum* Watson, 1880 | 17 |
| *Cerithium litteratum* Born | 37 |
| *Cerithium matukense* Watson, 1880 | 17 |
| *Cerithium munitum* Sow., 1855 | 17;*37* |
| *Cerithium morum* Lam. | 5;37;71 |
| *Cerithium nesioticum* Pilsbury & Vanatta, 1906 | 17;59;22;2;37;38;*1* |
| *Cerithium nodulosum* Brug., 1792 | 17;45;59;22;1;2;15;26;37;38 |
| *Cerithium patiens* Bayle | 37 |
| *Cerithium pingue* A. Ad. | 37 |
| *Cerithium punctatum* Brug., 1792 | 17;22;*2*;*1*;*15*;*59*;*45*;*37*;*38* |
| *Cerithium rostratum* Sow., 1855 | 59;60;22;2;15;26;16;37;38;*1* |
| *Cerithium rugosum* Wd. | 3;16 |
| *Cerithium ruppelli* Phil., 1848 | 17;*37* |
| *Cerithium salebrosum* Sow., 1855 | 17;2 |
| *Cerithium sinon* Bayle | 37 |
| *Cerithium tenuiscalptum* Sow. | 37 |
| *Cerithium torulosum* L., 1758 | 2;37 |
| *Cerithium traillii* Sow., 1855 | 22;1 |
| *Cerithium turritella* Anton | 38 |
| *Cerithium uncinatum* Gm. | 37 |
| *Cerithium zebrum* Kiener, 1841 | 17;22;59;37;38 |
| *Cerithium zonatum* (Wd., 1828) | 17;*2*;*37* |
| *Clypeomorus batillariaeformis* Habe & Kosuge, 1966 | 66;2 |
| *Clypeomorus bifasciatus* Sow., 1855 | 72;66;22;7;1;3;16;59;*57*;*7*;*5*;*37*;*2*;*38* |
| *Clypeomorus conciscus* (Hombron & Jacquinot, 1854) | 2 |
| *Clypeomorus gennesi* (Fischer & Vignal, 1901) | 2 |
| *Clypeomorus petrosa* (Wd., 1828) | 66;*37*;*1*;*37*;*38* |
| *Clypeomorus nympha* Houbrick, 1985 | 66;22 |
| *Clypeomorus purpurastoma* Houbrick, 1985 | 66 |
| *Plesiotrochus exilis* Pease | 37 |
| *Pseudovertagus aluco* (L., 1758) | 75;*37* |
| *Pseudovertagus nobilis* (Rve., 1855) | 75 |
| *Rhinoclavis articulata* (Ad. & Rve., 1850) | 75;2;*1*;*57*;*59* |
| *Rhinoclavis aspera* (L., 1758) | 75;22;15;26;59;60;*1*;*37* |
| *Rhinoclavis diadema* Houbrich, 1978 | 75;2 |
| *Rhinoclavis fasciata* Brug.1792 | 75;22;15;*26*;*9*;*37*;*1*;*2* |
| *Rhinoclavis kochi* (Phil., 1848) | 75;37;2;*1*;*3*;*16*;*37* |
| *Rhinoclavis vergatus* (L., 1758) | 75; *37*;*38* |
| *Rhinoclavis sinensis* Gm., 1791 | 75;*1*;2;59;22;4;20;*1*;*26*;*45*;*37*;*22*;*38* |
| *Rhinoclavis sordidula* Gould, 1849 | 75;*22* |
| **CERITHIOPSIDAE** | |
| *Cerithiopsis catenaria* Melvill & Standen | 37 |
| *Cerithiopsis fosterae* Melvill & Standen | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Cerithiopsis mathildaeformis* Melvill | 37 |
| *Cerithiopsis pulvis* Issel | 37 |
| *Cerithiopsis subreticulata* Dunker | 37 |
| *Seila alfredensis* Bartsch | 37 |
| **TRIPHORIDAE** | |
| *Triphora acicula* Issel | 37 |
| *Triphora acuta* Kiener | 37 |
| *Triphora adamsi* Des. | 37 |
| *Triphora angustissima* Des. | 37 |
| *Triphora alteruter* A. Ad. | 37 |
| *Triphora atomus* Issel | 37 |
| *Triphora aureus* Hervier | 37 |
| *Triphora chaperi* Jouss. | 37 |
| *Triphora cingulifera* Pease | 37 |
| *Triphora concinna* Hinds | 37 |
| *Triphora concors* Hinds | 37 |
| *Triphora connata* Montrouzier | 37 |
| *Triphora crassula* Martens | 37 |
| *Triphora crenulata* Des. | 37 |
| *Triphora distincta* Des. | 37 |
| *Triphora douvillei* Jouss. | 37 |
| *Triphora ducosensis* Jouss. | 37 |
| *Triphora episcopalis* Hervier | 37 |
| *Triphora eupunctata* Sow. | 37 |
| *Triphora flammulata* Pease | 37 |
| *Triphora formosa* Des. | 37 |
| *Triphora fusca* Dunker | 37 |
| *Triphora fuscozonata* Sow. | 37 |
| *Triphora hiliaris* Hinds | 37 |
| *Triphora hindisi* Des. | 37 |
| *Triphora lilaceocincta* Smith | 37 |
| *Triphora lilacina* Des. | 37 |
| *Triphora maxillaris* Hinds | 37 |
| *Triphora melantera* Hervier | 37 |
| *Triphora mirifica* Des. | 37 |
| *Triphora monacha* Hervier | 37 |
| *Triphora monilifera* Hinds | 37 |
| *Triphora pupaeformis* Des. | 37 |
| *Triphora pura* (Smith) | 1 |
| *Triphora reevei* Des. | 37 |
| *Triphora regalis* Jouss. | 37 |
| *Triphora rosea* Hinds | 37 |
| *Triphora rubra* Hinds | 37 |
| *Triphora rutilans* Hervier | 37 |
| *Triphora sculpta* Hinds | 37 |
| *Triphora speciosa* Ad. & Rve. | 37 |
| *Triphora taeniolata* Hervier | 37 |
| *Triphora tibialis* Jouss. | 37 |
| *Triphora trilirata* Jouss. | 37 |
| *Triphora tristis* Hinds | 37 |
| *Triphora tristoma* Blain. | 37 |
| *Triphora turricula* Hervier | 37 |
| *Triphora violacea* Quoy & Gaimard | 37 |
| *Triphora xystica* Jouss. | 37 |
| **DIALIDAE** | |
| *Diala lauta* (Ad.) | 6 |
| *Diala semistriata* Phil. | 38;59;37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| **LITIOPIDAE** | |
| *Alaba gonocheila* A. Ad. | *37* |
| **DIASTOMATIDAE** | |
| *Cerithidium perparvulum* Watson, 1886 | 22 |
| *Obtortio cerithina* Phil. | *37* |
| *Obtortio elongella* Melvill | 37 |
| *Obtortio geayi* Lamy | *38* |
| *Obtortio joviana* Melvill & Standen | 37 |
| *Obtortio latefasciata* Nevill | *37* |
| *Obtortio pupoides* A. Ad. | *57;7* |
| *Obtortio pyrachacma* Melville & Standen | 15;37 |
| *Obtortio reticulata* A. Ad., 1860 | *22* |
| *Obtortio scabra* A. Ad. | *57* |
| *Obtortio tulgida* C.B Ad. | *37* |
| *Obtortio vinacea* Nevill | *37* |
| *Obtortio virgata* Phil. | *37;38* |
| *Scaliola arenosa* A. Ad. | 59;15;37 |
| *Scaliola caledonica* Crosse | 38 |
| *Scaliola elata* Semper | 37 |
| *Scaliola glareosa* A. Ad. | 37 |
| **POTAMIDIDAE** | |
| *Terebralia palustris* (Brug.) (L., 1767) | 1;3;4;5;15;20;59;*38* |
| *Cerithidea decollata* L. | 1;3;4;5;20;22;*38* |
| **TURRITELLIDAE** | |
| *Turritella carinifera* Lam. | 4;20 |
| *Turritella cingalifera* Sow. | 37 |
| *Turritella cochlea* Rve., 1849 | *2* |
| *Turritella columnaris* Kiener | 37 |
| *Turritella concava* Martens | 37 |
| *Turritella duplicata* L. | 37 |
| *Turritella gascialis* Menke | 15 |
| *Turritella graciliima* Gould, 1860 | 2 |
| *Turritella terebra* (L.) | 1 |
| *Vermicularia* sp. | 1 |
| **SILIQUARIIDAE** | |
| *Siliquaria anguinus* L. | 37 |
| *Siliquaria cumingii* (Morch, 1860) | 2 |
| *Siliquaria lacteus* Lam. | 37 |
| *Siliquaria trochlearis* (Morch | 37;2 |
| **VERMETIDAE** | |
| *Dendropoma corallinaceum* (Tomlin, 1939) | 4 |
| *Dendropoma tholia* Keen & Morton, 1960 | 20;*16* |
| *Dendropoma maximum* Sow. | *37* |
| *Serpulorbis natalensis* (Mörch, 1862) | 4;16 |
| *Vermetus contors* Carpenter | 37 |
| *Vermetus decussatus* Gm. | 37 |
| *Vermetus dentifer* Lam. | 38 |
| *Vermetus eruca* Lam | 37 |
| *Vermetus glomeratus* Bivona | 37 |
| *Vermetus imbricatus* Dunker | 38 |
| *Vermetus lilacinus* Morch | 38 |
| *Vermetus roussaei* Vaillant | 38 |
| *Vermetus semisurrectus* Bivona | 37 |
| *Vermetus triquetra* Bivona | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| **STROMBIDAE** Review refs: 67;68;69;70 | |
| *Lambis chiragra arthritica* (Rdg., 1798) | 59;22;1;2;5 |
| *Lambis chiragra* (L., 1758) | 59;45;3;26;37;*38* |
| *Lambis crocata* (Link, 1807) | 67;*37*;59;45;22;1;2;15;10 |
| *Lambis digitata* (Perry, 1811) | 67;1;45;2;26;*37* |
| *Lambis lambis* (L., 1758) | 59;45;22;1;2;5;10;27;37;*38* |
| *Lambis scorpius* (L., 1758) | 67;40;2;45;11;*1*;37;*38* |
| *Lambis scorpius indomaris* Abbott, 1961 | 40;2;*37* |
| *Lambis truncata* (Humphrey,1786) | 67;59;45;2;*9*;26 |
| *Lambis violacea* (Swa.,1821) | 67;22;2;*26*;*27*;*37* |
| *Strombus aurisdiane* (L., 1758) | 69;59;45;22;2;1;26;37;38 |
| *Strombus decorus* (Rdg., 1798) | 69;59;22;2;26;20;*1*;*3*;*38*;*37* |
| *Strombus dentatus* L., 1758 | 69;1;2;59;22;37 |
| *Strombus erythrinus erythrinus* Dill., 1817 | 69;22;2 |
| *Strombus fusiformis* Sow., 1842 | 69;1 |
| *Strombus gibberulus gibberulus* L., 1758 | 72;22;1;5;3;15;10;2;26;20;59;54 |
| *Strombus haemastoma* Sow., 1842 | 22;2;37 |
| *Strombus labiatus olydius* (Duclos, 1844) | 69;22;1;2;*22*;*3*;*2*;*37*;*38* |
| *Strombus labiosus* Wd., 1828 | 69;1 |
| *Strombus lentiginosus* L., 1758 | 59;45;22;1;2;26;37 |
| *Strombus mutabilis ochroglottis* Abbott, 1960 | 40;*69*;*40*;*4*;*15*;*26*;*20*;*3*;*27*;*37*;*38*;*59*;*54*;*60*;*1* |
| *Strombus plicatus* Lam., | 69;15;37;*3*;*37*;*22* |
| *Strombus pipus* (Rdg., 1798) | 69;22;2;*37* |
| *Strombus rugosus* Sow. | 69;38;*37* |
| *Strombus taurus* Rve., 1857 | 22;37 |
| *Strombus terebellatus afrobellatus* Abbott, 1960 | 69;40;*22* |
| *Strombus wilsoni* Abbott, 1960 | 70;40;22;2 |
| *Tibia fuscus* L. | 22;2 |
| *Tibia insulaechorab* Rdg. | 22 |
| *Terebellum terebellum* (L., 1758) | 68;15;11;*37* |
| **VANIKORIDAE** | |
| *Vanikoro acuta* Rcz. | 37 |
| *Vanikoro blainvilleana* Rcz. | 37 |
| *Vanikoro cancellata* (Rve.) | 59;3;57;16;38;*1*;*22*;*37* |
| *Vanikoro clathrata* Rcz. | 27 |
| *Vanikoro cuvieriana* (Rcz., 1845) | 2;37 |
| *Vanikoro distans* (Rcz., 1845) | 2 |
| *Vanikoro granulosa* Rcz. | 37 |
| *Vanikoro gueriniana* Rcz. | 37;1 |
| *Vanikoro ligata* (Rcz., 1843) | 22;2;59;37;38 |
| *Vanikoro mauritii* (Rcz., 1845) | 2;37;27 |
| *Vanikoro natalensis* Smith, 1908 | 22;20;1 |
| *Vanikoro plicata* (Rcz., 1844) | 2 |
| *Vanikoro rosea* Rcz. | 37 |
| *Vanikoro rugata* A. Ad., 1853 | 22;37 |
| *Vanikoro scalaris* Rcz. | 37 |
| *Vanikoro solida* Sow. | 22 |
| **HIPPONICIDAE** | |
| *Cheilea cicatricosa* Rve. | 59;*37* |
| *Cheilea dormitoria* (Rve.,1858) | 2 |
| *Cheilea equestris* (L., 1758) | 1;22;2;57;16;37;*38* |
| *Cheilea hipponiciformis* Rve. | *37* |
| *Cheilea neptuni* Schumacher | *37* |
| *Cheilea papyracea* (A. Ad.) | 1;*37* |
| *Cheilea tectumsinensis* (Lam. 1822) | 2;1;37 |
| *Hipponix acuta* Quoy & Gaimard | 37 |
| *Hipponix antiquata* L. | 37;38 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Hipponix australis* Quoy | 37;38 |
| *Hipponix barbata* Sow. | 37 |
| *Hipponix conicus* (Schumacher, 1817) | 2;4;16;20;59;*1;57;10* |
| *Hipponix crystallina* Gould | 37 |
| *Hipponix grayana* Menke | 37 |
| *Hipponix lissa* (Smith) | *57;37* |
| *Hipponix pilosus* (Des.) | 20;37;38 |
| *Hipponix radiatus* Quoy & Gaimard | 38 |
| *Hipponix ticaonica* Sow. | 37;38 |
| *Hipponix violacea* Angas | 37 |
| **CREPIDULIDAE** | |
| *Crepidula* sp. | 26 |
| *Crepidula aculeata* (Gm.) | 38;20;*37* |
| **CAPULIDAE** | |
| *Capulus badius* Dunker | 37 |
| *Capulus incurvus* (Gm., 1791) | 2 |
| *Capulus intortus* (Lam.) | 16;37;38 |
| *Capulus paleacea* Menke | 22 |
| *Capulus reductus* Des. | 37 |
| **TRICHOTROPHIDAE** | |
| *Separatista chemnitzi* (A. Ad., 1855) | 2 |
| *Separatista blainvilleana* Petit | 37 |
| **XENOPHORIDAE** | |
| *Xenophora cerea* (Rve., 1845) | 2 |
| *Xenophora conchyliophora* Born | 37 |
| *Xenophora corrugata* (Rve., 1842) | 3;16;20;37 |
| *Xenophora indica* Gm. | 37 |
| *Xenophora pallidula* (Rve., 1842) | 2;20 |
| *Xenophora solarioides* Rve., 1845 | 22;2;57;37 |
| *Xenophora solaris* (L., 1764) | 16 |
| Family **CYPRAEIDAE** | |
| *Cypraea amarata* Meuschen | 37 |
| *Cypraea annulus* L., 1758 | 34;53;35;43;22;1;2;3;4;57;10;11;26;16;20;37;38 |
| *Cypraea arabica* L., 1758 | 72;34;59;53;64;22;1;2;3;5;26;27;16;20;37;38 |
| *Cypraea arabicula* Lam. | 35;37 |
| *Cypraea argus* L., 1758 | 34;59;64;1;5;2;27;37 |
| *Cypraea asellus* (L., 1758) | 34;45;64;53;1;2;37;38 |
| *Cypraea barclayi* Rve. | 16;37 |
| *Cypraea beckii* Gaskoin, 1836 | 22;2 |
| *Cypraea bistrinotata* Schilder & Schilder | 2;34 |
| *Cypraea brevidentata* Sow. | 37 |
| *Cypraea broderip* Sow., 1832 | 2;16;24;34 |
| *Cypraea camelopardalis* Perry | 34;*37* |
| *Cypraea caputserpentis* L., 1758 | 22;1;5;3;2;4;57;26;16;20;34;35;53;64;37;38 |
| *Cypraea carneola* L., 1758 | 34;59;35;53;22;1;5;3;2;4;57;10;26;20;37;38;*2* |
| *Cypraea caurica* L., 1758 | 22;1;3;2;59;34;43;53;64;37;38 |
| *Cypraea cernica* Sow., 1870 | 22;2;34;37 |
| *Cypraea childreni* Gray, 1825 | 2;34 |
| *Cypraea chinensis* Gm., 1791 | 22;59;34;53;64;1;3;2;11;16;20;37;38;*61;63* |
| *Cypraea cicercula* L., 1758 | 22;2;26;34;53;37;1 |
| *Cypraea citrina* (Gray, 1825) | 4;16;20;37 |
| *Cypraea clandestina* L., 1767 | 22;1;2;20;59;34;53;37 |
| *Cypraea coloba* Melvill, 1888 | 34 |
| *Cypraea contaminata* Sow., 1832 | 22;2;27;20;34 |
| *Cypraea cribellum* Gaskoin, 1849 | 22;2;34;37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Cypraea cribraria* L., 1758 | *63*;34;53;22;1;3;11;20;37 |
| *Cypraea cruenta* Gm. | 35 |
| *Cypraea cylindrica* Born | 37 |
| *Cypraea depressa* Gray, 1824 | 34;64;22;2 |
| *Cypraea diluculum* Rve., 1845 | 34;59;53;64;22;1;2;27 |
| *Cypraea erosa* L., 1758 | 34;59;53;64;35;43;22;1;5;3;2;4;26;16;20;*37*;38 |
| *Cypraea errones* L., 1758 | 22;37 |
| *Cypraea erythraeensis* Sow., 1837 | 34 |
| *Cypraea esontropia* Duclos, 1833 | 34;64;22;2;26;27;37 |
| *Cypraea exusta* Sow., 1832 | 34 |
| *Cypraea fabula* Kiener | 37 |
| *Cypraea felina* Gm., 1791 | 72;34;53;64;43;22;1;3;2;4;26;16;20;37;38 |
| *Cypraea fimbriata* Gm., 1791 | 22;2;57;20;34;59;64;37;43 |
| *Cypraea fultoni* Sow. | 33;20;*61* |
| *Cypraea gaskoini* Rve.,1846 | 22;2;34;37 |
| *Cypraea gillei* Jouss. | 37 |
| *Cypraea globulus* L., 1758 | 22;2;34;53;59;*35* |
| *Cypraea gracilis* Gaskoin, 1849 | 22;2;9;34;59;37 |
| *Cypraea grangranosa* Dill., 1817 | 34 |
| *Cypraea granulosa* Pease | *37* |
| *Cypraea grayana* Schilder, 1930 | 6;34 |
| *Cypraea helvola* L., 1758 | 22;1;3;2;4;57;10;11;26;16;20;43;35;53;64;37;38 |
| *Cypraea hirundo* L., 1758 | 22;34;45;35;37;*61* |
| *Cypraea histrio* Gm., 1791 | 34;59;53;64;1;5;2;57;26;27 |
| *Cypraea inocellata* Gray. | 64 |
| *Cypraea interrupta* Gray, 1824 | 34;59 |
| *Cypraea isabella* L., 1758 | 34;35;53;64;43;22;1;5;3;2;57;26;27;16;20;37;38 |
| *Cypraea kieneri* Hildago, 1906 | 22;1;2;10;26;34;59;53;64;43;37;38;*61* |
| *Cypraea lamarckii* Gray, 1825 | 34;64;22;1;3;2;10;16;20;37 |
| *Cypraea leviathan* Schilder & Schilder, 1937 | 34;2 |
| *Cypraea limancina* Lam., 1810 | 34;53;64;1;2 |
| *Cypraea lynx* L., 1758 | 72;34;35;53;59;43;61;22;1;2;57;26;16;20;37;38 |
| *Cypraea madagascariensis* Gm. | *37* |
| *Cypraea mappa* L., 1758 | 22;1;5;2;26;11;.34;59;64;53;37 |
| *Cypraea margarita* Dill. | 2 |
| *Cypraea marginalis* Dill., 1827 | 22;20;34;63;43;1 |
| *Cypraea mariae* Schilder, 1927 | 22;2;34 |
| *Cypraea mauritiana* L., 1758 | 72;34;59;64;22;1;5;3;2;26;37;38 |
| *Cypraea melvilli* Hidalgo | 37;38 |
| *Cypraea microdon* Gray, 1828 | 22;2;34;35;37;*38* |
| *Cypraea miliaris* Gm. | 37 |
| *Cypraea minoridens* Melville, 1901 | 22;37 |
| *Cypraea moneta* L., 1758 | 22;1;3;2;4;57;26;16;27;20;34;35;43;53;60;64;37;38 |
| *Cypraea nebrites* Melvill, 1888 | 34 |
| *Cypraea nebulosa* Kiener | 37 |
| *Cypraea nucleus* L., 1758 | 22;1;2;26;27;16;34;59;53;64;38;37 |
| *Cypraea ocellata* L., 1758 | 3;37 |
| *Cypraea onyx* L., 1758 | 22;1;5;3;11;16;34;37;38;2;9 |
| *Cypraea ovum* Gm., 1791 | 22 |
| *Cypraea owenii* Sow., 1837 | 34;64;22;1;2;*61*;*63*;*37* |
| *Cypraea peasei* Sow. | 37 |
| *Cypraea pantherina* (Solander) Dill. | 37 |
| *Cypraea polita* Roberts | 37 |
| *Cypraea poraria* L., 1758 | 22;2;34;64;53;43;37 |
| *Cypraea punctata* L., 1771 | 22;1;2;34;64;43;37 |
| *Cypraea puntulata* Gm | 37;38 |
| *Cypraea rashleighana* Mel. | 37 |
| *Cypraea scurra* Gm., 1791 | 22;5;2;57;34;53;64;43 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Cypraea semiplota* Mighels | 37 |
| *Cypraea staphylaea* L., 1758 | 22;1;2;4;27;20;34;45;35;64;38;37 |
| *Cypraea stolida* L., 1758 | 34;64;53;22;1;2;l;27;37;*61* |
| *Cypraea talpa* L., 1758 | 34;53;59;1;5;3;2;11;37 |
| *Cypraea teres* Gm., 1791 | 34;59;53;64;22;1;2;57;11;27;20;37;*63* |
| *Cypraea testudinaria* (L., 1758) | 34;59;64;1;2;27; 37;*61* |
| *Cypraea tigris* L., 1758 | 22;1;5;3;2;4;57;27;16;20;34;59;35;60;64;43;37;38 |
| *Cypraea trizonata* Sow. | 37 |
| *Cypraea turdus* Lam., 1810 | 34;64;37 |
| *Cypraea undata* Lam. | 37 |
| *Cypraea ursellus* Gm. | 37 |
| *Cypraea ventriculus* Lam. | 37 |
| *Cypraea vinosa* Gm. | 37 |
| *Cypraea vitellus* L., 1758 | 22;1;43;61;72;5;3;2;57;10;26;11;16;20;34;63;53;37;38 |
| *Cypraea walkeri* Sow., 1832 | 22;34;37 |
| *Cypraea ziczac* L., 1758 | 34;59;64;53;22;3;2;27;20;37 |
| **OVULIDAE** | |
| *Calpurnus lacteus* (Lam., 1810) | 2;11;34;*22;1;37* |
| *Calpurnus verrucosus* (L., 1758) | 1;2;11;16;*37* |
| *Crenavolva conspicua* Cate, 1975 | 2 |
| *Crenavolva stiatula hesperia* Cate, 1973 | 2 |
| *Crenavolva rosewateri* Cate, 1973 | 11 |
| *Cymbovula deflexa* (Sow., 1848) | 11 |
| *Dentiovula dorsuosa* Hinds, 1844 | 22 |
| *Dentiovula eizoi* Cate & Azuma in Cate, 1973 | 11 |
| *Ovula borbonica* Des. | *37* |
| *Ovula concinna* Ad. & Rve. | *37* |
| *Ovula costellata* Lam., 1810 | 2;11;1;*22* |
| *Ovula nubeculata* Ad. & Rve. | *37* |
| *Ovula obtusa* Sow. | *37* |
| *Ovula ovum* (L., 1758) | 1;5;2;11;26;59;45;38;*22;37* |
| *Ovula pulchella* A. Ad. | *37* |
| *Ovula smithi* Sow. | *37* |
| *Ovula tramentum* Sow. | *37* |
| *Phenacovolva birostris* (L., 1769) | 2 |
| *Phenacovolva longirostrata* (Sow., 1828) | 2;37;*22* |
| *Phenacovolva rosea* (A Ad., 1855) | 11;20 |
| *Phenacovolva tokioi* Cate, 1973 | 2 |
| *Phenacovolva weaveri* Cate, 1973 | 11 |
| *Primolvula punctata* Duclos | 27;37 |
| *Prosimnia coarctata* A Ad. | 22;1 |
| *Prosimnia semperi* (Weinkauff, 1881) | 11 |
| *Pseudocypraea adamsonii* (Sow., 1832) | 22;2;*37* |
| *Volva volva* (L., 1758) | 22;2;11;37 |
| **TRIVIIDAE** | |
| *Erato guttala* Sow. | 37 |
| *Erato nana* Duclos | 37 |
| *Eratoena smithi* Schilder, 1933 | 22 |
| *Eratoena sulcifera* Sow., 1832 | 22;*59;16;57;20;37* |
| *Trivia candidula* Gaskoin | 37 |
| *Trivia childreni* Gray | 37 |
| *Trivia corrugata* Pease | 37 |
| *Trivia globosa* Gray | 37 |
| *Trivia grando* Gaskoin | 37 |
| *Trivia insecta* Mighels | 37;38 |
| *Trivia paucilirata* Sow. | 37 |
| *Trivia pilula* Kiener | 37;38 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Trivirostra edgardi* Shaw, 1909 | 22 |
| *Trivirostra exigua* (Gray, 1831) | 2;22;*37* |
| *Trivirostra hordacea* Kiener, 1843 | 22 |
| *Trivirostra oryza* (Lam., 1811) | 2;4;11;16;22;*1;57;20;59;37;38* |
| *Trivirostra pellucidula* (Rve., 1846) | 4;20;22;*37* |
| *Trivirostra scabriuscula* Gary, 1827 | 22;37 |
| *Trivirostra triticum* Schilder, 1932 | 22 |
| *Trivirostra turneri* Schilder, 1932 | 22 |
| **PEDICULARIIDAE** | |
| *Pedicularia elegantissima* Des. 1863 | 22;2;37 |
| *Pedicularia pacifica* Pease | 37 |
| *Pedicularia subtilis* Schilder, 1931 | 22 |
| **LAMELLARIIDAE** | |
| *Lamellaria berghi* (Des., 1863) | 2;37;22 |
| *Lamellaria mauritiana* Berg. | 27;37;*20* |
| *Lamellaria perspicua* (L.) | 16 |
| **NATICIDAE** Review ref: 59 | |
| *Glyphepithena alapapilionis* (Rdg.,1798) | 59;2;20;*37;16* |
| *Natica albospira* Smith | 37 |
| *Natica antoni* Phil. | 37 |
| *Natica arachnoidea* (Gm., 1791) | 59;22;2 |
| *Natica asellusus* Rve. | 37 |
| *Natica avellana* Phil. | 37 |
| *Natica burnupi* Smith | 38 |
| *Natica canrena* L. | 37 |
| *Natica chinensis* (Lam.) | 1;3;37 |
| *Natica colliei* Rcz. | 37 |
| *Natica decipiens* Smith | 3 |
| *Natica didyma* Bolten | 3;4 |
| *Natica dillwyni* Payrandean | 37;1 |
| *Natica forskalii* Sow., 1825 | 59;*37* |
| *Natica hebraea* Phil. | 37 |
| *Natica incei* Phil. | 38 |
| *Natica kraussi* Smith | 37 |
| *Natica lineozona* Jouss. | 37 |
| *Natica maculosa* Lam. | 37 |
| *Natica maheensis* Dufo. | 37 |
| *Natica marochiensis* (Gm.) | 1;3;57;26;16;60;45;37;38 |
| *Natica nemo* Bartsch | 3 |
| *Natica pulicaris* Phil., 1852 | 59;22 |
| *Natica quecketti* Sow.,1894 | 59;20 |
| *Natica raynaudiana* (Rcz.) | 1;57;37;38 |
| *Natica robillardi* Sow., 1894 | 22;37 |
| *Natica rufa* Born | 37 |
| *Natica seychellium* (Watson, 1886) | 59;22 |
| *Natica strongyla* Melvill | 37 |
| *Natica taeniata* Menke | 38 |
| *Natica venustula* Phil. | 37 |
| *Natica vitellus* (L., 1758) | 59;22 |
| *Naticarius gualteriana* (Rcz., 1844) | 72;59;*1;37;5;2;4;20;22;54* |
| *Naticarius manceli* (Jouss., 1874) | 59;37 |
| *Naticarius onca* (Rdg., 1798) | 59;2;26 |
| *Polinices albula* Rcz. | 37 |
| *Polinices ampla* Phil. | 27;37 |
| *Polinices aurantia* Lam. | 37 |
| *Polinices columnaris* Rcz. | 37;*38* |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Polinices didyma* (Rdg., 1798) | 22;20;11;*16* |
| *Polinices flemingianus* Rcz., 1844 | 22;2;59;54 |
| *Polinices mamillaris* Lam. | 37 |
| *Polinices mammilla* (L., 1758) | 72;1;3;4;57;11;16;37;*38*;*5*;*2*;*20*;*22* |
| *Polinices melanostoma* Gm., 1791 | 59;22;1;26;*2*;*37*;*38* |
| *Polinices melanostomoides* Quoy & Gaimard, 1833 | 22;*37* |
| *Polinices melastoma* Lam. | 37 |
| *Polinices orientalis* Gm. | 37 |
| *Polinices priamus* Rcz. | 26;*37* |
| *Polinices ravidus* Souleyet, 1852 | 22 |
| *Polinices sebae* Rcz., 1844 | 22;*16* |
| *Polinices simiae* Des., 1838 | 22;20;2;57;*38*;*37* |
| *Polinices zanzibarica* (Rcz.) | 1 |
| *Sigaretus delesserti* Rcz. | 26 |
| *Sigaretus papilla* Gm. | 38 |
| *Sigaretus planulatus* Rcz. | 16;37;38;*1* |
| *Sinum pauloconvexum* Iredale, 1931 | 22 |
| *Tanea areolatus* (Rcz., 1844) | 59;22;2;*1*;*37* |
| *Tanea picta* (Rcz., 1844) | 59;37 |
| *Tanea euzona* (Rcz., 1844) | 59;2 |
| *Tectonatica bougei* (Sow., 1908) | 59;22 |
| *Tectonatica cernica* Jouss., 1874 | 59;22;2;37 |
| *Tectonatica tecta* (Anton, 1838) | 59;20;38;*3* |
| *Tectonatica violacea* (Sow., 1825) | 59;2;26;37 |
| **TONNIDAE** | |
| *Malea pommun* (L., 1758) | 2;22;11;26;*37*;*38*;*1* |
| *Tonna allium* (Dill., 1817) | 2 |
| *Tonna ampullacea* Phil., 1845 | 22; |
| *Tonna canaliculata* (L., 1758) | 1;5;2;26;16 |
| *Tonna cepa* Rdg., 1798 | 22 |
| *Tonna costatum* Menke | 26;37 |
| *Tonna deshayesii* Rve., 1849 | 22 |
| *Tonna dolium* (L., 1758) | 22;2 |
| *Tonna fimbriata* (Sow.) | 16 |
| *Tonna galea* L., 1758 | 3 |
| *Tonna luteostoma* (Kuster) | 3 |
| *Tonna maculatum* Lam. | 37 |
| *Tonna olearium* Brug. | 37;*38* |
| *Tonna perdix* (L., 1758) | 59;1;2;11;26 |
| *Tonna ringens* Swain. | 37 |
| *Tonna variegata* (Lam.) | 16;20 |
| *Tonna zonatum* (Green) | 1 |
| **FICIDAE** | |
| *Ficus ficoides* Lam. | 37;*38* |
| *Ficus ficus* (L., 1758) | 2;16;20;37 |
| *Ficus gracilis* (Sow., 1825) | 6 |
| *Ficus subintermedia* (Orbigny, 1852) | 22;20 |
| *Ficus tessellata* (Kobelt) | 1 |
| **CASSIDAE** Review ref: 56 | |
| *Casmaria ponderosa* (Gm., 1791) | 56;2;*37*;*1*;*38*;*16* |
| *Casmaria erinaceus* (L., 1758) | 56;59;2;26;*27*;*37*;*38*;*1* |
| *Cassis cornuta* (L., 1758) | 56;22;1;5;2;26 |
| *Cypraecassis rufa* (L., 1758) | 56;58;22;1;5;3;2;26;27;16;37;38 |
| *Phalium areolua* (L., 1758) | 56;1;3;2;26;16;20;37;38 |
| *Phalium bandatum exaratum* (Rve., 1848) | 56;2;37 |
| *Phalium bisulcatum booleyi* (Sow., 1900) | 56;2;*11*;38 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Phalium craticulatum* (Euthyme, 1885) | 56 |
| *Phalium faurotis* (Jouss., 1888) | 56 |
| *Phalium fimbria* Gm., 1791 | 56;22;2;*37* |
| *Phalium glaucum* (L., 1758) | 56;1;5;3;2;9;16;37 |
| *Phalium labiatum* (Perry, 1811) | 56;16;4 |
| *Phalium microstoma* (Martens, 1903) | 56 |
| *Phalium pyrum* (Lam., 1822) | 56;37;*27* |
| **RANELLIDAE** | |
| *Charonia grandimaculatus* (Rve.) | 1;*37* |
| *Charonia tritonis* (L., 1758) | 1;5;2;11;26;16;45;59;*37*;*38* |
| *Cymatium aegrotum* (Rve., 1844) | 2;37 |
| *Cymatium amictum* Rve. | 37 |
| *Cymatium aquatile* (Rve., 1844) | 2;20;45;*37*;*1* |
| *Cymatium caudatum* Gm. | 37 |
| *Cymatium chlorostoma* Lam. | 37 |
| *Cymatium clandestinum* Lam. | 37 |
| *Cymatium clavator* Lam. | 37 |
| *Cymatium comptum* (A. Ad., 1854) | 2 |
| *Cymatium crispum* Rve. | 37 |
| *Cymatium cutaceum africanum* (A. Ad.) | 20 |
| *Cymatium cynocephalum* Lam. | 37 |
| *Cymatium doliarium* Lam. | 3;16;*37* |
| *Cymatium elongatum* Rve. | 37 |
| *Cymatium exile* Rve. | 37 |
| *Cymatium eximium* Rve. | 37 |
| *Cymatium femorcle* L. | 37 |
| *Cymatium gallinago* Rve., 1844 | *3*;2;16;22;37;*1* |
| *Cymatium gemmatum* Rve. | 37;1;3;26;16;20;45 |
| *Cymatium gracils* Rve. | 37 |
| *Cymatium gyrinum* (L.) | 2 |
| *Cymatium hepaticum* (Rdg., 1798) | 2 |
| *Cymatium kleinei* Sow. | 3;16 |
| *Cymatium labiosum* (Wd., 1828) | 45;22;1;2;37 |
| *Cymatium loroisi* Petit | 37 |
| *Cymatium lotorium* (L., 1758) | 1;2;26;37 |
| *Cymatium moniliferus* (Rve.) | 1 |
| *Cymatium moritinctum* Rve. | 37;*1* |
| *Cymatium mundum* (Gould, 1849) | 2 |
| *Cymatium muricinum* Rdg., 1798 | 72;45;22;2;*59* |
| *Cymatium nicobaricum* (Rdg., 1798) | 2;26;11;59;45 |
| *Cymatium nodiferum* Lam. | 37 |
| *Cymatium olearium* L. | 3;16;*37* |
| *Cymatium orientale* G & H, Nevill | 37 |
| *Cymatium pachycheilos* Tapparone-Canefri | 37 |
| *Cymatium parthenopeum* (von Salis, 1793) | 20 |
| *Cymatium pfeifferianum* (Rve., 1888) | 2;20;37 |
| *Cymatium pileare* (L., 1758) | 59;5;3;2;57;10;26;16;20;37;38;*22* |
| *Cymatium pyrum* (L., 1758) | 2;37 |
| *Cymatium quoyi* Rve. | 37 |
| *Cymatium retustum* Lam. | 27;37;*1* |
| *Cymatium rubeculum* (L., 1758) | 1;2;26;37;38;1 |
| *Cymatium sarcostomum* (Rve., 1844) | 2;37;1 |
| *Cymatium sinense* Rve. | 37 |
| *Cymatium tabulatum durbanensis* (Smith) | 20 |
| *Cymatium testudinarium* (A. Ad. & Rve., 1850) | 2 |
| *Cymatium thersites* Rve. | 37 |
| *Cymatium tripus* Lam. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Cymatium tuberosum* Lam. | 37;38;57;26 |
| *Cymatium vespaceum* (Lam., 1822) | 22;1;26;16;20;45;37 |
| *Distorsio anus* (L., 1758) | 1;2;26;45;37 |
| *Distorsio cancellinus* (Roissy) | 1;*37* |
| *Distorsio decipiens* Rve. | 37 |
| *Distorsio reticularis* (L., 1758) | 16 |
| *Distorsio ridens* Rve. | 37 |
| *Gyrineum bituberculare* (Lam.) | *57* |
| *Gyrineum gyrinum* (L., 1758) | 2;45 |
| *Gyrineum pusillum* (Brod., 1833) | 2;1;20;59;45;*57*;*16*;*22* |
| *Linatella clandestina* (Lam.) | 1 |
| *Linatella cingulata* (Lam.) | 1 |
| *Linatella succincta* (L., 1771) | 2 |
| *Ranella anceps* Lam. | 38 |
| *Ranella cruentata* Sow. | 38 |
| *Ranella crumena* Lam. | 3 |
| *Ranella gemmifera* (Euthyene) | *3* |
| *Ranella reticularis* L. | 38 |
| *Ranella siphonata* Rve. | 38 |
| **BURSIDAE** | |
| *Bufonaria crumena* (Lam., 1816) | 1;16;*22*;*2* |
| *Bufonaria crumenoides* (Valenciennes, 1832) | 20 |
| *Bufonaria echinata* (Link, 1807) | *2* |
| *Bufonaria foliata* (Brod., 1825) | 20 |
| *Bursa anceps* Lam. | 37 |
| *Bursa argus* Gm. | 27 |
| *Bursa bergeri* (Tapparone-Canefri, 1880) | 2 |
| *Bursa bubo* L. 1758 | 59;22;2 |
| *Bursa bufonia* (Gm., 1791) | 59;45;22;2;57;16;37;1 |
| *Bursa cumingiana* Dunker | 37 |
| *Bursa cruentata* Sow., 1835 | 45;22;2;16;37 |
| *Bursa granifera* Rdg. | 3 |
| *Bursa granularis* (Rdg., 1798) | 59;45;2;4;57;20;*16* |
| *Bursa granularis affinis* Brod., 1833 | 26;37;20 |
| *Bursa granularis alfredensis* Turton, 1932 | 20 |
| *Bursa grayana* Dunker | 37 |
| *Bursa gyrina* Lam. | 37 |
| *Bursa lampas* (L.) | 1;2;26;59;*37*;*38*;57;*10*;*16* |
| *Bursa livida* Rve. | 1;45 |
| *Bursa marginata* Gm. | 27 |
| *Bursa nigrita* Mulhauser & Blotcher, 1979 | 2 |
| *Bursa nobilis* (Rve.,1844) | 2 |
| *Bursa paulucciana* Tapparone-Canefri | 37 |
| *Bursa ponderosa* Rve. | 37 |
| *Bursa pusilla* Brod. | 37 |
| *Bursa rhodostoma* (Sow., 1835) | 59;45;2;20;37 |
| *Bursa rosa* Perry, 1811 | 22;1;2;20 |
| *Bursa rosea* Rve. | 37 |
| *Bursa rufo* (L.) | 1 |
| *Bursa rugosa* (Born, 1778) | 1;45 |
| *Bursa thomae* d'Orbingy, 1842 | 37;*22* |
| *Bursa spinosa* Lam. | 37 |
| *Bursa semigranosa* Lam. | 37 |
| *Bursa siphonata* Rve. | 37 |
| *Bursa tuberculata* Brod. | 37 |
| *Bursa tuberosissima* Rve. | 37 |
| *Bursa vemustula* (Rve., 1844) | 2 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| **TRIPHORIDAE** | |
| *Mastonia peanites* Jouss., 1898 | 2 |
| *Triphora acicula* Issel | 37 |
| *Triphora acuta* Kiener | 37 |
| *Triphora adamsi* Des. | 37 |
| *Triphora alteruter* A. Ad. | 37 |
| *Triphora angustissima* Des. | 37 |
| *Triphora atomus* Issel | 37 |
| *Triphora aurea* (Hervier) | 57;37 |
| *Triphora cancellata* Hinds | 59 |
| *Triphora chaperi* Jouss. | 37 |
| *Triphora cingulata* A. Ad. | 59 |
| *Triphora cingulifera* Pease | 37 |
| *Triphora coetiviensis* (Melvill) | 57;59 |
| *Triphora concinna* Hinds. | 37 |
| *Triphora connata* Montr. | 37 |
| *Triphora consors* Hinds | 59;37 |
| *Triphora corrugata* (Hinds) | 57 |
| *Triphora crassula* Martens | 37 |
| *Triphora crenulata* Des. | 37 |
| *Triphora distincta* Des. | 37 |
| *Triphora douvillei* Jouss. | 37 |
| *Triphora elegans* | 59 |
| *Triphora episcopalis* Herv. | 37 |
| *Triphora eupunctata* Sow. | 37 |
| *Triphora flammulata* Pease | 37 |
| *Triphora formosa* Des. | 37 |
| *Triphora fusca* Dunker | 37 |
| *Triphora fuscozonata* Sow. | 37 |
| *Triphora hilaris* Hinds | 37 |
| *Triphora hindsi* Des. | 37 |
| *Triphora incisa* Bolten | 57 |
| *Triphora intergranosa* Hervier | 59 |
| *Triphora lilaceocincta* Smith | 59;37 |
| *Triphora lilacina* Des. | 37 |
| *Triphora maxillaris* Hinds. | 37 |
| *Triphora melantera* Hervier | 37 |
| *Triphora mirifica* Des. | 37 |
| *Triphora monacha* Hervier | 37 |
| *Triphora monilifera* (Hinds) | 57;59;37 |
| *Triphora pupaeformis* Des. | 37 |
| *Triphora pyrimidata* Hinds | 59 |
| *Triphora reevei* Des. | 37 |
| *Triphora regalis* Jouss. | 37 |
| *Triphora rosea* Hinds | 37 |
| *Triphora rubra* (Hinds) | 57;10;37 |
| *Triphora rutilans* Hervier | 37 |
| *Triphora sculpta* Hinds | 37 |
| *Triphora speciosa* Ad. & Rve. | 37 |
| *Triphora taeniolata* Hervier | 37 |
| *Triphora tibialis* Jouss. | 37 |
| *Triphora trilirata* Jouss. | 37 |
| *Triphora tristis* Hinds | 37 |
| *Triphora tristoma* Blain. | 37 |
| *Triphora turricula* Herv. | 37 |
| *Triphora violacens* Quoy & Gaimard | 59;37 |
| *Triphora xystica* Jouss. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| **EPITONIIDAE** | |
| *Alora rapunculus* Kilburn, 1975 | 2 |
| *Alora reticulata* (Habe, 1962) | 2 |
| *Amaea acuminata* (Sow., 1844) | 6;*2* |
| *Eglisia elegans* Melvill | 1 |
| *Epitonium abbreviatum* Sow. | 37 |
| *Epitonium aculeatum* Sow. | 37 |
| *Epitonium alata* Sow. | 59;37 |
| *Epitonium antennata* Pease | *38* |
| *Epitonium artimi* Jouss. | *38* |
| *Epitonium billeeanum* (Dushane & Bratcher, 1965) | 11 |
| *Epitonium bulbulum* Sow. | 37 |
| *Epitonium bullatum* (Sow., 1844) | 2;20 |
| *Epitonium cancellatum* Humphreys | 37 |
| *Epitonium clementina* | 1;*21* |
| *Epitonium coronatum* Lam., 1816 | 22;1;20;59;37 |
| *Epitonium crispatum* (Pease, 1863) | 2 |
| *Epitonium fasciatum* Sow., 1844 | 22;37 |
| *Epitonium gracile* Sow. | 37 |
| *Epitonium histricosa* Jouss. | *38* |
| *Epitonium interstriatum* Sow. | 37 |
| *Epitonium kieneri* Canefri | 27;37 |
| *Epitonium lactea* Krauss | 37 |
| *Epitonium lamellosa* (Lam., 1822) | 20;*2* |
| *Epitonium lamellosum* Sow. | 37 |
| *Epitonium latedisjuncta* Jouss. | *38* |
| *Epitonium latifasciatum* Sow., 1874 | 22;*37* |
| *Epitonium laxatum* Sow. | 37 |
| *Epitonium lineolatum* Sow. | 37 |
| *Epitonium lyra* Sow., 1844 | 22;2;37;*59* |
| *Epitonium marmoratum* Sow. | 37 |
| *Epitonium martinii* Wd. | 37 |
| *Epitonium multicostatum* (Sow., 1844) | 2;37 |
| *Epitonium multiperforatum* Sow. | 37 |
| *Epitonium obliquum* (Sow., 1844) | 2 |
| *Epitonium pallosi* Kiener | 37 |
| *Epitonium papyracea* (de Boury) | 1 |
| *Epitonium perplexum* Des., 1863 | 22 |
| *Epitonium raricostatum* (Lam., 1822) | 2;27;37 |
| *Epitonium replicatum* Sow. | 37 |
| *Epitonium robillardi* Sow., 1894 | 37;22;*21*;*38* |
| *Epitonium savignyi* Jouss., 1912 | 2 |
| *Epitonium sexcosta* Jouss. | *38* |
| *Epitonium subauriculata* Souverbie | *38* |
| *Epitonium textum* Smith | 37 |
| *Epitonium undulatissimum* Sow., 1874 | 22 |
| *Epitonium varicosum* Lam. | 27;*1* |
| *Epitonium viaderi* Fenaux, 1938 | 2 |
| *Variscala varicostata* Lam. | 22 |
| **JANTHINIDAE** | |
| *Janthina balteata* Rve., 1858 | 2 |
| *Janthina bicolor* Menke | 37 |
| *Janthina communis* Lam. | 37 |
| *Janthina exigua* (Lam.) | 20;37 |
| *Janthina prolongata* Blain., 1822 | 20;*1*;*59*;*2*;*38*;*37*;*22* |
| *Janthina janthina* (L., 1758) | 22;1;20;38 |
| *Janthina vinsoni* Des., 1863 | 2;37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Recluzia jehennei* Petit, 1853 | 22;2;37 |
| *Recluzia rollandiana* Rcz. | 37 |
| **EULIMIDAE** | |
| *Arcuella mirifica* Nelvill, 1874 | 22 |
| *Echineulima eburneus* Des., 1863 | 22;*37* |
| *Echineulima metcalfei* A. Ad., 1853 | 22;*37* |
| *Eulima acicalata* Sow. | 37 |
| *Eulima acuta* A. Ad. | 37 |
| *Eulima ascuata* Sow | 37 |
| *Eulima epeterium* Melville, 1889 | 22 |
| *Eulima flexuosa* Sow. | 26;37 |
| *Eulima hastata* Sow., 1834 | 22;37 |
| *Eulima inflexa* Blain. | 37 |
| *Eulima labiosa* Sow. | 57;1 |
| *Eulima lactea* A. Ad. | 1;37 |
| *Eulima major* Sow. | 26;37 |
| *Eulima mirifica* Nelvill | 37 |
| *Melanella algoensis* (Smith) | 16 |
| *Melanella cumingi* (A. Ad. 1854) | 22;*37* |
| *Melanella dufresnei* (Bowdich, 1822) | 2 |
| *Melanella teinostoma* A. Ad., 1853 | 22 |
| *Melanella robillardiana* (Pilsbury) | 57;*37* |
| *Pyramidelloides angusta* (Hedley, 1898) | 22 |
| *Pyramidelloides miranda* (A. Ad., 1861) | 22 |
| *Scalenostoma carinata* Des., 1863 | 22;37 |
| *Scalenostoma exarata* A. Ad., 1855 | 22;*37* |
| *Scalenostoma lubricum* Fischer, 1886 | 22 |
| *Scalenostoma speciosus* H. Ad., 1869 | 22;37;*26* |
| *Scalenostoma subulata* Brod., 1832 | 22;2;*37* |
| **THYCIDAE** | |
| *Thyca crystallina* (Gould) | 11;57 |
| **STILIFERIDAE** | |
| *Robillardia cernica* Smith | 37 |
| *Stilifer ovoideus* H. & A. Ad., 1853 | 22;1 |
| *Stilifer apiculatus* Souverbie | 37 |
| *Stilifer cumingianus* A. Ad. | 37 |
| *Stilifer subangulatus* A. Ad. | 37 |
| **MURICIDAE** | |
| *Aspella anceps* Lam. | 59 |
| *Aspella lamellosa* Dunker, 1863 | 22 |
| *Aspella platylaevis* Radwin & d'Attilio, 1976 | 2 |
| *Aspella producta* (Pease, 1861) | 2 |
| *Chicoreus akritos* Radwin & d'Attilio, 1976 | 22 |
| *Chicoreus banksii* (Sow., 1841) | 1 |
| *Chicoreus (Naquetia) barclayi* Rve., 1858 | 22;2;*37* |
| *Chicoreus brunneus* (Link, 1807) | 2;11 |
| *Chicoreus cloveri* Houart, 1985 | 2 |
| *Chicoreus dovi* Houart, 1984 | 44 |
| *Chicoreus (Naquetia) fenestrata* Chemn. | 22 |
| *Chicoreus groscgi* Vokes, 1978 | 2 |
| *Chicoreus incarnatus* (Rdg.) | 57 |
| *Chicoreus maurus* (Brod.) | 20 |
| *Chicoreus microphyllus* (Lam.) | 1 |
| *Chicoreus palmarosae* (Lam., 1822) | 2;*26*;2;*37* |
| *Chicoreus ramosus* (L., 1758) | 22;1;5;3;2;4;26;20;59;45;*14* |
| *Chicoreus saulii* (Sow., 1841) | 2;*37* |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Chicoreus superbus* (Sow., 1889) | 2 |
| *Chicoreus torrefactus* (Sow., 1841) | 2;45;*1* |
| *Chicoreus (Naquetia) trigonula* Lam., 1822 | 22 |
| *Chicoreus (Naquetia) triqueter* (Born, 1789) | 2;*37*;*1* |
| *Cronia coronata* (H. Ad., 1869) | 2 |
| *Cronia crassulnata* (Hedley, 1915) | 2 |
| *Cronia heptagonalis* (Rve., 1846) | 2;20;*3*;*22*;*14* |
| *Cronia iostoma* (A Ad., 1853) | 2;*45* |
| *Cronia konkanensis* (Melvill, 1893) | 6 |
| *Cronia latiaxidea* (Sow., 1893) | 2 |
| *Cronia margariticola* (Brod., 1833) | 72;59;*2*;20;22;*45*;*37*;*1*;*57*;*14*;*58*;*60* |
| *Cronia marginatra* (Blain., 1832) | 2;20;*37* |
| *Cronia ochrostoma* (Blain., 1832) | 2;*57*;20;*60*;*37*;*59*;*22* |
| *Cronia spinosa* (H & A Ad., 1853) | 2;*37* |
| *Drupa andrewsi* Smith | 37 |
| *Drupa angulata* Sow. | 37;*27* |
| *Drupa aspera* Lam. | 37 |
| *Drupa biconica* Blain | 37 |
| *Drupa cancellata* Q & G., 1833 | 22;37 |
| *Drupa chrysostoma* Des. | 37;*38* |
| *Drupa clathrata miticula* (Lam., 1822) | 59;2;*57*;*37* |
| *Drupa concatenta* Lam. | 37;38 |
| *Drupa elata* Blain | 37;*3* |
| *Drupa fiscellum* Chemn. | 37 |
| *Drupa fusconigra* Dunker | 72;6;*59* |
| *Drupa grossularia* Rdg., 1798 | 22 |
| *Drupa horrida* Lam. | 37 |
| *Drupa hystrix* Lam. | 37 |
| *Drupa lobata* (Blain., 1832) | 22;1;26;58;45;80;*37* |
| *Drupa morum morum* Rdg., 1798 | 59;54;22;1;2;57;26;80 |
| *Drupa muricina* Blain. | 37 |
| *Drupa nodus* Lam. | 37 |
| *Drupa porphyrostoma* Rve. | 37 |
| *Drupa ricinus ricinus* (L., 1758) | 72;1;58;80;38;*3*;*57*;*26*;*20*;*37*;*38* |
| *Drupa ricina albolabris* (Blain., 1832) | 45;2;20;*1* |
| *Drupa ricina arachnoidea* (Lam., 1810) | 54;2 |
| *Drupa rubusidaeus* Rdg.,1798 | 45;59;2;80 |
| *Drupa siderea* Rve. | 37 |
| *Drupa spathulifera* (Blain.) | 1;57 |
| *Drupa spectrum* Rve. | 37;*38* |
| *Drupa squamulosa* Des. | 37 |
| *Drupa striata* Pease | 37 |
| *Drupa tuberculata* Blain | 37;*1*;*3*;*38* |
| *Drupa undata* Chemn. | 37;*38* |
| *Drupella cariosa* Wd. | 59;72 |
| *Drupella cornus* (Rdg., 1798) | 22;2;59;45;*1*;*57* |
| *Drupella fraga* (Blain., 1832) | 2;*37* |
| *Drupella rugosa* (Born, 1778) | 59;2 |
| *Favartia brevicula* Sow., 1834 | 22;*37* |
| *Favartia cyclostoma* (Sow., 1841) | 22;2 |
| *Favartia garretti* (Pease, 1868) | 2 |
| *Favartia jeanae* D'Attilio & Bartch, 1980 | 2 |
| *Favartia judithae* D'Attilio & Bartch, 1980 | 2 |
| *Favartia minotauros* Radwin & d'Attilio, 1976 | 2 |
| *Favartia obtusus* Sow., 1893 | 22;*27*;*37* |
| *Favartia salmonea* Melvill & Standen, 1899 | 22;2;*37* |
| *Haustellum gallinago fernandesi* Houart, 1990 | 52 |
| *Haustellum haustellum* L., 1758 | 2 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Homolocantha anatomica* (Perry, 1811) | 2 |
| *Homolocantha fauroti* (Jouss., 1888) | 2 |
| *Homalocantha zamboi* (Burch & Burch, 1960) | 2 |
| *Maculotriton bracteatus* Hinds, 1844 | 22 |
| *Maculotriton digitalis* (A. Ad.) | 1;57;59 |
| *Maculotriton serriale* (Des. in Laborde & Linant, 1834) | 20;2;59 |
| *Morula anaxares* (Duclos MS Kiener, 1843) | 72;54;59;22;57;2;14;20;70;*3*;*38*;*1*;*37* |
| *Morula biconica* (Blain., 1832) | 2;20 |
| *Morula concatenata* Lam., 1843 | 2;*22*;1 |
| *Morula echinata* (Rve., 1846) | 2 |
| *Morula fiscella* Gm., 1791 | 22;*37* |
| *Morula granulata* (Duclos, 1832) | 59;72;54;22;1;2;4;57;16;20;70;*3*;*42* |
| *Morula marginatra* Blain., 1832 | 22;45;72;59;*3*;*71* |
| *Morula mutica* (Lam.,1816) | 80;*2*;*20*;*37*;*27*;*22* |
| *Morula nodosa* (Hombrun & Jacquinot) | 20;*14*;*1* |
| *Morula rosea* (Rve., 1846) | 2 |
| *Morula spinosa* H. & A. Ad. | 59 |
| *Morula squamiliratum* Smith | 59 |
| *Morula uva* (Rdg., 1798) | 45;59;1;2;10;20;*57* |
| *Murex aculeatus* Lam. | 37 |
| *Murex aduncospinosus* Beck in Sow., 1841 | 2 |
| *Murex adustos* Lam. | 57;38;37;*1* |
| *Murex affinis* Rve. | 37 |
| *Murex alveatus* (Kiener) | 1 |
| *Murex anguliferus* Lam. | 27;37 |
| *Murex antelmei* Viades | 37 |
| *Murex axicornis* Lam. | 37 |
| *Murex benedictus* Melvill | 37 |
| *Murex brevispina* Lam., 1822 | 22;1;3;4;14;20;38;*1* |
| *Murex clavus* Kiener | 37 |
| *Murex crossei* Leinard | 37 |
| *Murex crouchi rufescens* Sow. | 27 |
| *Murex crouchi* Sow. | 27 |
| *Murex darrosensis* Smith | 37 |
| *Murex denudatus* Perry | 37 |
| *Murex dichrous* Tapparone-Canefri | 37 |
| *Murex euracanthus* Adams | 37 |
| *Murex fenestratus* Chemn. | 37 |
| *Murex haustellum* (L.) | 1;37 |
| *Murex incarnatus* Bolten | 37 |
| *Murex inflatus* Lam. | 38 |
| *Murex lienardi* Crosse | 37 |
| *Murex lobbeckei* Kobelt | 37 |
| *Murex malabaricus* Smith | 37 |
| *Murex microphyllus* Lam. | 37;38 |
| *Murex motacilla* Chemn. | 37 |
| *Murex mundus* Rve. | 37 |
| *Murex pecten* Lightfoot, 1786 | 5;2;26 |
| *Murex pinnatus* Wd. | 37 |
| *Murex purpuroides* (Dunker) | 1;27 |
| *Murex rectirostris* Sow., 1841 | 22 |
| *Murex rota* (Sow.) | 1;37 |
| *Murex rubiginosus* Rve. | 14 |
| *Murex scalopax* Dill., 1817 | 22 |
| *Murex scorpio* L. | 37 |
| *Murex submissus* Smith | 37 |
| *Murex sykesi* Preston | 37 |
| *Murex ternispina* Lam. | 38;37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Murex tetragonus* Brod. | 37 |
| *Murex trialatus* Sow. | 37 |
| *Murex tribulus* L. | 37 |
| *Murex tripterus* Born. | 37 |
| *Murex uncinarius* Lam. | 37 |
| *Murex virgineus* Bolten-Rdg. | 14 |
| *Nassa francolina* (Brug., 1789) | 45;59;2;20 |
| *Nassa glans* (L.) | 14 |
| *Nassa kraussiana* Dunker | 3;14 |
| *Nassa margaritifera* (Dunker) | 14 |
| *Nassa natalensis* Smith | 14 |
| *Nassa papillosa* (L.) | 14 |
| *Nassa plebecula* Gould | 14 |
| *Nassa serta* (Brug., 1789) | *57;1;22;37;38*;26 |
| *Ocenebra inermicosta* Vokes, 1964 | 22 |
| *Pascula lefevreiana* (Tapparone-Canefri, 1880) | 2 |
| *Phyllocoma convolutus* (Brod., 1833) | 2 |
| *Phyllocoma sculptilis* (Rve., 1846) | 2 |
| *Pinaxia coronata* A. Ad., 1853 | 1;22;37 |
| *Pinaxia versicolor* (Gray, 1839) | 2 |
| *Pterynotus barclayana* H. Ad., 1873 | *22;2* |
| *Pterynotus celinamarumai* Kosuge, 1980 | 2 |
| *Pterynotus elongata* Lightfoot, 1786 | *22;2* |
| *Pterynotus loebbeckei* Kobelt, 1879 | 22;2 |
| *Pterynotus martinetana* (Rdg., 1798) | 2;*22* |
| *Pterynotus nodulifera* Sow., 1841 | *22* |
| *Pterynotus pellucida* (Rve., 1845) | *2* |
| *Purpura javanica* Phil. | 38 |
| *Purpura luteomarginata* Montrouzier | 38 |
| *Purpura pseudohippocastanum* Dautz. | 38 |
| *Purpura* (*Thais*) *panama* Rdg., 1798 | 4;45;20;*57;59;54;38;1;3;37* |
| *Purpura* (*Thais*) *persica* L., 1758 | 72;2;26;*22;37* |
| *Rapana bulbosa* (Born) | 3;14 |
| *Rapana rapiformis* (Born, 1778) | 1 |
| *Ricinula clathrata* Lam. | 38 |
| *Spinidrupa euracanthus* (A. Ad., 1853) | 2 |
| *Thais (Mancinella) alouina* (Rdg., 1798) | 2;4;20;54;*45;14;1;3;37* |
| *Thais aculeatus* (Des. & M. Edwards) | 59;72;54;2;57;71 |
| *Thais alevolata* Rve. | 37 |
| *Thais armigera* (Lam.) | 59;1;57;*9;37;2* |
| *Thais bimaculata* (Jonas, 1845) | 27 |
| *Thais bitubercularis* Lam., 1822 | 22;1;14 |
| *Thais blanfordi* (Melvill,1892) | 22;1;20;45 |
| *Thais buccinea* | 1 |
| *Thais bufo* (Lam., 1822) | 3;4;20;*38* |
| *Thais coronata* (Lam., 1816) | 1 |
| *Thais echinata* Blain. | 37 |
| *Thais echinulata* (Lam.) | 1;57;45;37;*20;59* |
| *Thais elata* Blain. | 37 |
| *Thais haemastoma* L. | 37 |
| *Thais hippocastanum* (L., 1758) Lam. | 22;37 |
| *Thais intermedia* (Kiener, 1836) | 22;3;2;26;37;*59* |
| *Thais lacera* (Born, 1778) | 20;*14* |
| *Thais luculentus* (Rve.) | 1 |
| *Thais muricina* Blain | 37 |
| *Thais neritoidea* Des. | 37 |
| *Thais pica* Blain. | 37 |
| *Thais savignyi* (Des., 1844) | 4;20;59;54;*45;14;38* |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Thais spectrum* Rve. | 37 |
| *Thais squamigera* (Des., 1832) | 2 |
| *Thais squamosa* Lam. | 37 |
| *Thais tissoti* (Petit, 1853) | 20 |
| *Thais tuberosa* Rdg., 1798 | 22;59;45;*2*;*3* |
| *Trophon fossuliferus* Tapparone-Canefri | 37 |
| *Usila leucostoma* Des. | 37 |
| *Vexilla fusconigra* (Pease, 1860) | 2 |
| *Vexilla lineata* (A. Ad., 1853) | 2 |
| *Vexilla taeniata* Powys | 37 |
| *Vexilla vexillum* (Gm., 1791) | 1;20;59;*37*;*38* |
| *Vexilla variabilis* (Des., 1863) | 2;37 |
| **CORALLIOPHILIDAE** | |
| *Coralliophila barclayana* A. Ad. | 37 |
| *Coralliophila clathrata* (A. Ad., 1854) | 2;37 |
| *Coralliophila coronata* Barclay, 1869 | 22;*37* |
| *Coralliophila costata* Blain | 37 |
| *Coralliophila costularis* (Lam., 1816) | 22;1;2;59;45;37 |
| *Coralliophila curta* Sow., 1894 | 22;27;37 |
| *Coralliophila deformis* (Lam.) | 37 |
| *Coralliophila erosa* (Rdg., 1798) | 1;2 |
| *Coralliophila fimbriata* (A. Ad., 1854) | *2*;*22*;*37* |
| *Coralliophila fritschi* (Martens) | 14 |
| *Coralliophila latiaxidea* Sow. | 27;37 |
| *Coralliophila madreporarum* (Sow., 1822) | 2;*14*;37;*22*;*59* |
| *Coralliophila meyendorffi* (Calcara) | 1 |
| *Coralliophila monodonta* (Quoy & Gaimard) | *57* |
| *Coralliophila neritoidea* (Lam., 1816) | 2;11;47;37 |
| *Coralliophila orbignyana* Rve. | 59;*38* |
| *Coralliophila radula* (A Ad., 1855) | 2 |
| *Coralliophila squamosissima* (Smith, 1876) | 22;2;20 |
| *Coralliophila squamulosa* Lam. | 37 |
| *Coralliophila violacea* (Kiener) | 59;46;1;57;10;38;*37* |
| *Latiaxis deburghiae* Rve. | 37 |
| *Latiaxis princeps* Melvill | 37;26 |
| *Magilus antiquus* Montfort, 1810 | 22;1;2;26;27;37;59 |
| *Magilus cumingi* Des. | *37* |
| *Magilus cuvieri* Des. | *37* |
| *Magilus ellipticus* Sow. | *37* |
| *Magilus lamarckii* Des., 1863 | 1;*22*;*37* |
| *Magilus robillardi* Lienard | 27;*37* |
| *Magilus ruppellii* Des., 1863 | 22;27;*37* |
| *Magilus striatus* Ruppell | *37* |
| *Rapa bulbiformis* Sow., 1870 | 2 |
| *Rapa incurvus* (Dunker, 1852) | 2 |
| *Rapa papyracea* Lam. | 37 |
| *Rapa penardi* (Montroux) | 1 |
| **BUCCINIDAE** | |
| *Caducifer truncata* (Hinds, 1844) | 2 |
| *Cantharus crocata* Rve., 1846 | 37;22;2;*26* |
| *Cantharus fumosus* (Dill., 1817) | *22*;37;*38* |
| *Cantharus iostoma* (Gray, 1834) | *20*;2 |
| *Canthurus marmorata* Rve., 1846 | *59*;*22*;*37*;*14* |
| *Cantharus recurva* Rve., 1846 | 22;*37* |
| *Cantharus rubiginosus* Rve. | 37 |
| *Cantharus spiralis* Gray | 37 |
| *Cantharus subcostatus* (Krauss) | 1 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Cantharus tranquebaricus* Gm. | 37 |
| *Cantharus undosus* (L., 1758) | 22;59;20;1;57;37;26;*2*;*38* |
| *Canthurus (Pollia) wagneri* (Anton, 1839) | 2;*26* |
| *Colus longicauda* L. | 37 |
| *Engina alveolata* (Kiener, 1836) | 2;37 |
| *Engina andrewsi* Smith | 37 |
| *Engina astricta* Rve. | 37;38 |
| *Engina bonasia* Martens, 1880 | 59;22;2;37 |
| *Engina carbonaria* Rve. | 37 |
| *Engina carolinae* Kiener | 37 |
| *Engina concinna* Rve. | 37 |
| *Engina elegans* (Dunker) | 1 |
| *Engina egregia* Rve., 1846 | 22;2;*37* |
| *Engina fusiformis* Pease | 21;37 |
| *Engina gibbosa* Garett | 37 |
| *Engina histrio* Rve. | 37 |
| *Engina incarnata* (Des., 1834) | 22;2 |
| *Engina iodosia* Duclos | 37 |
| *Engina lineata* (Rve.) | 57;37 |
| *Engina melanozona* Tomlin | 37;*59* |
| *Engina mendicaria* (L., 1758) | 22;1;3;72;26;14;59;55;37;38;71 |
| *Engina natalensis* Melvill, 1895 | 22;20 |
| *Engina nodicostata* Pease | 37 |
| *Engina obliquicostata* Rve., 1846 | 22 |
| *Engina phasinola* Duclos | 37 |
| *Engina rawsoni* Melvill | 37 |
| *Engina striata* Pease | 37 |
| *Engina variabilis* Pease | 37 |
| *Engina xantholeuca* Smith | 37 |
| *Engina zatricium* Melvill | 37 |
| *Engina zea* Melvill, 1893 | 2 |
| *Engina zepa* Duclos | 37 |
| *Engina zonata* Rve. | 37 |
| *Nassaria acuminata* (Rve., 1844) | 76;22 |
| *Nassaria gracilis* Sow., 1902 | 76;14 |
| *Nassaria (Hindsia) nivea* Gm. | 37 |
| *Olivipollia fragaria* (Wd. 1828) | 2;*26*;*22* |
| *Olivipollia pulchra* (Rve., 1846) | 2;*37* |
| *Phos cyanostoma* (A Ad.,1850) | 59;2;57;1 |
| *Phos roseatus* (Hinds, 1844) | 22;2;57;37 |
| *Phos senticostus* L., 1758 | 22 |
| *Phos textum* (Gm., 1791) | 2;37;*22* |
| *Pisania amphodon* Martens | 22;37 |
| *Pisania billehensti* Petit | 37 |
| *Pisania crenilabrum* A. Ad. | 37 |
| *Pisania fasciculata* Rve., 1846 | 22;2;20;37 |
| *Pisania gracilis* Rve. | 37 |
| *Pisania ignea* (Gm., 1791) | 22;1;2;37 |
| *Pisania inctuosa* Tapparone-Canefri | 37 |
| *Pisania lefevreiana* Tapparone-Canefri | 37 |
| *Pisania luctuosa* Tapparone-Canefri, 1880 | 2 |
| *Pisania montrouzieri* Crosse | 37 |
| *Pisania naevosa* Martens | 37 |
| *Pisania obliquecostata* Tapparone-Canefri. | 37 |
| *Pisania polychloros* Tapparone-Canefri | 37 |
| *Pisania proxima* Tapparone-Canefri | 37 |
| *Pisania rubiginosa* (Rve.) | 1 |
| *Pisania truncatus* Hinds | 59 |
| *Siphonalia corrugata* A. Ad. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| **COLUMBELLIDAE** | |
| *Anachis atrata* (Gould) | 20;*37*;*14* |
| *Anachis (Zafra) punctata* Brug. | 27;*37* |
| *Columbella alabastrum* Martens | 37 |
| *Columbella galaxias* Rve. | 38 |
| *Columbella mercatoria* Lam. | 3;*37* |
| *Columbella moleculinella* Dautz. | 38 |
| *Columbella pardalina* Lam. | 59;*37* |
| *Columbella tankervillei* (Montrouzier) Hervier | 38;37;*26* |
| *Columbella turturina* Lam. | 59;3;57;20;38;*1*;*45*;*37*;*22* |
| *Columbella zelina* Duclos | 37 |
| *Mitrella albina* (Kiener, 1841) | 2;*37* |
| *Mitrella (Atilia) cumingii* Rve., 1859 | 22;*37* |
| *Mitrella flexuosa* Lam., 1822 | 22;*37* |
| *Mitrella hanleyi* Des., 1863 | 22;*37* |
| *Mitrella (Atilia) lactea* Duclos | 27;*37* |
| *Mitrella marquesa* Gaskoin, 1852 | 22;*37* |
| *Pyrene albinodulosa* Gaskoin | 37 |
| *Pyrene amirantium* Smith | 37 |
| *Pyrene araneosa* Kiener | 37 |
| *Pyrene articulata* Souverbie | 37 |
| *Pyrene atomella* Duclos | 37 |
| *Pyrene azora* (Duclos, 1840) | 57;37;*22*;*38* |
| *Pyrene bidentata* Menke | 37 |
| *Pyrene blanda* Sow. | 59 |
| *Pyrene brevissima* Hervier | 37 |
| *Pyrene carolinae* Smith | 37 |
| *Pyrene cartwrighti* Melvill | 37 |
| *Pyrene chuni* (Thiele, 1925) | 22;1 |
| *Pyrene cincinnata* (Martens) | 57;37 |
| *Pyrene clausiliformis* Kiener | 37 |
| *Pyrene conspera* Gaskoin | 37;*1* |
| *Pyrene dautzenbergi* Hervier | 37 |
| *Pyrene digglesi* Brazier | 37 |
| *Pyrene dunkeri* Tyron | 37 |
| *Pyrene filicincta* Tapparone-Canefri | 37 |
| *Pyrene flava* (Brug., 1789) | 72;22;1;57;20;45;37;*38* |
| *Pyrene floccata* (Rve.) | 1;*20* |
| *Pyrene fulgurans* Lam. | 37;*14* |
| *Pyrene gowllandi* Brazier | 37 |
| *Pyrene hindsi* Rve. | 37 |
| *Pyrene indica* Rve. | 37 |
| *Pyrene isabellina* Crosse | 37 |
| *Pyrene isomella* Duclos | 37 |
| *Pyrene kraussi* | 1 |
| *Pyrene lachryma* Rve. | 37 |
| *Pyrene ligula* (Duclos) | 1;37;*59* |
| *Pyrene moleculina* Duclos | 59;37;*38* |
| *Pyrene mutata* D. & B. | 37 |
| *Pyrene nana* (Michauld) Duclos | 37 |
| *Pyrene nevilli* Tryon | 37 |
| *Pyrene nympha* Kiener | 37 |
| *Pyrene obesula* Hervier | 37 |
| *Pyrene obtusa* (Sow.) | 20 |
| *Pyrene ocellata* Link, 1807 | 22;7 |
| *Pyrene ocellatula* Hervier | 37 |
| *Pyrene oselmonta* Duclos | 37 |
| *Pyrene pacei* Smith | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Pyrene peasei* Martens & Langkavel | 37 |
| *Pyrene pellucida* Pease | 37 |
| *Pyrene pinguis* Hervier | 37 |
| *Pyrene poecila* Sow. | 37 |
| *Pyrene polita* Nevill | 37 |
| *Pyrene puella* Sow. | 37 |
| *Pyrene purpurea* Adams | 37 |
| *Pyrene pusilla* Sow. | 37 |
| *Pyrene rasolia* Duclos | 37 |
| *Pyrene regnardi* Viader, 1938 | 22 |
| *Pyrene regulus* Souverbie | 37 |
| *Pyrene robillardi* Sow. | 37 |
| *Pyrene rorida* Rve., 1859 | 37;*22* |
| *Pyrene rufopipercta* Smith | 37 |
| *Pyrene rustica* L. | 37 |
| *Pyrene scalpta* Rve. | 37 |
| *Pyrene scripta* (L.) | 1;45 |
| *Pyrene scripta* Lam. | 37 |
| *Pyrene selasphora* Melville & Standen | 59 |
| *Pyrene spiratella* Martens | 37 |
| *Pyrene stepheni* Melvill & Standen | 37;*38* |
| *Pyrene striatula* Dunker | 37 |
| *Pyrene sublaevis* Montrouzier | 37 |
| *Pyrene succinea* Hervier | 37 |
| *Pyrene testudinaria* (Link, 1807) | 22 |
| *Pyrene troglydytes* (Souvier) | 57;37;*38* |
| *Pyrene tylerae* (Griffiths & Pidgeon) | 1;45 |
| *Pyrene unifascialis* Lam. | 37 |
| *Pyrene varians* (Sow.) | 1;37;*38* |
| *Pyrene versicolor* Sow. | 37 |
| **NASSARIDAE** | |
| *Bullia annulata* (Lam.) | 20 |
| *Bullia diluta* (Krauss) | 20;3;14 |
| *Bullia mauritiana* Gray, 1839 | 22 |
| *Bullia mozambicensis* Smith, 1878 | 22;20;14 |
| *Bullia natalensis* Krauss | 3;14 |
| *Bullia rhodostoma* (Gray) Rve. | 14 |
| *Bullia similis* Sow. | 20 |
| *Bullia vittata* L., 1767 | 22 |
| *Cyllene japonica* Pilsbury | 37 |
| *Cyllene pulchella* Ad. & Rve. | 37 |
| *Nassarius albescens gemmuliferus* (A. Ad., 1852) | 72;59;60;7;1;2;4;26;20;*57*;*11*;*37*;*3*;*38*;*37*;*14*;*22* |
| *Nassarius arcularia plicatus* (Rdg., 1798) | 22;72;20;*1*;*2*;*3*;*4*;*57*;*37* |
| *Nassarius callosa* A. Ad. | *37* |
| *Nassarius callospira* (A. Ad.) | 1 |
| *Nassarius canaliculata* Lam. | *37* |
| *Nassarius cancellata* A. Ad. | *37* |
| *Nassarius capensis* (Dunker) | 14;*37* |
| *Nassarius castus* (Gould, 1835) | 2 |
| *Nassarius compta* A. Ad., 1852 | *26*;*2*;37;*22* |
| *Nassarius concinnus* (Powys, 1835) | 2;26;*22*;*37* |
| *Nassarius coronatus* (Brug., 1789) | 72;22;1;2;57;26;3;38;14;20;59;55;*37* |
| *Nassarius coronulus* (A. Ad., 1852) | 2;4;*37* |
| *Nassarius crematus* (Hinds, 1844) | 1;2 |
| *Nassarius cremulata* Brug. | 1;*37* |
| *Nassarius dermestina* Gould | *37* |
| *Nassarius dorsuosa* A. Ad. | *37* |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Nassarius echinatus* (Ad., 1852) | 59;72;*22*;*37* |
| *Nassarius elegans* (Kiener) | 57;*37* |
| *Nassarius erythraea* Issel | *37* |
| *Nassarius eximia* Gould | *37* |
| *Nassarius fasciata* Quoy & Gaimard | *37* |
| *Nassarius filosus* (Rve., 1853) | 20 |
| *Nassarius fraudulentus* Marrat, 1877 | 22; |
| *Nassarius gaudiosus* (Hinds, 1844) | 2;59;*37*;*22* |
| *Nassarius geniculata* A. Ad. | *37* |
| *Nassarius glabrata* A. Ad. | *37* |
| *Nassarius glans* (L., 1758) | 1;2;*22*;*37* |
| *Nassarius granifera* Kiener | 1;59;*37* |
| *Nassarius gramuliferus* (Kiener, 1834) | 2 |
| *Nassarius granum* Lam. | *37* |
| *Nassarius graphitera* Hombrun & Jacquinot | *37* |
| *Nassarius gruneri* (Dunker) | 1 |
| *Nassarius horridus* Dunker | 59;*37*;*22* |
| *Nassarius isabellei* Rve. | *37* |
| *Nassarius kieneri* Des. | *37* |
| *Nassarius kraussianus* (Dunker, 1846) | 4;20 |
| *Nassarius lentiginosa* A. Ad. | *37* |
| *Nassarius labiatus* A. Ad., 1853 | *22* |
| *Nassarius livescens* (Phil., 1849) | 2;*22* |
| *Nassarius luctuosa* A. Ad. | *37* |
| *Nassarius maculata* A. Ad. | *37* |
| *Nassarius margaritiferus* Dunker, 1847 | 1;55;59;72;*22* |
| *Nassarius mucronata* Ad. | 26;*37* |
| *Nassarius muricatus* Quoy & Gaimard | 27;*37* |
| *Nassarius nana* A. Ad. | *37* |
| *Nassarius natalensis* Smith, 1903 | 22 |
| *Nassarius nodifer* Powys, 1835 | 22 |
| *Nassarius obockensis* Jouss. | 38 |
| *Nassarius oneratus* (Des., 1863) | 2;*37* |
| *Nassarius ornata* Des. | *37* |
| *Nassarius papillosus* (L., 1758) | 59;2;11;26;1;*37* |
| *Nassarius pauperus* Gould, 1850 | 59;*37*;38;1;*22* |
| *Nassarius picta* Dunker | *37* |
| *Nassarius pullus* (L., 1758) | 38;1;*22* |
| *Nassarius punctata* Ad. | *37* |
| *Nassarius reeveanus* Dunker, 1847 | 22 |
| *Nassarius scalaris* A. Ad. | *37* |
| *Nassarius scalpta* Marrat | *37* |
| *Nassarius sertula* Ad. | *37* |
| *Nassarius simusigera* A. Ad. | *37* |
| *Nassarius siquijorensis* (A. Ad., 1852) | 2;*37* |
| *Nassarius stolata* Gm. | *37* |
| *Nassarius striata* A. Ad. | *37* |
| *Nassarius subspinosus* (Lam.) | 1;*37* |
| *Nassarius taenius* (Gm.) | 1;26;38;*37* |
| *Nassarius thersites* Gm. | *37* |
| *Zeuxius olivaceus* (Brug., 1789) | 22;*37*;*2* |
| **MELONGENIDAE** | |
| *Busycon perversum* (L.) | 1 |
| *Melongena pyrum* (Gm., 1791) | 2;1;20;38 |
| *Volema paradisiaca* Rdg., 1798 | 72;22;*3*;*14* |
| **FASCIOLARIDAE** | |
| *Colubraria angulata* Rve. | 37 |
| *Colubraria antiquata* Hinds | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Colubraria bracteata* Hinds | 37 |
| *Colubraria ceylonensis* Sow. | 37 |
| *Colubraria clathratus* Sow., 1833 | 22;*37* |
| *Colubraria convoluta* Brod. & Sow. | 37 |
| *Colubraria decapitatus* Rve., 1844 | 22;37 |
| *Colubraria digitalis* Rve. | 37 |
| *Colubraria distorta* Schubert & Wagner | 37 |
| *Colubraria lanceolata* Menke | 37 |
| *Colubraria maculosa* (Gm.) | 1 |
| *Colubraria muricata* (Lightfoot, 1786) | *26;37* |
| *Colubraria nitidula* (Sow., 1833) | 26;37;1 |
| *Colubraria obscura* (Rve., 1844) | 26;22;59;37;1 |
| *Colubraria reticosa* A. Ad., 1870 | 22;37 |
| *Colubraria sculptilis* Rve., 1844 | 22;37 |
| *Colubraria sowerbyi* Rve. | 37 |
| *Colubraria testacea* March | 37 |
| *Colubraria tortuosa* (Rve., 1844) | *26* |
| *Colubraria truncata* Hinds | 37 |
| *Fusinus colus* (L., 1758) | 1;3;2;14;45 |
| *Fusinus forceps* (Perry, 1811) | 2 |
| *Fusinus longissimus* (Gm., 1791) | 2;*37* |
| *Fusinus oblitus* (Rve., 1847) | 2;*37* |
| *Fusinus toreuma* (Martyn, 1784) | 2 |
| *Fusus barclayi* Sow. | 37 |
| *Fusus nicobaricus* Chemn. | 37 |
| *Fusus tuberculatus* Lam. | 38 |
| *Fusus xanthochrous* Tapparone-Canefri | 37 |
| *Latirus* (*Fusus*) *temuistriatus* (Sow.) | 1 |
| *Latirus australiensis* (Rve.) | 1 |
| *Latirus barclayi* (Rve., 1847) | 2;26;37;*21* |
| *Latirus brazieri* (Angas) | 1 |
| *Latirus cariniferus* Lam. | 37 |
| *Latirus concinnus* Tapparone-Canefri, 1880 | 2;*37* |
| *Latirus craticulatus* (L., 1758) | 22;2;57;26;59;37 |
| *Latirus lancea* Gm. | 37 |
| *Latirus lanceolatus* (Rve., 1847) | 2 |
| *Latirus nodatus* Gm., 1791 | 22;*37* |
| *Latirus noumeensis* (Crosse, 1870) | 22;26;*2;37* |
| *Latirus ocellatus* Gm. | 37 |
| *Latirus polygonus* Gm., 1791 | 22;1;57;59;45;37;*14;38* |
| *Latirus praestantior* Melvill, 1891 | 22 |
| *Latirus prismaticus* (Martyn) | 1 |
| *Latirus puchellus* (Rve.) | 1 |
| *Latirus robillardi* Tapparone-Canefri | 2;37 |
| *Latirus turrita* (Gm., 1791) | 22;2;26;37 |
| *Leucozonia smaragdula* (L., 1758) | 14;59;*1;45;2;37* |
| *Peristernia belcheri* Rve. | 37 |
| *Peristernia caledonica* Petit | 37 |
| *Peristernia canthariformis* Melvill, 1891 | 22;2;37 |
| *Peristernia carotiana* Tapparone-Canefri | 37 |
| *Peristernia chlorostoma* Sow., 1825 | 22;37 |
| *Peristernia cremnochione* Melvill, 1891 | 22;37 |
| *Peristernia crenulata* Kiener | 37 |
| *Peristernia forskalli forskalli* (Tapparone-Canefri, 1875) | 22;4;20;45;37 |
| *Peristernia fragaria* Wd. | 59 |
| *Peristernia hesterae* Melvill, 1911 | 22 |
| *Peristernia hilaris* Melville | 2;37 |
| *Peristernia incarnata* Des. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Peristernia infracincta* Kuster | 37 |
| *Peristernia jeaniae* Melvill, 1911 | 22 |
| *Peristernia kobeltiana* Tapparone-Canefri | 21;37 |
| *Peristernia leucothea* Melville | 3 |
| *Peristernia maculata* Rve. | 37 |
| *Peristernia mannophora* Melvill | 37 |
| *Peristernia marquesana* A. Ad. | 37 |
| *Peristernia microstoma* Kuster | 37 |
| *Peristernia nana* Rve. | 37 |
| *Peristernia nassatula* (Lam., 1822) | 22;57;10;3;72;26;14;59;45;38;37;*1* |
| *Peristernia photiformis* Melvill, 1891 | 22 |
| *Peristernia retiaria* Melvill, 1891 | 22;2;37 |
| *Peristernia scabra* Souverbie | 37 |
| *Peristernia smithiana* Melvill, 1891 | 22;37 |
| *Peristernia ustulata* Rve. | 37 |
| *Peristernia wagneri* Anton | 37 |
| *Pleuroploca trapezium* (L., 1758) | 2;57;26;59;45;22;1;*3*;*14*;*37*;*38* |
| *Pleuroploca filamentosa* (Rdg.) | 45;1;2;57;*14*;*37* |
| **VOLUTIDAE** | |
| *Lyria delessertiana* Petit, 1842 | 22;28;12;27;*37* |
| *Lyria lyraeformis* Swai., 1821 | 22;12;27 |
| *Lyria queketti* (Smith) | 20 |
| *Voluta africana* Rve. | 14 |
| *Voluta costata* Swai. | 37 |
| **HARPIDAE** | |
| *Harpa amouretta* Rdg., 1798 | 59;45;22;1;2;26;20;38;81 |
| *Harpa articularis* Lam., 1822 | 2;81 |
| *Harpa costata* (L., 1758) | 81;22;2;26;27;37;2 |
| *Harpa davidis* Rdg., 1798 | 81;*37* |
| *Harpa duplicata* L. | 27 |
| *Harpa gracilis* Brod. & Sow., 1829 | 81;37 |
| *Harpa harpa* L., 1758 | 81;5;11;38 |
| *Harpa lanceata* L. | 27 |
| *Harpa major* Rdg., 1798 | 81;22;2;5;27;20;*37*;*3* |
| *Harpa nobilis* (Rumphius) Bolten | 37 |
| *Harpa ventricosa* Lam., 1816 | 81;22;2;26;20 |
| *Morum exquisitum* Ad. & Rve. | 37 |
| *Morum praeclarum* Melvill | 29 |
| **VASIDAE** Review ref.: 74 | |
| *Tudicula zanzibarica* Abbott, 1958 | 74;40;26 |
| *Vasum ceramicum* (L., 1758) | 74;45;1;2;38 |
| *Vasum rhinocerus* (Gm., 1791) | 74;22;1;45 |
| *Vasum turbinellus* (L., 1758) | 72;74;1;2;57;10;45;59;38;37;71 |
| **OLIVIDAE** | |
| *Amalda obesa* (Sow.) | 20 |
| *Ancilla albisulcata* Sow. | 38 |
| *Ancilla ampla* (Gm.) | 57;*37* |
| *Ancilla aperta* Sow., 1825 | *22* |
| *Ancilla candida* Lam. | 37 |
| *Ancilla castanea* (Sow., 1830) | 3;*37* |
| *Ancilla cinnamomea* Lam., 1801 | 1;*37*;*22* |
| *Ancilla djiboutiensis* (Jouss.) | 38 |
| *Ancilla exigua sulcata* Thiele, 1925 | *22* |
| *Ancilla lineolata* A. Ad. | 38 |
| *Ancilla mauritiana* Sow. | *37* |
| *Ancilla minima* Thiele, 1925 | *22* |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Ancilla optima* Sow. | 3 |
| *Ancilla rubiginosa* Swa. | 27;37 |
| *Ancilla sarda* (Rve.) | 72 |
| *Ancilla torosa* (Meuschen) | 1 |
| *Ancilla turrida* Rdg., 1798 | *22* |
| *Ancilla ventricosa ventricosa* (Lam., 1811) | 2;27;*22* |
| *Oliva amethystina* (Rdg.) | 1 |
| *Oliva annulata* Gm., 1791 | 59;2;26;37;*22* |
| *Oliva atalina* Duclos | 37 |
| *Oliva athenia* Duclos | 37 |
| *Oliva australis* (Duclos) | 1 |
| *Oliva bulbosa* (Rdg., 1798) | 1;2;*22* |
| *Oliva carneola* (Gm., 1791) | 2;37 |
| *Oliva caroliniana* Duclos, 1835 | 4;20;37;*22*;*3* |
| *Oliva duclosi* Rve., 1850 | 2 |
| *Oliva elegans* Lam. | 3 |
| *Oliva emicator* Meuschen | 37 |
| *Oliva episcopalis* (Lam.) | 37;1;26;*57*;*59*;*2* |
| *Oliva erythrostoma* Meuschen | 57;37 |
| *Oliva inflata* (Lam.) | 1;37 |
| *Oliva infrenata* Marrat, 1871 | *22* |
| *Oliva ispidula* L. | 37 |
| *Oliva lecoquiana* Duclos | 37 |
| *Oliva lepida* Duclos, 1835 | 2;*22* |
| *Oliva leucostoma* Duclos, 1835 | *22* |
| *Oliva macleaya* Duclos, 1835 | 2 |
| *Oliva minaicea* Rdg., 1798 | 2;*22* |
| *Oliva oliva* (L., 1758) | 5;2;37 |
| *Oliva olympiadina* Duclos, 1844 | 2 |
| *Oliva panniculata* Duclos, 1835 | 2;37 |
| *Oliva paxillus* Rve., 1850 | 1;2;37;*59* |
| *Oliva pica* Lam., 1811 | 59;37;*22* |
| *Oliva ponderosa* Duclos, 1835 | 37;*22* |
| *Oliva reticularis* Lam. | 37 |
| *Oliva reticulata* Rdg., 1798 | 11;*22* |
| *Oliva sanguinolenta* Lam. | 37 |
| *Oliva scitula* (Marrat) | 1 |
| *Oliva scripta* Lam. | 37 |
| *Oliva sericea* (Rdg., 1798) | 1;2 |
| *Oliva sidelia* Duclos | 57;11;37 |
| *Oliva sowerbyi* Marrat | 37 |
| *Oliva tessellata* Lam. | 37 |
| *Oliva textilina* Lam. | 37 |
| *Oliva tigerina* Lam., 1811 | 1;5;2;37;38;*22* |
| *Oliva todosina* Duclos, 1835 | 2;*22* |
| *Oliva tremulina* Lam., 1811 | 1;2;37;*22* |
| *Oliva tricolor* Lam. | 37 |
| *Oliva volvaroides* Duclos, 1835 | 2;*22* |
| *Olivancillaria gibbosa* (Born, 1778) | 2 |
| *Olivancillaria nana* Lam., 1811 | 22 |
| *Olivancillaria nebulosa* (Lam., 1811) | 2 |
| *Olivella nympha* Ad. & Angus | 37 |
| *Olivella williamsi* Melvill & Standen | 37 |
| **MARGINELLIDAE** | |
| *Bullata strigata* Dill., 1817 | 22 |
| *Extra extra* Jouss., 1894 | 22 |
| *Granula atomella* Bavay, 1917 | 22 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Marginella angustata* Sow., 1846 | 2 |
| *Marginella asellina* Jouss. | 37 |
| *Marginella burnupi* Sow. | 14 |
| *Marginella crassilabram* Sow. | 37 |
| *Marginella delessertiana* Rcz., 1841 | 37;*22* |
| *Marginella festiva* Kiener | 27 |
| *Marginella fusiformis* Hinds | 37 |
| *Marginella gemma* Adams | 37 |
| *Marginella granum* Phil., 1850 | 37;*22* |
| *Marginella guttula* Sow. | 37 |
| *Marginella lantzi* Jouss. | 37;*22* |
| *Marginella louisae* Bavay | 37 |
| *Marginella majuscula* Martens | 37 |
| *Marginella mancielli* (Jouss., 1875) | 2;37 |
| *Marginella monilis* L., 1758 | *22* |
| *Marginella mariei* Crosse | 37 |
| *Marginella nevilli* Jouss. | 37 |
| *Marginella obscura* (Rve., 1865) | 1;*22* |
| *Marginella osteri* Jouss. | 37;*22* |
| *Marginella paros* Jouss., 1875 | 37;*22* |
| *Marginella peasei* Rve., 1865 | 37;*22* |
| *Marginella picturata* G. & H. Nevill | 37;*22* |
| *Marginella pulchella* Kiener | 38 |
| *Marginella pulvis* Jouss., 1875 | 37;*22* |
| *Marginella pumila* Redfield | 37 |
| *Marginella ros* Rve., 1865 | *22* |
| *Marginella rufula* Gaskoin | 37 |
| *Marginella sarda* (Kiener, 1834) | 2;27;37;*22* |
| *Marginella scripta* Hinds | 27 |
| *Marginella serrata* Gaskoin | 37;*22* |
| *Marginella sordida* Rve., 1865 | 37;*22* |
| *Marginella sueziensis* (Issel, 1869) | *22* |
| *Prunum gibbosa* Jouss., 1875 | 22 |
| *Volvarina compressa* Rve., 1865 | 22 |
| *Volvarina eumorpha* Melvill, 1906 | 22 |
| **MITRIDAE** | |
| *Cancilla antoniae* (H. Ad.) | 1;*37*;*59* |
| *Cancilla carnicolor* (Rve., 1844) | 2 |
| *Cancilla filaris* (L., 1771) | 2;*22*;*37*;*27* |
| *Cancilla granatina* (Lam., 1811) | 2;*59* |
| *Cancilla praestantissima* (Rdg., 1758) | 2;*26* |
| *Cancilla rufilirata* (Ad. & Rve., 1850) | 2 |
| *Imbricaria filum* Wd. | 59;*1* |
| *Imbricaria olivaeformis* (Swai., 1821) | 2 |
| *Imbricaria punctata* Swai., 1821 | 22;2;1;*37* |
| *Mitra acuminata* Swai., 1824 | 2;26;59;37;82;*1* |
| *Mitra acupicta* Rve. | 37 |
| *Mitra acutilirata* Sow. | 14;37 |
| *Mitra adamsoni* Rve. | 37 |
| *Mitra adusta* Lam. | 37 |
| *Mitra alveolus* Rve. | 37 |
| *Mitra amabilis* (Rve.) | 1;38;37;*26* |
| *Mitra ambigua* Swa., 1832 | 2;1;82 |
| *Mitra arenosa* (Lam.) | 1 |
| *Mitra assimilis* Pease, 1868 | 82 |
| *Mitra astricta* Rve. | 37 |
| *Mitra aurantia aurantia* (Gm., 1791) | 22;37;82;*3*;*14*;*20* |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Mitra aureolata* Gm. | 37 |
| *Mitra auriculoides* Rve., 1845 | 2;26;37;82;*22* |
| *Mitra aurora floridula* Sow., 1874 | 2;82;37;*22* |
| *Mitra avenacea* Rve., 1845 | 2;82 |
| *Mitra (Nebularia) barclayi* "Hanley" 1874 | 22 |
| *Mitra bicolor* Des. | 37 |
| *Mitra bilieata* Rve. | 37 |
| *Mitra brevicaudata* Sow. | 37 |
| *Mitra brevicula* Souverbie | 37 |
| *Mitra buryi* Melvill & Sykes | 1 |
| *Mitra cadaverosa* Rve. | 37 |
| *Mitra caeligna* Rve. | 37 |
| *Mitra caffra* (L.) | 14 |
| *Mitra candida* Rve. | 37 |
| *Mitra cardinalis* (Gm., 1791) | 2;26;82;*37* |
| *Mitra casta* Lam. | 27 |
| *Mitra catenata* Swai. | 37 |
| *Mitra (Thala) cernica* Sow. | 37 |
| *Mitra chrysalis* Rve., 1844 | 82;2;45;38;37;*22* |
| *Mitra chrysostoma* Brod., 1836 | 37;82;*22* |
| *Mitra cinctella* Lam. | 37 |
| *Mitra cineracea* Rve. | 37 |
| *Mitra clathrus* Rve. | 37 |
| *Mitra coarctata* Rve., 1844 | 2 |
| *Mitra coffea* Schubert & Wagner, 1829 | 2;26;37;82 |
| *Mitra columbellaeformis* Kiener, 1838 | 37 |
| *Mitra commutata* B. & Dantz. | 37 |
| *Mitra compta* A. Ad. | 37 |
| *Mitra conica* Schumacher | 37 |
| *Mitra contracta* Swa., 1820 | 2;82 |
| *Mitra corallina* Rve. | 37 |
| *Mitra coronata* Lam., 1811 | 2;26;59;82;*37*;*22* |
| *Mitra corrugata* Lam. | 37 |
| *Mitra crebrilineata* Sow. | 37 |
| *Mitra crebrilirata* Rve. | 37 |
| *Mitra crenifera* Lam. | 14;59 |
| *Mitra crocata* Lam. | 37;38 |
| *Mitra cruentata* Chemn. | 37 |
| *Mitra cucumerina* Lam., 1811 | 2;57;26;*22*;59;38;37;82 |
| *Mitra cumingi* Rve. | 37 |
| *Mitra cylindracea* Rve. | 3 |
| *Mitra daedala* Rve., 1845 | 3;*22* |
| *Mitra decaryi* Dautz. | 38 |
| *Mitra dermestina* Lam. | 37 |
| *Mitra deshayesi* Rve. | 3;26;38;37 |
| *Mitra discoloria* Rve. | 37 |
| *Mitra diutenera* herbier | 37 |
| *Mitra doilum* Kuster, 1839 | 82;*37*;*22* |
| *Mitra dorothae* Melvill & Standen | 37 |
| *Mitra edentula* Swa., 1823 | 2;*22*;*37*;*1*;59;82 |
| *Mitra episcopalis* L. | 14 |
| *Mitra eremitarum* Rdg., 1798 | 2 |
| *Mitra exasperata* Gm. | 37;1 |
| *Mitra fasciata* Martyn | 37 |
| *Mitra fastigium* Rve., 1845 | 82;2;*6*;*1*;*37* |
| *Mitra fenestrata* Lam. | 37 |
| *Mitra ferruginea* Lam., 1811 | 1;2;26;37;59;45;*22* |
| *Mitra festa* Rve. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Mitra flammea* Quoy & Gaimard | 26;37;38;*22* |
| *Mitra fraga* Q & G., 1833 | 82;1;2;37;45;*22* |
| *Mitra fulgetrum* Rve. | 37 |
| *Mitra fulvescens* Brod., 1836. | 82;37;2;*22* |
| *Mitra gruneri* Rve. | 37 |
| *Mitra guttata* Swa., 1824 | 82;2;*37* |
| *Mitra harpeformis* Lam. | 37 |
| *Mitra hastata* Sow. | 37 |
| *Mitra honesta* Melvill & Standen | 37 |
| *Mitra imperialis* Rdg., 1798 | 2;82;*37*;*21*;*1*;*59* |
| *Mitra incisa* Ad. & Rve. | 37 |
| *Mitra incompta* (Lightfoot, 1786) | 2;22;82;*1* |
| *Mitra infansta* Rve. | 37 |
| *Mitra ingubris* Swai. | 37 |
| *Mitra intermedia* Kiener | 37 |
| *Mitra judaeorum* Dohrn | 37 |
| *Mitra lanta* Rve. | 37 |
| *Mitra litterata* Lam., 1811 | 82;3;2;4;37;27;14;20;*22* |
| *Mitra lobens* Rve. | 37 |
| *Mitra luctuosa* A & Ad., 1853 | 82;3;2;37;*22* |
| *Mitra mediomaculata* Sow. | 37 |
| *Mitra michelini* Petit | 37 |
| *Mitra militaris* Rve. | 37 |
| *Mitra mirabilis* A. Ad. | 37 |
| *Mitra mitra* (L., 1758) | 3;2;26;37;59;45;82 |
| *Mitra modesta* Rve. | 37 |
| *Mitra multiplicata* (Pease, 1865) | 2;82;*22*;*37* |
| *Mitra musiculata* Lam. | 37 |
| *Mitra nassoides* Sow., 1874 | 37;*22* |
| *Mitra nitidina* Duclos | 6;*1* |
| *Mitra nitidissima* Melvill & Standen | 37 |
| *Mitra nodosa* Swai. | 37 |
| *Mitra nubila nubila* (Gm., 1791) | 22;*37*;*1* |
| *Mitra nucea* Gronovius | 37 |
| *Mitra obeliscus* Rve. | 37 |
| *Mitra ocellata* (Swai., 1831) | 14;*22* |
| *Mitra ochracea* Hervier | 37 |
| *Mitra oleacea* Rve. | 1;6;37;*59* |
| *Mitra osidiris* Issel | 37 |
| *Mitra pacifica* Pease | 37 |
| *Mitra paligera* Sow. | 37 |
| *Mitra papalis* (L.) | 1;2;11;26;*37* |
| *Mitra pardalis* Kuster | 37 |
| *Mitra patriarchalis* Gm. | 37 |
| *Mitra paupercula* (L., 1758) | 27;20;37;82;*1*;*57*;*22*;*54*;*59* |
| *Mitra pellisserpentis pellisserpentis* Rve., 1844 | 2;26;37;82;*22*;*59* |
| *Mitra pharaonis* Adams | 37 |
| *Mitra pica* (Dill., 1817) | 2;*26*;*22*;*37* |
| *Mitra polita* (Rve.) Martens | 37 |
| *Mitra porphyritica* Rve. | 37 |
| *Mitra praetexta* A. Ad. | 37 |
| *Mitra pretiosa* Rve. | 37;1;*2* |
| *Mitra proscissa* Rve. | 37 |
| *Mitra puncticulata* Lam., 1811 | 82 |
| *Mitra punctostriata* (A. Ad., 1855) | 20 |
| *Mitra purpurata* Rve. | 37 |
| *Mitra pyramis* (Wd., 1828) | 82;2;*22*;*37* |
| *Mitra recurra* Rve. | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Mitra regina* Swain. | 37 |
| *Mitra retusa* Lam., 1811 | 82;37 |
| *Mitra rosacea* Rve., 1845 | 2 |
| *Mitra rossiae* Rve., 1844 | 82;22;37 |
| *Mitra rubiginosa* Rve. | 37 |
| *Mitra rubra* Rve. | 37 |
| *Mitra rubritincta* Rve., 1844 | 82;2;*37* |
| *Mitra rufescens* A & Ad. | 3;37 |
| *Mitra rugosa* Rve. | 37 |
| *Mitra sanguisuga* L. | 37 |
| *Mitra scabricula* Lam. | 37 |
| *Mitra scarbiuscula* (Solander) | 1 |
| *Mitra sculptilis* | 1 |
| *Mitra scutulata* (Gm., 1891) | 6 |
| *Mitra semifasciata* Lam. | 38;37 |
| *Mitra semiferruginea* Rve., 1845 | 22 |
| *Mitra semirosea* Sow. | 37 |
| *Mitra serotina* A. Ad. | 37 |
| *Mitra simulans* Martens | 37 |
| *Mitra sinensis* Rve. | 37 |
| *Mitra smithi* Sow. | 37 |
| *Mitra solandri* Rve., 1844 | 37 |
| *Mitra sophiae* Crosse, 1862 | 2 |
| *Mitra speciosa* Rve. | 37 |
| *Mitra sphaerulata* Martyn | 37 |
| *Mitra stictica* (Link, 1807) | 82;2;26;22;45;59;*14*;*37* |
| *Mitra striatula* Lam. | 37 |
| *Mitra suavis* Souverbie | 37 |
| *Mitra subdivisa* (Chemn.) Lam. | 37 |
| *Mitra subquadrata* Sow. | 37 |
| *Mitra subulata* Lam. | 37 |
| *Mitra suffecta* B. & D. | 37 |
| *Mitra sanginolenta* Lam., 1811 | 82;37 |
| *Mitra tabanula* Lam., 1811 | 82;38;37;2;*26*;*22* |
| *Mitra taeniata* Lam. | 37 |
| *Mitra telescopium* Rve., 1844 | 82;37;2;*22* |
| *Mitra texturata* Lam. | 37 |
| *Mitra ticaonica* Rve., 1844 | 82;37;2;*22*;*59* |
| *Mitra triplicata* Martens, 1904 | 82 |
| *Mitra turben* Rve. | 37 |
| *Mitra turgida* Rve., 1845 | 2;37;82 |
| *Mitra tusa* Rve. | 37 |
| *Mitra typha* Rve., 1845 | 37;2;82;*22* |
| *Mitra umbonata* Sow. | 37 |
| *Mitra ustulata* Rve., 1844 | 2 |
| *Mitra vanikoroensis* Quoy & Gaimard | 37 |
| *Mitra variata* Rve. | 37 |
| *Mitra variegata* Gm. | 37 |
| *Mitra vulpecula* L. | 37 |
| *Mitra zephyrina* Duclos | 26;37 |
| *Neocancilla circula* (Kiener, 1838) | 2;*37*;*38* |
| *Neocancilla clathrus* (Gm., 1791) | 22;2;*57* |
| *Neocancilla papilio* (Link, 1807) | 2 |
| *Pterygia crenulata* (Gm., 1791) | 22;1;2;*37* |
| *Pterygia nucea* Gm., 1791 | 2;22;59;*1* |
| *Pterygia pudica* (Pease, 1860) | 2 |
| *Pterygia scabricula* L., 1758 | 22 |
| *Scabricula bicolor* Swai., 1824 | 2 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Scabricula caerulea* (Rve., 1845) | 2 |
| *Scabricula casta* Gm., 1791 | 22 |
| *Scabricula coriacea* (Rve., 1845) | 2 |
| *Scabricula desetangsii* (Kiener, 1838) | 22;*37* |
| *Scabricula eximia* (A. Ad., 1853) | 22;2;*26*;*37* |
| *Scabricula fissurata* (Lam., 1811) | 2;*1*;*22*;*27*;*37* |
| *Scabricula fusca* Swai., 1824 | 2;*22* |
| *Scabricula lacunosa* Rve., 1844 | 22 |
| *Scabricula mauritiana* Sow., 1874 | 22;*37* |
| *Scabricula newcombi* Pease | *1* |
| *Scabricula zephyra* Rcz. | *59*;*1* |
| *Subcancilla anmulata* Rve., 1844 | 22;*37* |
| *Subcancilla interlirata* Rve., 1844 | 22;*2*;*37* |
| *Subcancilla juttingae* Koperberg, 1931 | 2 |
| *Ziba intersculpta* (Sow., 1870) | 2 |
| **COSTELLARIIDAE** | |
| *Thala maxmarrowi* Cernohorsky, 1980 | 2 |
| *Thala mirifica* (Rve., 1845) | 22;2 |
| *Thala simulans* (Martens, 1880) | 2 |
| *Thala todilla* Mighels, 1845 | 22 |
| *Vexillum acupictum* (Rve., 1845) | 2;26 |
| *Vexillum alauda* (Sow.) | 14;1 |
| *Vexillum amabile* (Rve., 1845) | 2;*22* |
| *Vexillum amanda* Rve., 1844 | 22 |
| *Vexillum angustissimum* (Smith, 1903) | 2 |
| *Vexillum approximatum* Pease, 1860 | 22 |
| *Vexillum bernhardina* (Rdg., 1798) | 2;*22* |
| *Vexillum bipartitum* (Smith, 1894) | 2 |
| *Vexillum cadaverosum* (Rve., 1844) | 1;59;2;26;*22* |
| *Vexillum catenatum* Brod., 1836 | 22;2 |
| *Vexillum cancellarioides* (Anton, 1839) | 2;*22*;*26* |
| *Vexillum cineria* Rve. | 59 |
| *Vexillum Pusia cithara* Rve., 1845 | 22 |
| *Vexillum coccineum* (Rve.) | 2 |
| *Vexillum Pusia consanguineum* Rve., 1845 | 22;26;1 |
| *Vexillum corbicula* (Sow., 1870) | 2;*22* |
| *Vexillum coronatum* (Helbling, 1779) | 2 |
| *Vexillum costatum* (Gm., 1791) | 2;1 |
| *Vexillum crocatum* (Lam., 1811) | 2;*22* |
| *Vexillum cumingi* (Rve., 1844) | 2 |
| *Vexillum microzonias* Lam., 1811 | 22 |
| *Vexillum deshayesi* (Rve., 1844) | 2;57;*22* |
| *Vexillum discoloria* (Rve.) | 14 |
| *Vexillum diutenerum* (Hervier, 1897) | 2 |
| *Vexillum echinatum* (A. Ad., 1853) | 2;*22* |
| *Vexillum evelynae* Melvill, 1895 | 22 |
| *Vexillum exasperatum* (Gm., 1791) | 2;57;14;*22* |
| *Vexillum (Pusia) fulvosulcata* Melvill, 1888 | 22 |
| *Vexillum humilis* (Hevier, 1897) | 2 |
| *Vexillum intermedium* (Kiener) | 2;57 |
| *Vexillum interstriatum* (Sow., 1870) | 2 |
| *Vexillum lyratum* Lam., 1811 | 22 |
| *Vexillum mediomaculatum* (Sow., 1870) | 2;*22* |
| *Vexillum micra* (Pilsbury, 1921) | 2 |
| *Vexillum millecostatum* (Brod., 1836) | 2;*22* |
| *Vexillum mirabilie* (A. Ad., 1858) | 2 |
| *Vexillum modestum* (Rve., 1845) | 2;*22* |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Vexillum obeliscus* (Rve., 1844) | 2;22 |
| *Vexillum osiridis* (Issel, 1869) | 2;22 |
| *Vexillum pacificum* (Rve., 1845) | 2;22 |
| *Vexillum pardalis* (Kuster, 1841) | 2;22 |
| *Vexillum plurinotatum* (Hervier, 1897) | 2 |
| *Vexillum polygonum* (Gm., 1791) | 2;22 |
| *Vexillum regina* (Sow., 1828) | 2;22 |
| *Vexillum (Pusia) rhodinosphaera* Melvill, 1888 | 2237 |
| *Vexillum roseum* (Brod., 1836) | 2;22 |
| *Vexillum rubrum* (Brod., 1836) | 2 |
| *Vexillum rugosum* (Gm., 1791) | 3;22;1 |
| *Vexillum rusticum* Rve., 1845 | 22 |
| *Vexillum salisbury* Cernohorsky, 1976 | 2 |
| *Vexillum sanguisugrum* (L.) | 57 |
| *Vexillum sculptile* (Rve., 1845) | 2;22 |
| *Vexillum semicostatum* (Anton, 1838) | 2 |
| *Vexillum spicatum* Rve., 1845 | 22 |
| *Vexillum speciosum* (Rve., 1844) | 2;22 |
| *Vexillum suavis* (Sow., 1875) | 2;22 |
| *Vexillum subdivisum* (Gm., 1791) | 26 |
| *Vexillum takisaoi* (Kuroda, 1959) | 2 |
| *Vexillum tankervillei* (Melville, 1888) | 2;26 |
| *Vexillum tuberosum* (Rve., 1845) | 2;26 |
| *Vexillum turrigerum* Rve., 1845 | 22 |
| *Vexillum tusum* (Rve., 1845) | 2 |
| *Vexillum unifascialis* (Lam., 1811) | 2;22 |
| *Vexillum unifasciatum* (Wd.,1828) | 2;22 |
| *Zierliana woldemarii* Kiener, 1838 | 22 |
| **CANCELLARIIDAE** | |
| *Cancellaria cantabulata* (Sow.) | 1 |
| *Cancellaria costifera* (Sow.) | 1;37 |
| *Cancellaria hystrix* Rve. | 37 |
| *Cancellaria lamellosa* Hinds | 3;1 |
| *Cancellaria melanostoma* (Sow., 1849) | 6 |
| *Cancellaria scalariformis* Lam. | 37 |
| *Cancellaria scalarina* Lam. | 14;37 |
| *Cancellaria textilis* Kieo | 37 |
| *Scalptia obliquata* (Lam., 1822) | 2;27 |
| *Scalptia scalata* (Sow., 1833) | 22;2;37 |
| *Turehua antiquata* (Hinds) | 2 |
| **CONIDAE** | |
| *Conus abbas* Hwass | 37 |
| *Conus achatinus* (Gm., 1791) | 1;2;37 |
| *Conus adansoni* Rve. | 37 |
| *Conus amadis* Gm., 1791 | 2 |
| *Conus ammiralis* L., 1758 | 22;37 |
| *Conus anabathrum* Crosse | 37 |
| *Conus araneosus* (Hwass) | 1 |
| *Conus archiepiscopus* Hwass | 37 |
| *Conus arenatus* Hwass in Brug., 1792 | 59;45;22;1;3;37;10;26;19;57 |
| *Conus articulatus* Sow., 1873 | 2;37 |
| *Conus artoptus* Sow., 1833 | 22 |
| *Conus atramentosus* Rve. | 37 |
| *Conus augur* (Solander) | 1;59;37 |
| *Conus aulicus* L., 1758 | 22;2;26;37;1 |
| *Conus auratus* Hwass | 37 |
| *Conus aureus* Hwass 1792 | 22 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Conus auricomos* Hwass | 2 |
| *Conus balteatus* Sow., 1833 | 22;2;37 |
| *Conus bandamus* Hwass, 1792 | 2;37 |
| *Conus barthelemyi* Bernardi, 1861 | 2;37 |
| *Conus betulinus* L., 1758 | 1;5;3;2;57;26;27;19;20;59;45;60;37;38 |
| *Conus biliosus* Rdg., 1798 | 20 |
| *Conus blainvillii* Vignard, 1829 | 2 |
| *Conus boeticus* Rve., 1844 | 22 |
| *Conus borbonicus* H. Ad. | 37 |
| *Conus broderipii* Sow. | 24 |
| *Conus bullatus* L., 1758 | 2;26;37 |
| *Conus caillaudi* Kiener | 37 |
| *Conus cancellatus* Hwass | 37 |
| *Conus canonicus* Hwass, 1792 | 72;22;2;37 |
| *Conus capitaneus* (L., 1758) | 1;2;57;10;26;20;37 |
| *Conus catus* Hwass, 1792 | 22;1;2;26;45;59;37 |
| *Conus cernicus* H. Ad., 1869 | 22;2;37 |
| *Conus ceylanensis* Hwass in Brug. | 45;3;19;37;1 |
| *Conus chaldeus* Hwasss, 1792 | 72;45;59;1;2;57;26;20 |
| *Conus circumclausus* Fenaux, 1942 | 2 |
| *Conus clarus* Smith | 9 |
| *Conus clavus* L. | 37 |
| *Conus clytospira* Melvill & Standen | 37 |
| *Conus coelinae* Crosse, 1858 | 2 |
| *Conus coffea* Gm. | 37 |
| *Conus colubrinus* Lam., 1810 | 22;2;37 |
| *Conus connectens* A Ad., 1855 | 22;2 |
| *Conus convolutus* Sow., 1857 | 2;37 |
| *Conus coronalis* (Rdg.) | 1 |
| *Conus coronatus* Gm., 1791 | 72;2;57;20;22;59;45;37;*38*;*1* |
| *Conus crocatus* Lam. | 37 |
| *Conus cylindraceus* Brod. & Sow., 1830 | 22;2;37 |
| *Conus dictator* Melvill | 37 |
| *Conus dilectus* Gould, 1850 | 2 |
| *Conus distans* Hwass 1792 | 22;1;2;45;37 |
| *Conus dusaveli* H. Ad., 1872 | 22;37 |
| *Conus eberneus* Hwass | 37 |
| *Conus ebraeus* L., 1758 | 22;1;3;2;4;57;19;20;45;59;37;72;38;71 |
| *Conus elongatus* Rve. | 37 |
| *Conus encaustus* Kiener | 37;72 |
| *Conus episcopatus* Da Motta, 1982 | 2 |
| *Conus episcopus* Hwass, 1792 | 2;37 |
| *Conus epistomium* Rve. | 37;1 |
| *Conus ermineus* (Born) | 1 |
| *Conus erythraeensis* Rve., 1843 | 22 |
| *Conus euetrios* Sow., 1882 | 2 |
| *Conus festivus* Chem. | 37 |
| *Conus figulinus* L., 1758 | 22;1;2;26;37 |
| *Conus flavidus* Lam., 1810 | 22;1;3;72;2;57;20;59;45;60;37 |
| *Conus floccatus* Sow. | 37 |
| *Conus frauenfeldi* Crosse, 1865 | 2 |
| *Conus frigidus* Rve., 1848 | 2;37 |
| *Conus fulgetrum* (Sow.) | 1;45 |
| *Conus furvus* Rve., 1843 | 22 |
| *Conus fuscatus* Born, 1778 | 2;26 |
| *Conus generalis* L., 1767 | 22;1;5;26;27;45;37 |
| *Conus geographus* L., 1758 | 22;1;3;2;11;26;27;37;38 |
| *Conus glans* Hwass in Brug., 1792 | 22;2;37;1 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Conus glaucus* Hwass | 37 |
| *Conus gloynei* Sow. | 37 |
| *Conus gubernator* Hwass 1792 | 22;1;2;26;27;37;38 |
| *Conus hebraeus* Born | 27 |
| *Conus hwassi* A. Ad. | 37 |
| *Conus imperialis* L., 1758 | 22;2;57;19;72;59;45;37;1 |
| *Conus inscriptus* Rve., 1843 | 22 |
| *Conus janus* Hwass 1792 | 22;2;37 |
| *Conus julii* Lienard, 1870 | 22;2;26;37 |
| *Conus legatus* Lam., 1810 | 2;37 |
| *Conus leinardi* Bernardi | 37 |
| *Conus leopardus* Rdg., 1758 | 22;2;26;59;45 |
| *Conus litoglyphus* Hwass in Brug. 1792 | 22;2;26;59;45;*37;38* |
| *Conus litteratus* L., 1758 | 1;5;2;57;26;27;59;45;60;37 |
| *Conus lividus* Hwass in Brug., 1792 | 22;1;3;2;4;57;26;72;14;20;59;45;37;38 |
| *Conus lohri* Kilburn | 20 |
| *Conus lombei* Sow. | 37 |
| *Conus macarae* Bernardi | 37 |
| *Conus madagascariensis* Sow. | 37 |
| *Conus magnificus* Rve., 1843 | 2 |
| *Conus magus* L., 1758 | 22;37 |
| *Conus maldivus* Hwass | 2;37 |
| *Conus mappa* Crosse | 37 |
| *Conus marmoreus* L. | 6;11;26;45;37;1 |
| *Conus miles* L., 1758 | 22;1;3;2;57;26;27;20;59;45;37;38 |
| *Conus miliaris* Hwass in Brug.1792 | 3;2;27;26;19;20;59;45;37 |
| *Conus milneedwardsi* Jouss., 1894 | 2;11;26;24 |
| *Conus mindanus* Hwass 1792 | 22 |
| *Conus minimus* L. | 3 |
| *Conus mitratus* Hwass in Brug.,1792 | 22;2;27;37 |
| *Conus moluccensis* Küster, 1833 | 2 |
| *Conus monachus* L. | 37 |
| *Conus monile* Hw. | 37 |
| *Conus montillai* Rockel, 1985 | 2 |
| *Conus moreleti* Crosse, 1858 | 2;59 |
| *Conus mucronatus* Rve., 1843 | 2 |
| *Conus muriculatus* Sow., 1833 | 22 |
| *Conus musicus* Hwass, 1792 | 22;59;45;37;72 |
| *Conus mustelinus* Hwass, 1792 | 22;37 |
| *Conus namocanus* (Hwass) | 1;2;20;45;37 |
| *Conus nanus* Brod., 1833 | 2;37 |
| *Conus natalis* Sow. | 3 |
| *Conus nicobaricus* Hwass | 26;37 |
| *Conus nobilis* L. | 37 |
| *Conus nocturnus* Hwass | 37 |
| *Conus nucleus* Rve., 1848 | 2;37 |
| *Conus nussatella* L., 1758 | 22;1;2;57;26;27;37;38 |
| *Conus nux* Brod. | 37 |
| *Conus obesus* Hw. | 37 |
| *Conus oblitus* Rve. | 37 |
| *Conus obscurus* Sow., 1833 | 59;1;2;37;38 |
| *Conus omaria* Hwass, 1792 | 59;1;2;37 |
| *Conus orbignyi* Audouin, 1931 | 22 |
| *Conus parvatus* Walls, 1979 | 2 |
| *Conus paulucciae* Sow., 1843 | 2;37 |
| *Conus pennaceus* Born, 1778 | 22;37 |
| *Conus penniculus* Lam. | 37 |
| *Conus pertusus* Hwass 1792 | 22;2;26;37;38 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Conus pigmentatus* Ad. & Rve. | 37 |
| *Conus planaxis* Des., 1863 | 22;37 |
| *Conus planorbis* Born | 26;37 |
| *Conus plumbeus* Rve. | 37 |
| *Conus pontificalis* Lam. | 37 |
| *Conus praecellens* A. Ad. | 37 |
| *Conus praeclarus* Fenaux | 2 |
| *Conus praelatus* (Hwass) | 1 |
| *Conus proteus* Hw. | 37 |
| *Conus pulchellus* Swai. | 37 |
| *Conus pulicarius* Hwass in Brug. | 26;37 |
| *Conus punctatus* Sow. | 37 |
| *Conus puncturatus* Brug. | 37 |
| *Conus pupaeformis* Sow. | 37 |
| *Conus pusillus* Chemn. | 37 |
| *Conus pyramidalis* Lam. | 37 |
| *Conus quercinus* Lightfoot, 1786 | 20;*37* |
| *Conus quercinus* Solander, 1786 | 59;2;26;1 |
| *Conus rattus* Hwass, 1792 | 72;59;1;2;57;10;20;37 |
| *Conus retifer* Menke, 1829 | 2;37 |
| *Conus robillardi* Bernard | 37 |
| *Conus rosaceous* (Chemn.) Tyron | 37 |
| *Conus rubiginosus* Hwass, 1792 | 2;37 |
| *Conus rubropennatus* Da Motta, 1982 | 2 |
| *Conus saecularis* Melvill | 37 |
| *Conus sanguinolentus* Quoy & Gaimard, 1832 | 59;2;20 |
| *Conus simplex* Sow. | 19 |
| *Conus spectrum* L., 1758 | 22;27;37 |
| *Conus spirogloxus* Des. | 37 |
| *Conus splendidulus* Sow. | 37 |
| *Conus sponsalis* Hwass in Brug. 1792 | 1;22;72;2;4;20;59;*37* |
| *Conus stercus muscarum* L. | 37 |
| *Conus stramineus* Link, 1807 | 22 |
| *Conus striatellus* Link, 1807 | 22;*1*;*59*;*45*; |
| *Conus striatus* L., 1758 | 22;2;26;59;45;37 |
| *Conus sugillatus* Rve., 1844 | 2;37 |
| *Conus sulphuratus* Kiener | 37 |
| *Conus sumatrensis* (Brug.) | 1 |
| *Conus sutorianus* Weinkauff | 37 |
| *Conus tahitensis* Hwass | 37 |
| *Conus telatus* Rve. | 37 |
| *Conus tendeneus* Hwass in Brug. | 57;37;1 |
| *Conus temuistriatus* Sow., 1857 | 2 |
| *Conus tenuisulcatus* Sow. | 37 |
| *Conus terebra* Born, 1778 | 2;37 |
| *Conus teremachii* Kuroda | 24 |
| *Conus terminus* Lam. | 37 |
| *Conus tessulatus* Born, 1778 | 60;59;45;22;1;2;5;57;10;26;19;20;38;*37*;*3* |
| *Conus textile* L., 1758 | 45;22;1;5;3;2;4;57;11;26;19;20;37;38 |
| *Conus thailandis* Da Motta, 1978 | 2 |
| *Conus thalassiarchus* Sow., 1834 | 22 |
| *Conus tigrinus* (Sow.) | 1 |
| *Conus timorensis* Hwass, 1792 | 22;2;37 |
| *Conus tulipa* L., 1758 | 22;2;1;26;27;37 |
| *Conus typhon* Kilburn | 20 |
| *Conus varius* L., 1758 | 59;45;22;1;2;37 |
| *Conus vermiculatus* Lam. | 3;37 |
| *Conus verriculum* Rve., 1843 | 2 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Conus vexillum* (Gm., 1791) | 59;45;1;2;27;19;20;37;*38*;*57* |
| *Conus victoriae* Rve. | 37 |
| *Conus violaceus* Gm., 1791 | 22;2;26 |
| *Conus virgo* L., 1758 | 1;2;57;10;26;37 |
| *Conus viridis* Sow. | 37 |
| *Conus vitulinus* Hwass | 37 |
| *Conus zeylanicus* Gm., 1791 | 2;1;19 |
| *Conus zonatus* Hwass, 1791 | 2 |
| **TURRIDAE** | |
| *Asthenotoma vertebrata* (Smith) | 19;1 |
| *Austrodrillia burmupi* (Sow., 1897) | 20 |
| *Clathurella alba* Des. | 21;37 |
| *Clathurella albicaudata* Smith | 37 |
| *Clathurella albovirgulata* Souverbie | 37 |
| *Clathurella clandestina* Des. | 37 |
| *Clathurella cumingi* (Powys) Rve. | 37 |
| *Clathurella euzonata* (Hervier) | 57 |
| *Clathurella edychroa* Hervier | 37 |
| *Clathurella exquisita* Hinds | 37 |
| *Clathurella felina* Rve. | 37 |
| *Clathurella hadfieldi* Melvill & Standen | 37 |
| *Clathurella cyclophora* Des. | 37 |
| *Clathurella hindsi* Rve. | 37 |
| *Clathurella hirsuta* de Folin | 37 |
| *Clathurella lactea* Rve. | 37 |
| *Clathurella rexa* Rve. | 37 |
| *Clathurella punctifera* Garret | 37 |
| *Clathurella reeveana* Des. | 37 |
| *Clathurella robillardi* (Barclay) H. Ad. | 37 |
| *Clathurella tessellata* Hinds | 37 |
| *Clathurella tincta* Rve. | 37 |
| *Clathurella tricarinata* Rve. | 37 |
| *Clavus auriculifera* Lam. | 59 |
| *Clavus bilineata* Rve., 1845 | 22 |
| *Clavus exasperatus* (Rve., 1843) | 22;2;37 |
| *Clavus flammulatus* Montfort, 1810 | 22 |
| *Clavus formosus* Rve. | 37 |
| *Clavus inclinatus* (Sow., 1893) | 2;37 |
| *Clavus infrafusca* (Sow., 1893) | 2 |
| *Clavus laetus* Hinds | 37 |
| *Clavus lamberti* Montrouzier, 1860 | 22 |
| *Clavus mediocris* Des. | 37 |
| *Clavus pica* Rve. | 37 |
| *Clavus protentus* Hinds | 37 |
| *Clavus pulchellus* Rve. | 37 |
| *Clavus unizonalis* Lam., 1822 | 22;1 |
| *Clavus zebra* Lam. | 37 |
| *Comitas aequatorialis* (Thiele, 1925) | 48 |
| *Comitas erica* (Thiele, 1925) | 48 |
| *Comitas subsuturalis* (Martens, 1902) | 48 |
| *Cochlespira travancorica* (Smith, 1904) | 48 |
| *Crassispira barkliensis* H. Ad. | 21;37 |
| *Crassispira digitatis* Rve. | 37 |
| *Crassispira zebra* Lam. | 37 |
| *Cyathara citharella* (Lam.) | 1 |
| *Cyathara euselma* Melville & Standen | 57 |
| *Daphnella atractoides* Hervier | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Daphnella boholensis* Rve., 1843 | 22 |
| *Daphnella candida* Des. | 37 |
| *Daphnella cumingii* (Lam.) | 1 |
| *Daphnella (Hemidaphne) cyclophora* Des., 1863 | 22 |
| *Daphnella delicata* Rve. | 59;37 |
| *Daphnella flammea* (Hinds) | 1 |
| *Daphnella fragilis* Rve. | 37 |
| *Daphnella lymneiformis* Kiener | 37 |
| *Daphnella menecharmes* Melvill | 37 |
| *Daphnella (Hemidaphne) reeveana* Des. | 59 |
| *Daphnella rissoides* (Rve., 1845) | 2 |
| *Daphnella sabauriformis* Smith | 37 |
| *Daphnella trivaricosa* Martens | 37 |
| *Drillia allaudi* Dautzenberg | 38 |
| *Drillia crenularis* Lam. | 37 |
| *Drillia flavidula* Lam. | 37 |
| *Drillia intertincta* Smith | 38 |
| *Drillia lallemantiana* Crosse & Fischer | 38 |
| *Drillia lanta* Pease | 37 |
| *Drillia mariesi* Souverbie | 37 |
| *Drillia ochroleuca* Melvill & Sykes | 37 |
| *Drillia pupoidea* H. Ad. | 37 |
| *Drillia pygmaea* (Duclos) | 1 |
| *Drillia suavis* Hervier | 37 |
| *Drillia varicosa* Rve. | 37 |
| *Etrema scalarina* Des. | 59 |
| *Eucithara agna* Melvill & Standen | 37 |
| *Eucithara amabilis* G. & H. Nevill | 37 |
| *Eucithara articulata* Sow., 1894 | 22;37 |
| *Eucithara cernica* Nevill | 37 |
| *Eucithara (Pleurotomoides) decaryi* Dautz. | 38 |
| *Eucithara delacourciana* Crosse | 37 |
| *Eucithara dubiosa* Nevill | 37 |
| *Eucithara eumerista* Melvill & Standen | 37 |
| *Eucithara funiculata* Rve., 1846 | 22 |
| *Eucithara gracilis* Rve., 1846 | 22;37 |
| *Eucithara gradata* G. & H. Nevill | 37 |
| *Eucithara isseli* Nevill | 37 |
| *Eucithara lamellata* (Rve., 1846) | 2 |
| *Eucithara lyrica* Rve., 1846 | 22;38 |
| *Eucithara (Pleurotomoides) petiti* Dautz. | 38 |
| *Eucithara richardi* Crosse | 37 |
| *Eucithara souverbiei* Tyron | 37 |
| *Eucithara stromboides* (Rve., 1846) | 2 |
| *Eucithara (Pleurotomoides) tessellata* Hinds | 38 |
| *Eucithara trivaricosa* (Martens, 1880) | 2 |
| *Eucithara zonata* Rve., 1846 | 22 |
| *Gemmula aethiopica* (Thiele, 1925) | 48 |
| *Gemmula (Ptychosyrinx) bisimuata* (Martens, 1901) | 48 |
| *Gemmula ducalis* (Thiele, 1925) | 48 |
| *Gemmula gilchristi* (Sow., 1902) | 48;19 |
| *Gemmula martini* (Tesch, 1915) | 48 |
| *Gemmula rosario* Shikama & Hayashi, 1977 | 2 |
| *Gemmula rotatilis* (Martens, 1902) | 48 |
| *Gemmula thielei* (Finlay, 1930) | 2 |
| *Glyphostoma graveli* Dautz. | 38 |
| *Glyphostoma hervieri* Dautz. | 38 |
| *Leucosyrinx caecilia* Thiele, 1925 | 48 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Leucosyrinx elsa* Theiele, 1925 | 48 |
| *Leucosyrinx erna* Thiele, 1925 | 48 |
| *Leucosyrinx julia* Thiele, 1925 | 48 |
| *Leucosyrinx sansibarica* Thiele, 1925 | 48 |
| *Lienardia aliciae* Melvill & Standen | 37 |
| *Lienardia apiculata* Montrouzier | 37 |
| *Lienardia compta* Rve., 1846 | 22;37 |
| *Lienardia crassilabrum* Rve. | 37 |
| *Lienardia fallax* G. Nevill | 37 |
| *Lienardia infracinta* Sow. | 37 |
| *Lienardia lousseaumi* Hervier | 37 |
| *Lienardia malleti* Rcz. | 37 |
| *Lienardia mighelsi* Iredale & Tomlin | 59 |
| *Lienardia nigrocincta* Montrouzier | 37 |
| *Lienardia ocellata* Jouss. | 37 |
| *Lienardia polynesiense* Rve. | 38 |
| *Lienardia purpurascens* Dunker | 38 |
| *Lienardia rabida* Hinds | 37 |
| *Lienardia roseotincta* (Montrouzier, 1872) | 22;2;37;38 |
| *Lienardia rugosa* Mighels | 37 |
| *Lienardia scalarium* Des. | 37 |
| *Lienardia strombillum* Hervier | 37 |
| *Lienardia trigonostoma* Hervier | 37 |
| *Lienardia vultuosa* Rve. | 37 |
| *Lophiotoma abbreviata* (Rve., 1843) | 48;2;37 |
| *Lophiotoma acuta* (Perry, 1811) | 48;22;2;57;19 |
| *Lophiotoma albina* (Lam., 1822) | 48;2;37;*1*;*38* |
| *Lophiotoma babylonia* (L., 1758) | 37;2;*11*;*27* |
| *Lophiotoma cingulifera* (Lam., 1822) | 48;1;57;22;59;2;*26*;*19*;*37*;*38* |
| *Lophiotoma indica* (Rdg., 1798) | 2;*19*;*37* |
| *Lophiotoma ruthveniana* (Melvill, 1923) | 48 |
| *Lucerapex denticulata* (Thiele, 1925) | 48 |
| *Macteola segesta* Chenu, 1850 | 22 |
| *Mangelia alticostata* (Sow.) | 1 |
| *Mangelia angicostata* Rve. | 37 |
| *Mangelia bella* Deace | 37 |
| *Mangelia calathiscus* Melvill & Standen | 37 |
| *Mangelia cithara* Gould | 37 |
| *Mangelia cycloptera* Des. | 37 |
| *Mangelia decaryi* Dautz. | 38 |
| *Mangelia dulcinea* Melvill & Standen | 37 |
| *Mangelia euselma* Melvill & Standen | 37 |
| *Mangelia finterae* Smith | 21;37 |
| *Mangelia gemmulata* Des. | 37 |
| *Mangelia gracilienta* Rve. | 37 |
| *Mangelia hexagonalis* Rve. | 37 |
| *Mangelia himerodes* Melvill & Standen | 37 |
| *Mangelia himerta* Melvill & Standen | 37 |
| *Mangelia interrupta* Rve. | 37 |
| *Mangelia louisiensis* Sow. | 37 |
| *Mangelia nanisca* Hervier | 38 |
| *Mangelia thermeropsis* Melvill & Standen | 37 |
| *Mangelia theskela* Melvill & Standen | 37 |
| *Mangelia theskeloides* Melvill | 37 |
| *Mangelia townsendi* Sow. | 37 |
| *Mangelia triticea* Kiener | 37 |
| *Mangelia turricula* Rve. | 37 |
| *Marshallena philippinarum* (Watson, 1882) | 48 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Mitromorpha atramentosa* Rve. | 59 |
| *Mitromorpha metula* Hinds, 1843 | 22 |
| *Nihonia circumstricta* (Martens, 1901) | 48 |
| *Philbertia barnardi* Brazier | 59 |
| *Philbertia granicostata* Rve. | 59 |
| *Philbertia (Pseudoraphitoma) hexagonalis* Rve., 1845 | 22 |
| *Philbertia tincta* Rve. | 59 |
| *Pseudodaphnella granicostata* (Rve., 1846) | 2 |
| *Ptychobela* sp. | 2 |
| *Tritonoturris cumingi* (Powys, 1835) | 22;2 |
| *Tritonoturris menecharmes* (Melvill, 1923) | 22;2 |
| *Tritonoturris robillardi* (H. Ad., 1869) | 22;2 |
| *Turricula aethiopica* (Thiele, 1925) | 48 |
| *Turricula javana* (L., 1767) | 48 |
| *Turricula nelliae* Smith, 1877 | 48;37 |
| *Turridrupa bijubata* (Rve., 1843) | 48;22;36;37 |
| *Turridrupa cerithina* (Anton, 1839) | 48;*38* |
| *Turridrupa cincta* (Lam., 1822) | 48;22;2;27;37 |
| *Turris bulowi* Sow. | 37 |
| *Turris crassa* (Smith) | 1 |
| *Turris crispa* (Lam., 1816) | 48 |
| *Turris garnonsii* (Rve., 1843) | 48;1;22;2;37 |
| *Turris jickeli* Weisskauf | 37 |
| *Turris multiseriata* (Smith) | 19 |
| *Turris spectabilis* (Rve., 1843) | 48;1;2;26 |
| *Turris tuberculata* Gray | 37 |
| *Turris unedo* Valenciennes | 37 |
| *Turris ustulata* Rve. | 37 |
| *Turris variegata* (Kiener, 1839) | 37 |
| *Vexitomina regis* (Rve., 1842) | 48 |
| **TEREBRIDAE** | |
| *Diplomeriza duplicata* (L., 1758) | 22 |
| *Diplomeriza evoluta* (Des.) | 2 |
| *Diplomeriza fictilis* (Hinds) | 20;*1* |
| *Diplomeriza raphanula* (Lam., 1822) | 2;*26*;*37* |
| *Diplomeriza trochlea* Des., 1857 | 22 |
| *Hastula albula* (Menke, 1843) | 59;2;20 |
| *Hastula castanea* (Kiener) | 2 |
| *Hastula celidonta* (Melville & Sykes, 1898) | 2;*37* |
| *Hastula diversa* (Smith) | 20;*18* |
| *Hastula inconstans* (Hinds) | 2 |
| *Hastula penicillata* Hinds, 1844 | 22;2;*1*;*37* |
| *Hastula solida* (Des., 1855) | 2;*59*;*37* |
| *Hastula strigilata* (L., 1758) | 2;*37* |
| *Impages hectica* (L., 1758) | 22;1;*37*;*38*;*2* |
| *Impages aciculina* Lam., 1822 | 22 |
| *Terebra aciculina* (Rve.) | 1 |
| *Terebra affinis* Gray, 1834 | 59;22;3;2;57;10;19;37 |
| *Terebra albula* Hinds | 37 |
| *Terebra alveolata* Hinds | 37 |
| *Terebra amanda* Hinds, 1844 | 22;37 |
| *Terebra amoena* Des. | 37 |
| *Terebra andamanica* Melvill & Sykes | 37 |
| *Terebra anilis* (Rdg., 1798) | 2;20;*3* |
| *Terebra approximata* Des. | 37 |
| *Terebra archimedis* Des. | 59 |
| *Terebra areolata* (Link, 1807) | 2;45 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Terebra argus* Hinds, 1844 | 22;2;59;37;1 |
| *Terebra babylonia* Lam., 1822 | 1;2;57;59;37 |
| *Terebra caliginosa* Des., 1859 | 22 |
| *Terebra cancellata* Quoy | 37 |
| *Terebra casta* Hinds | 59;19;37;1 |
| *Terebra cerithina* Lam., 1822 | 22;2;57;59;*1*;*37* |
| *Terebra cernica* Sow. | 37 |
| *Terebra chlorata* Lam., 1822 | 22;1;2;37 |
| *Terebra cinerea* Born | 37;38 |
| *Terebra cingulifera* Lam., 1822 | 2;59;37;1 |
| *Terebra collumellaria* Hinds, 1844 | 59;2;26;37;1 |
| *Terebra confusa* Smith | 37 |
| *Terebra consobrina* Des. | 37 |
| *Terebra consors* Hinds, 1844 | 22;1;2;37 |
| *Terebra conspersa* Hinds, 1844 | 22;2;37 |
| *Terebra crenulata* (L., 1758) | 59;45;1;2;57;37 |
| *Terebra cumingi* Des. | 37 |
| *Terebra cuspidata* Hinds | 37 |
| *Terebra deshayes* Rve., 1860 | 2 |
| *Terebra dimidiata* (L., 1758) | 59;45;1;3;2;57;26;19;37 |
| *Terebra duplicata* Lam. | 37;1 |
| *Terebra felina* (Dill., 1817) | 2;59 |
| *Terebra flavofasciata* Pilsbury, 1921 | 2; |
| *Terebra funiculata* Hinds, 1844 | 22;1;2;37 |
| *Terebra guttata* (Rdg., 1798) | 59;1;2;57 |
| *Terebra hastata* Gm. | 1;37 |
| *Terebra kilburni* Burch, 1965 | 2 |
| *Terebra laevigata* Gray, 1834 | 1;59;22;57 |
| *Terebra lanceata* (L.) | 1;2;26;18;59;37;*22* |
| *Terebra ligata* Hinds | 37 |
| *Terebra livida* (Rve.) | 1 |
| *Terebra longicosta* Des. | 3;37 |
| *Terebra mactanensis* Bratcher & Cernohorsky, 1982 | 2 |
| *Terebra maculata* (L., 1758) | 5;2;26;*37* |
| *Terebra marmorata* | 1 |
| *Terebra mera* Hinds | 37 |
| *Terebra monilis* Quoy & Gaimard | 1;59;37;38 |
| *Terebra muscaria* (Lam.) | 1;57;37 |
| *Terebra nassoides* Hinds | 72;38 |
| *Terebra nebulosa* Sow., 1825 | 1;59;22;2;26;37 |
| *Terebra nitida* Hinds, 1844 | 22;59;37 |
| *Terebra nodularis* Des., 1859 | 2 |
| *Terebra oculata* Lam. | 37 |
| *Terebra parkinsoni* Cernohorsky & Bratcher, 1976 | 2 |
| *Terebra pica* (Hinds) | 1 |
| *Terebra pertusa* Born, 1778 | 59;2;57 |
| *Terebra plicatella* Hinds | 37 |
| *Terebra plumbea* Quoy & Gaimard | 37 |
| *Terebra praelonga* Des., 1859 | 2 |
| *Terebra pseudopertusa* Bratcher & Cernohorsky, 1985 | 2 |
| *Terebra pulchella* Des. | 37 |
| *Terebra puncticulata* Des. | 37 |
| *Terebra quoygaimardi* Cernohorsky & Bratcher, 1976 | 2 |
| *Terebra reunionensis* Bratcher & Cernohorsky, 1985 | 2 |
| *Terebra straminea* Gray | 3;37 |
| *Terebra striata* (Quoy & Gaimard) | 1 |
| *Terebra subulata* (L., 1767) | 1;59;22;3;2;57;37;38 |
| *Terebra textilis* Hinds, 1844 | 2 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| *Terebra tigrina* Gm. | 37 |
| *Terebra tricolor* Hinds | 37 |
| *Terebra triseriata* Gray, 1834 | 2;37 |
| *Terebra undulata* Gray | 1;59;37 |
| *Terebra venosa* Hinds | 37 |
| *Terebra violascens* Hinds | 37 |
| *Terenolla pygmaea* (Hinds, 1844) | 2 |
| **ARCHITECTONICIDAE** | |
| *Architectonica laevigatum* Lam. | *38* |
| *Architectonica modesta* (Phil., 1848) | 2 |
| *Architectonica perspectiva* (L., 1758) | 59;22;3;57;11;37;*16* |
| *Heliacus areola* (Gm., 1791) | 22 |
| *Heliacus crenellus* (L.) | 16;37 |
| *Heliacus dilecta* (Des.) | 2;37 |
| *Heliacus dorsuosus* Hinds | 37;*38* |
| *Heliacus implexus* (Mighels, 1845) | 22;2 |
| *Heliacus infundibuliformis* (Gm., 1791) | 2;37 |
| *Heliacus trochoides* Des. | 37 |
| *Heliacus variegatus* (Gm., 1791) | 22;1;2;4;57;11;26;20;59;37;*38* |
| *Philippia cingulum* Kiener | 37 |
| *Philippia conulus* Weinkauff | 37 |
| *Philippia hybrida* (Lam.) | 1;*37*; *38* |
| *Philippia radiata* Rdg., 1798 | 22;1;2;20;59 |
| **PYRAMIDELLIDAE** | |
| *Miralda (Oscilla) tornata* Melvill | 57 |
| *Odostomia aciculina* Souverbie | 37 |
| *Odostomia bulimoides* Souverbie | 37 |
| *Odostomia gemma* A. Ad. | 37 |
| *Odostomia mauritiana* Dall & Bartsch | 37 |
| *Odostomia rufula* Souverbie | 37 |
| *Odostomia versicolor* Melvill & Standen | 37 |
| *Odostomia zaleuca* Melville | 57 |
| *Otopleura auris-cati* (Holten) | 1;*27*;*37* |
| *Otopleura mitralis* (A. Ad. in Sow., 1854) | 57;26;59;37;*1*;*3*;*37* |
| *Otopleura nodocincta* A. Ad. | 59 |
| *Otopleura sulcata* A. Ad. | 37 |
| *Pyramidella acus* (Gm., 1791) | 26;27;2;37 |
| *Pyramidella corrugata* Lam. | 1;*37* |
| *Pyramidella dolobrata* (L., 1758) | 2;26;16;37;38;*3* |
| *Pyramidella garrettii* Tryon | 37 |
| *Pyramidella maculosa* Lam., 1822 | 57 |
| *Pyramidella sulcatus* (A Ad., 1854) | 59;1;2;16;37;38 |
| *Pyramidella terebelloides* (Ad.) | 1;37 |
| *Pyramidella terebellum* Melvill | 57;37;*1*;*59* |
| *Pyramidella teres* (Ad.) | 1 |
| *Pyramidella ventricosa* (Guerin, 1831) | 2;38 |
| *Syrnola aperanta* Melvill | 57 |
| *Syrnola brunnea* (A. Ad.) | 1 |
| *Tropaeas livida* Sow. | *37* |
| *Turbonilla basilica* Melvill | 57 |
| *Turbonilla chrysozona* (Martens) | 2;37 |
| *Turbonilla isseli* Tryon | 37 |
| *Turbonilla princeps* Preston | 37 |
| *Turbonilla scalpidens* Watson | 37 |

Table 5. (continued)

| Taxa | Reference sources |
|---|---|
| **AMATHINIDAE** | |
| *Amathina angustata* Souverbie | 37 |
| *Amathina bicarinata* Pease | 37 |
| *Amathina imbricata* Sow., 1889 | 22;37 |
| *Amathina tricarinata* (L., 1758) | 22;1 |
| *Amathina tricostata* Gm. | 37 |

Table 6. Preliminary checklist of western Indian Ocean polyplacophoran molluscs.
Reference source numbers in italics represent records of synonyms. For details of reference sources see Checklist Sources at end of this section. Question marks indicate uncertainty of identification.

| Taxa | Reference sources |
|---|---|
| **LEPTOCHITONIDAE** | |
| *Leptochiton eugenei* Kass & Van Belle, 1981 | 1 |
| *Leptochiton nierstrazi* (Leloup, 1985) | 1 |
| *Lepidopleurus angusticostatus* Quoy & Gaimard | 7 |
| **ISCHNOCHITONIDAE** | |
| *Callistochiton barnardi* Leloup, 1981 | 1 |
| *Callistochiton crosslandi* Sykes, 1907 | 1;4(?). |
| *Callistochiton rotondus* Leloup, 1981 | 1 |
| *Callochiton clausadei* Kass & Van Belle, 1985 | 1 |
| *Callochiton deshayesi* Thiele, 1909 | 1;7 |
| *Callochiton vannini* Ferreira, 1983 | 1 |
| *Ischnochiton oniscus* (Krauss, 1848) | 3 |
| *Ischnochiton yerburyi* (Smith, 1891) | 1;2 |
| *Lepidozona* sp. | 1 |
| *Stenoplax madagassicus* (Thiele, 1917) | 1 |
| **MOPALIIDAE** | |
| *Plaxiphora granulata* Leloup, 1981 | 1 |
| *Plaxiphora parva* Nierstrasz, 1906 | 1 |
| *Plaxiphora tulearensis* Leloup, 1981 | 1 |
| **CHITONIDAE** | |
| *Acanthopleura brevispinosa* (Sow., 1840) | 1;4;6;7 |
| *Acanthopleura gemmata* (Blain., 1825) | 1;4;5;6 |
| *Chiton barnardi* Ashby, 1931 | 4(?) |
| *Chiton fosteri* Bullock, 1972 | 2 |
| *Chiton hululensis* (Smith, 1903) | 1 |
| *Chiton kaasi* (Leloup, 1981) | 1 |
| *Chiton laterorugosus* Kaas, 1986 | 1 |
| *Chiton mauritianus* Quoy & Gaimard | 1;7 |
| *Chiton rusticus* Des. | 7;5 |
| *Onithochiton literatus* (Krauss, 1848) | 4;3 |
| *Onithochiton maillardi* (Des., 1863) | 1;5;7 |
| *Schizochiton incisus* Des. | 7 |
| *Tonicia carnosa* Kaas, 1979 | 1 |
| *Tonicia sueziensis* (Rve., 1847) | 2 |
| **ACANTHOCHITONIDAE** | |
| *Acanthochitona limbata* Kaas, 1986 | 1 |
| *Acanthochitona garnoti* (Blain., 1825) | 7 |
| *Acanthochitona pencillata* (Des., 1863) | 7;1 |
| *Acanthochitona quincunx* Leloup, 1981 | 1 |
| *Cryptoconchus burrowi* Nierstrasz, 1905 | 1 |
| *Cryptoplax sykesi* Thiele, 1909 | 1 |
| *Notoplax elegans* Leloup, 1981 | 1 |
| *Notoplax productus* (Carpenter & Pilsbury, 1892) | 1 |
| **CRYPTOPLACIDAE** | |
| *Choneplax indica* Odhner, 1919 | 1 |

Table 7. Preliminary checklist of western Indian Ocean bivalve molluscs.
Reference source numbers in italics represent records of synonyms. For details of reference sources see Checklist Sources at end of this section.

| Taxa | Reference sources |
|---|---|
| **NUCULIDAE** | |
| *Leda* sp. | 29 |
| *Leda novae-guineensis* Smith | 8 |
| *Nucula* sp. | 23 |
| *Nucula convexa* Sow. | 1 |
| *Nucula mauritiana* Sow. | 28 |
| *Nucula rugosa* Odhner | 29 |
| *Nucula sultana* Thiele | 9 |
| **SOLEMYIDAE** | |
| *Solemya africana* Martens, 1879 | 12;20 |
| *Solemya australis* Lam. | 1 |
| *Solemya togata* Poli | *8* |
| *Solemya occidentalis* Koch | 8 |
| **ARCIDAE** | |
| *Acar plicata* Dill., 1817 | 24;25;22;23;1;*20* |
| *Anadara antiquata* (L., 1758) | 22;1;2;8;26;20;*28* |
| *Anadara clathrata* (Rve.) | 23 |
| *Anadara ehrenbergi* (Dunker, 1868) | *8* |
| *Anadara erythraeonensis* (Phil., 1851) | 22;20 |
| *Anadara natalenis* (Krauss, 1848) | 22;1;3;8;20;*9*. |
| *Anadara uropigimelana* (Bory, 1824) | 23;9;*28* |
| *Arca avellana* Lam., 1819 | 18;22;23;9;20;*8;1;28;29* |
| *Arca bistrigata* Dunker, 1866 | 8;9;*22* |
| *Arca cunealis* (Rve.) | 1 |
| *Arca donaciformis* Rve. | 27 |
| *Arca erythraensis* Jonas | 8;9;18 |
| *Arca granosa* L. | 28 |
| *Arca lactea* L. | 28 |
| *Arca linter* Jonas, 1845 | 8 |
| *Arca natalensis* Krauss | 28 |
| *Arca navicularis* Brug.,1789 | 22;8;23;9;28;1;*8* |
| *Arca nivea* Chemn. | 8;28;29 |
| *Arca plicata* Chemn. | 29;8;9;28 |
| *Arca truncata* (Sow.) | 1 |
| *Arca ventricosa* Lam., 1819 | 22;1 |
| *Arca zebra* Swa., 1832 | 8 |
| *Barbatia caelata* Rve., 1844 | 22;*28;1* |
| *Barbatia cometa* (Rve.) | 1 |
| *Barbatia decussata* (Sow., 1833) | 24;1;8;17 |
| *Barbatia dichotoma* Des., 1863 | 22;*28* |
| *Barbatia foliata* (Forskal, 1775) | 19;2;20;22;*28;1;23;9;28* |
| *Barbatia fusca* (Brug.) | 1;5;8;23 |
| *Barbatia kraussi* (Krauss) | 1 |
| *Barbatia lacerata* L., 1758 | 22;1;18;*28* |
| *Barbatia obliquata* (Wd., 1828) | 1;4;22;*20;9;29* |
| *Barbatia parva* (Sow., 1833) | 1 |
| *Barbatia revelata* (Des., 1863) | 2;20 |
| *Barbatia setigera* (Rve., 1844) | 22 |
| *Barbatia tenella* Rve., 1844 | 22;1;2;23;28 |
| *Barbatia tetraquetra* Kilburn, 1983 | 22 |
| *Barbatia virescens* Rve., 1844 | 22;1 |
| **NOETIIDAE** | |
| *Arcopsis gibba* (Krauss, 1848) | 20;*9;22;1;3;8* |
| *Sheldonella lateralis* (Rve., 1844) | *20*;22;*1* |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Striarca symmetrica* (Rve.,1844) | 22;23;*8;9* |
| *Trisidos semitorta* Lam., 1817 | 22;*8;9* |
| *Trisidos tortuosa* (L., 1758) | 22;*9* |
| **CUCULLAIEDAE** | |
| *Cucullaea cucullata* Rdg., 1798 | 22;*23;27* |
| **LIMOPSIDAE** | |
| *Limopsis multistriata* (Forskal) | 9 |
| **GLYCYMERIDIDAE** | |
| *Glycymeris amboinensis* (L. & Gm.) | 1;22 |
| *Glycymeris hoylei* Melvill & Standen, 1899 | 23;22 |
| *Glycymeris livida* (Rve., 1843) | 2;22;*28* |
| *Glycymeris pallium* Rve., 1848 | 22 |
| *Glycymeris pectunculus* (L., 1758) | 6 |
| *Glycymeris quecketti* (Sow., 1897) | 3;8;20 |
| *Glycymeris tenuicostatus* Rve. | 23 |
| *Pectunculus arabicus* A. Ad. | 29 |
| *Pectunculus asperus* Ad. & Rve. | 28 |
| *Pectunculus nodosus* Rve. | 28 |
| *Pectunculus vitreus* Lam. | 28 |
| *Tucetona audouini* Matsukama, 1985 | 2 |
| **MYTILIDAE** | |
| *Arcuatula capensis* (Krauss, 1848) | 4;20 |
| *Botula cinnamomea* (Lam.) | 23 |
| *Brachidontes australis* (Sow.) | 1 |
| *Brachidontes australis* Martens, 1879 | 22 |
| *Brachidontes variabilis* (Krauss, 1848) | 17;18;24;1;3;8;23;26;9;*22* |
| *Brachidontes semistriatus* (Krauss, 1848) | 4;20 |
| *Brachidontes virgiliae* (Barnard, 1964) | 20;4;*9* |
| *Choromytilus meridionalis* (Krauss) | 5 |
| *Leiosolenus obesa* (Phil., 1847) | 23;9;*20* |
| *Lithophaga calcifer* (Iredale) | 1 |
| *Lithophaga cinnamomina* Chemn. | 28;29 |
| *Lithophaga gracilis* Phil. | 28 |
| *Lithophaga lithophaga* L., 1758 | 22;8;*3*;28 |
| *Lithophaga malaccana* Rve. | 24 |
| *Lithophaga nasuta* (Phil., 1846) | 1;20;24;17;18 |
| *Lithophaga teres* Phil., 1846 | 22;1;18;23;*2* |
| *Modiolus auriculatus* (Krauss, 1848) | 22;2;4;8;23;26;9;20;24;25;29;*1* |
| *Modiolus barbatus* (L., 1758) | 8 |
| *Modiolus cylindricus* (Krauss) | 1 |
| *Modiolus floridus* (Dunker) | 1 |
| *Modiolus ligneus* (Rve., 1858) | 20 |
| *Modiolus metcalfei* Hanley, 1943 | 22;1 |
| *Modiolus philippinarum* (Hanley, 1843) | 1;3;5;8;11;9;29 |
| *Modiolus pulex* (Lam.) | 1 |
| *Modiolus trailli* Rve. | 29 |
| *Modiolus vagina* (Lam.) | 1 |
| *Musculus africana* (Bartsch) | *8* |
| *Musculus cumingiana* (Dunker) | 1;*28* |
| *Musculus cuneata* (Gould) | *9* |
| *Musculus difficilis* (Des.) | 9 |
| *Mytilus edulis* (L.) | 1 |
| *Mytilus elongatus* (Chemn.) Schroter | 29 |
| *Mytilus variabilis* Krauss | 28;29 |
| *Perna picta* (Born, 1778) | 4;5;20;9;3;8;1;24;18*6;12;29* |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Ryenella cumingiana* Rve., 1857 | 22 |
| *Septifer bilocularis* (L., 1758) | 1;3;2;4;8;23;26;9;20;24;28;29 |
| *Septifer excisus* (Wiegmann, 1837) | 22;1;19;28;29 |
| *Septifer kraussi* Kuster | 28;29 |
| **PTERIIDAE** | |
| *Electroma alacorvi* (Dill.) | 23 |
| *Electroma physoides* (Lam., 1819) | 20;*3;8;9* |
| *Electroma vexillum* (Rve.) | 9 |
| *Pinctada imbricata* (Rdg., 1798) | 20;*1* |
| *Pinctada margaritifera* (L., 1758) | 1;23;11;26;*8;28* |
| *Pinctada nigra* (Gould, 1850) | 20 |
| *Pinctada radiata* (Leach) | 18 |
| *Pinctada vulgaris* (Schum.) | 1;*3;8* |
| *Pteria alacorvi* Chemn. | 28 |
| *Pteria capensis* (Sow., 1889) | 1;5;3;4;8;*9;20* |
| *Pteria chinensis* (Leach, 1814) | 6 |
| *Pteria crocea* (Lam.) | 11;27;28 |
| *Pteria iridescens* (Rve.) | 1;*29* |
| *Pteria loweni* Dunker | 2 |
| *Pteria malleoides* (Rve.) | 1;28 |
| *Pteria mauritii* Jameson | 28 |
| *Pteria semisagitta* Lam. | 28 |
| *Pteria tortirostris* (Dunker, 1848) | 11;20;*1* |
| **MALLEIDAE** | |
| *Malleus anatinus* (Gm.) | 1 |
| *Malleus legumen* L. | 8 |
| *Malleus regula* (Forskal, 1775) | 9;20 |
| *Malvufundus normalis* (Lam., 1819) | 6;*28* |
| *Vulsella minor* Rdg,. 1798 | 9;20 |
| *Vulsella rugosa* (Lam.) | 1 |
| *Vulsella* (*Reniella*) *spongiarum* (Lam.) | 1;23 |
| **ISOGNOMONIDAE** | |
| *Crenatula mytiloides* Lam. | 9 |
| *Isognomon dentifera* (Krauss) | 18;17;8;9;22;23;13;24;1;3;*28;20* |
| *Isognomon ephippium* (L.) | 1;28;29 |
| *Isognomon isognomon* (L.) | 1;2;29;28 |
| *Isognomon legumen* (Gm.) | 24;*20;29* |
| *Isognomon linguaeformis* Rve. | 28 |
| *Isognomon maillardi* Des. | 28 |
| *Isognomon sulcata* Lam. | *28* |
| *Isognomon vitrea* Rve. | *28* |
| *Isognomon vulsella* Lam. | *28* |
| *Perna patibulum* Rve. | 29 |
| **PINNIDAE** Review ref: 15 | |
| *Atrina pectinata* (L., 1767) | 5;20; |
| *Atrina squamifera* (Sow., 1835) | 3;9;*28;8* |
| *Atrina vexillum* (Born, 1778) | 1;3;8;20;*22;8;29;28* |
| *Pinna bicolor* Gm., 1791 | 9;20;28;29;1;*8;3* |
| *Pinna muricata* L., 1758 | 18;22;2;4;23;8;26;9;20;25;29;*3;1;28* |
| *Streptopinna saccata* (L., 1758) | 1;2;23;9;20;*8;28;29* |
| **LIMIDAE** | |
| *Ctenoides annulata* (Dill.) | 23;*26;28* |
| *Lima inflata* Chemn. | 28 |
| *Lima lima* (L.) | 3;8;9;29 |
| *Lima multicostata* Sow. | 28 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Lima nimbifera* Iredale, 1924 | 20 |
| *Lima simplex* Robillard | 27 |
| *Lima sowerbyi* Des., 1863 | 2;28 |
| *Lima temuis* H. Ad. | 28 |
| *Limaria fragilis* (Gm., 1791) | 20;*23*;*28*;*29*;*9* |
| *Promantellum parafragile* (Iredale) | 1 |
| **OSTREIDAE** | |
| *Alectryonella plicatula* (Gm., 1791) | 11 |
| *Lopha cristagalli* (L., 1758) | 11;26;*23*;*25*;*28*;*29* |
| *Ostrea amasa* (Iredale) | 1 |
| *Ostrea barclayana* Sow. | 28 |
| *Ostrea cerata* Sow. | 22;28 |
| *Ostrea cucullina* Des. | 28 |
| *Ostrea denticulata* (Born) | 28 |
| *Ostrea folium* L. | 8;23 |
| *Ostrea forskali* Chemn. | 29 |
| *Ostrea frons* L. | 28 |
| *Ostrea lentiginosa* (Sow.) | 1 |
| *Ostrea mytiloides* Lam. | 8 |
| *Ostrea pes-tigris* Hanley | 8 |
| *Ostrea plicata* Chemn. | 8 |
| *Ostrea radiata* Valenciennes | 28 |
| *Ostrea violacea* Des. | 28;*22* |
| *Ostrea vitrefacta* Sow. | 1;8;28 |
| *Saccostrea cucullata* (Born, 1778) | 5;4;18;26;13;24;21;*1*;*3*;*23*;*8*;*9*;*20*;*17* |
| *Striostrea margaritacea* (Lam., 1819) | 5;4;*1*;*9*;*3*;*8*;*20* |
| **GRYPHAEIDAE** | |
| *Hyotissa hyotis* (L., 1758) | 11;*1*;*13*;*28*;*29*;*8*;*26*;*9* |
| *Hyotissa mumisma* (Lam., 1819) | 18;1;8;23;28;22;20;*25* |
| *Neopycnodonte cochlear* (Poli, 1795) | 19 |
| **PLICATULIDAE** | |
| *Plicatula australis* Lam., 1819 | 1 |
| *Plicatula chinensis* Morch | 23 |
| *Plicatula depressa* Lam. | 28 |
| *Plicatula imbricata* (Menke) | 1;28 |
| *Plicatula multiplicata* Des. | 28 |
| *Plicatula plicata* (L., 1767) | 9;29 |
| *Plicatula ramosa* Lam. | 28 |
| *Plicatula squamosissima* Smith, 1899 | 20 |
| **PECTINIDAE** | |
| *Anguipecten aurantiacus* (Ad. & Rve., 1850) | 2 |
| *Chlamys albolineatus* (Sow.) | 1 |
| *Chlamys andamanica* Preston, 1908 | 2 |
| *Chlamys asperrimus* Lam. | 28 |
| *Chlamys bernardi* Phil., 1851 | 22;*28* |
| *Chlamys cauteriatus* Des. | 28 |
| *Chlamys concinnus* Rve. | 28 |
| *Chlamys corallinoides* d'Orbingy | 28 |
| *Chlamys coruscans* (Hinds, 1845) | 20;22;*23*;*28* |
| *Chlamys crassicostata* Sow. | 29 |
| *Chlamys dringii* (Rve.) | 23 |
| *Chlamys elegantissima* (Des.) | 2;*22* |
| *Chlamys fultoni* Sow., 1904 | 20;22 |
| *Chlamys gibbus* L. | 28 |
| *Chlamys guendolinae* Melvill, 1888 | 22 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Chlamys histrionica* (Gm.) | 23;28 |
| *Chlamys inaequivalvis* Sow., 1842 | 22;28 |
| *Chlamys irregularis* Sow., 1842 | 22;23;28;29 |
| *Chlamys lemniscata* Rve., 1853 | 22;2;23 |
| *Chlamys lentiginosa* (Rve., 1853) | 3;8 |
| *Chlamys livida* (Lam., 1819) | 28;*22* |
| *Chlamys madreporarum* Sow., 1842 | 22;*28* |
| *Chlamys maldivensis* Smith | 28 |
| *Chlamys nodosus* L. | 28 |
| *Chlamys nux* Rve. | 28 |
| *Chlamys ornatus* Lam. | 28 |
| *Chlamys pallium* L. | 28;29;*1*;*2*;*23* |
| *Chlamys perfectus* Melvill | 28 |
| *Chlamys pseudo-lima* Sow. | 28 |
| *Chlamys radula* L. | 28 |
| *Chlamys reticulatus* Rve. | 28 |
| *Chlamys rosaceus* Des. | 28 |
| *Chlamys rubromaculatus* Sow. | 28 |
| *Chlamys senatorius* (Gm., 1791) | 22;1;5;23;28;2;8;9 |
| *Chlamys squamosus* Gm., 1791 | 22;28;29;2 |
| *Chlamys textiliosus* Des. | 28 |
| *Chlamys tincta* (Rve., 1853) | 3;4;8;20;22 |
| *Chlamys vexillum* Rve. | 29 |
| *Decaptopecten amiculum* Phil., 1851 | 22 |
| *Decaptopecten plica* (L., 1758) | 23 |
| *Excellichlamys spectabilis* (Rve., 1853) | 22;2 |
| *Lyropecten noduliferus* (Sow., 1842) | 23;11;28;22 |
| *Mirapecten mirificus* (Rve., 1853) | 22;2;*28* |
| *Mirapecten rastellum* Lam. | 22; |
| *Pecten pyxidatus* Born | 29 |
| *Pecten tranquebaricus* Lam. | 8 |
| *Pecten velutinus* Sow. | 8 |
| *Pedum spondyloideum* Gm., 1791 | 22;11;28 |
| *Propeamussium caducum* Smith, 1885 | 22;*28* |
| *Semipallium crouchi* Smith, 1892 | 22;2;*28* |
| *Semipallium tigris* (Lam.) | 1;22 |
| **SPONDYLIDAE** | |
| *Spondylus aculeatus* Chemn. | 29 |
| *Spondylus anacanthus* Mawe | 28 |
| *Spondylus aurantiacus* Bolten | 28 |
| *Spondylus aurantius* Lam. | 22;28 |
| *Spondylus candidus* L. | 22 |
| *Spondylus coccineus* Lam. | 28;29 |
| *Spondylus concavus* Des. | 28 |
| *Spondylus foliaceus* Chemn. | 27 |
| *Spondylus longitudinalis* Lam. | 28 |
| *Spondylus marisrubri* Bolten | 28 |
| *Spondylus microlepos* Lam. | 8 |
| *Spondylus multisetosus* (Sow.) | 1 |
| *Spondylus nicobaricus* Schreibers, 1793 | 19;2;8;26;*23*;*22*;*27*;*9*;*1*;*28*;*3* |
| *Spondylus peasanimus* Bolten | 28 |
| *Spondylus spectrum* Rve. | 28 |
| *Spondylus tenuispinosus* Sow. | 28 |
| *Spondylus varius* Sow. | 26;28 |
| *Spondylus zonalis* Lam. | 28 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| **ANOMIIDAE** | |
| *Anomia acheus* Gray, 1850 | 4;20;22;12;*1* |
| *Anomia scabra* Rve. | 8 |
| *Anomia sol* Rve. | 29 |
| **LUCINIDAE** | |
| *Anodontia edentula* (L., 1758) | 20;25;2;4;23;*9*;*26*;*29* |
| *Anodontia ovulum* Rve. | 22;*28* |
| *Codakia divergens* Phil. | 25;2 |
| *Codakia bella* Conrad | 28 |
| *Codakia exasperata* (Rve.) | 1;3;8;28 |
| *Codakia interrupta* (Lam.) | 1;23;28 |
| *Codakia miniata* Des. | 2 |
| *Codakia punctata* (L.) | 18;1;3;2;8;23;28;29 |
| *Codakia paytenorum* Iredale, 1937 | 2;28 |
| *Codakia punctata* (L., 1758) | 25;9 |
| *Codakia reevei* (Des., 1863) | 2; |
| *Codakia simplex* (Rve.) | 6 |
| *Codakia tigerina* L., 1758 | 18;22;1;2;23;9;25;28;29 |
| *Ctena divergens* (Phil., 1850) | 23 |
| *Divaricella dalliana* Vanetta, 1901 | 1;2;9;*20* |
| *Divaricella ornata* Rve. | 23;*2*;*29* |
| *Linga roscoeorum* Kilburn, 1974 | 22;20 |
| *Linga semperiana* (Issel, 1869) | *22*;*1*;*9* |
| *Loripes clausus* (Phil., 1847) | 18;22;1;3;4;8;9;20;29 |
| *Lucina jacksoniensis* Smith | 8 |
| *Phacoides rosea* (Angas) | 9 |
| *Phacoides semperiana* Issel | 29;9 |
| **UNGULINIIDAE** | |
| *Cryptodon eutormus* (Tomlin) | 1;8 |
| *Cryptodon tumidus* (Rve.) | 1 |
| *Diplodonta globosa* Forskal | 28;*8* |
| *Diplodonta lateralis* Smith | 23 |
| *Diplodonta* cf. *sansibarica* Jaeckel & Thiel | 9 |
| **ERYCINIDAE** | |
| *Erycina* sp. | 23 |
| *Galeoma aurantia* (Des., 1835) | 11 |
| *Galeoma argentea* (Des.) | 23 |
| *Galeoma turtoni* Sow. | 28 |
| *Galeoma splendida* Des. | 28 |
| *Kellia approximata* Des. | 22 |
| *Lasaea adansoni turtoni* Bartsch, 1915 | 4;20 |
| *Lasaea rubra* Montagu | 24 |
| *Scintilla ambigua* (Des.) | 23 |
| *Scintilla aperta* Sow. | 28 |
| *Scintilla aurantia* Lam | 28;*22* |
| *Scintilla incerta* Des. | 28 |
| *Scintilla lutea* Lam. | 28 |
| *Scintilla oblonga* (Sow.) | 1 |
| *Scintilla paucistriata* (Des.) | 1 |
| *Scintilla solidula* Des. | 29 |
| *Thyreopsis coralliophila* H. Ad. | 28 |
| **SPORTELLIDAE** | |
| *Prasina borbonica* Des. | 28 |
| *Prasina cornuta* de Folin | 28 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| **CARDITIDAE** | |
| *Cardita bimaculata* Des. | 8 |
| *Cardita gubernaculum* (Rve., 1843) | 8;*22* |
| *Cardita rufescens* Lam. | 28 |
| *Cardita variegata* Brug., 1792 | 18;1;3;2;4;8;23;9;20;24;28;29 |
| *Carditella* sp. | 23 |
| *Cardites cooperi* Melvill, 1909 | 22;*28* |
| **CHAMIDAE** | |
| *Chama aspera* Rve., 1846 | 1;23;10;28 |
| *Chama asperella* Lam. 1819 | 2;10;20 |
| *Chama brassica* Rve., 1847 | 1 |
| *Chama damaecornis* (Lam.) | 1;28 |
| *Chama delesserti* Chenu | 22 |
| *Chama fibula* Rve. | 28 |
| *Chama fimbriata* (Rve.) | 1 |
| *Chama gryphoides* L. | 28 |
| *Chama imbricata* Brod. | 28;29 |
| *Chama lazarus* L., 1758 | 22;2;28 |
| *Chama limbula* Lam., 1819 | 20;*10* |
| *Chama macrophylla* Gm. | 28 |
| *Chama nivosa* (Rve.) | 1 |
| *Chama reflexa* (Rve.) | 1 |
| *Pseudochama cristella* (Lam., 1819) | 20 |
| **CARDIIDAE** | |
| *Cardium adamsi* Ad. & Rve. | 28 |
| *Cardium alternatum* Sow. | 8 |
| *Cardium assimile* (Rve.) | 1;8 |
| *Cardium australe* (Sow.) | 1;28;29;*23* |
| *Cardium bicolor* Sow. | 28 |
| *Cardium biradiatum* Brug. | 28 |
| *Cardium* (*Acanthocardia*) *burmupi* (Sow.) | 1;8 |
| *Cardium cardissa* L. | 28 |
| *Cardium costatum* L. | 27 |
| *Cardium crenelloides* Rve. | 28 |
| *Cardium dupuchense* Rve. | 28 |
| *Cardium elongatum* (Brug.) | 1;28;29 |
| *Cardium flavum* (Lam.) | 1 |
| *Cardium fornicatum* Sow. | 28 |
| *Cardium leucostoma* Born | 28 |
| *Cardium lyratum* (Sow.) | 1;29;*9* |
| *Cardium mauritianum* Des. | 28 |
| *Cardium medium* L. | 28 |
| *Cardium orbita* Rve. | 29 |
| *Cardium papyraceum* Chemn. | 28;29 |
| *Cardium pectiniforme* Born | 29 |
| *Cardium robillardi* Sow. | 28 |
| *Cardium roseolum* Melvill | 28 |
| *Cardium simillimum* Smith | 28 |
| *Cardium tenuicostatum* Lam. | 8 |
| *Cardium unedo* L. | 28 |
| *Cardium unicolor* (Sow.) | 1 |
| *Ctenocardia victor* Angas, 1872 | 22;2;*28* |
| *Fragum auricula* (Niebuhr in Forskål, 1775) | 6 |
| *Fragum fornicatum* (Sow., 1840) | 2;*8* |
| *Fragum fragum* (L.) | 18;1;23;9;*28*;*29* |
| *Fragum hemicardium* (L., 1758) | *23*;*27* |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Fragum levisulcatum* (Smith) | 1 |
| *Fragum nivale* Rve., 1845 | 22 |
| *Fragum subretusa* (Sow.) | 1 |
| *Laevicardium australis* (Sow., 1841) | 22;2 |
| *Laevicardium biradiatum* (Brug., 1789) | 2;23 |
| *Laevicardium fragilis* (Forskal, 1775) | 22 |
| *Laevicardium papyracea* (Brug., 1789) | 20;9 |
| *Parvicardium sueziense* (Issel, 1869) | 23;25 |
| *Plagiocardium pseudolima* (Lam., 1819) | *1;22* |
| *Plagiocardium setosum* (Redfield, 1848) | 2 |
| *Trachycardium elongatum* (Brug., 1789) | 2 |
| *Trachycardium flavum* (L., 1758) | 4;20;*3;8;9;2;5;22* |
| *Trachycardium lacunosum* Rve., 1856 | 22 |
| *Trachycardium leucostoma* Born, 1780 | 22;23 |
| *Trachycardium nebulosum* (Rve.) | 2 |
| *Trachycardium rubicundum* (Rve.1844) | 5;4;20;22;*1;3;8* |
| *Trachycardium variegatum* Sow., 1841 | 22 |
| *Vasticardium elongatum* L. | 22 |
| *Vepricardium asiaticum* Brug., 1792 | 22;*8* |
| **TRIDACNIDAE** Ref. source: 16 | |
| *Hippopus hippopus* L. | 28 |
| *Tridacna maxima* (Rdg., 1798) | 16;22;5;4;23;*8;9;28;29;1;28;29* |
| *Tridacna squamosa* Lam. | 16;1;5;3;4;8;23;9;28 |
| **MACTRIDAE** | |
| *Lutraria (Phsamophila) australis* Rve. | 22 |
| *Lutraria rhynchaena* (Jonas) | 1 |
| *Mactra achatina* (Chemn.) Dill. | 8;*23* |
| *Mactra aequisulcata* Sow., 1894 | 1;3;8;9;20;22;29 |
| *Mactra angulifera* (Rve.) | 1 |
| *Mactra capensis* (Sow., 1892) | 3;8 |
| *Mactra cuneata* (Chemn.) Gm. | 5;9 |
| *Mactra fragilis* Chemn. | 8 |
| *Mactra glabrata* L.1767 | 1;3;4;8;20;29;5;23;9;22 |
| *Mactra jekelli* Weinkauff | 29 |
| *Mactra lurida* (Phil.) | 22;1;8 |
| *Mactra ovalina* (Lam., 1818) | 9;22;20 |
| *Mactra semisulcata* Des. | 8 |
| *Meropesta nicobarica* (Gm., 1791) | 22;*1;3;8;9;29* |
| *Meropesta solanderi* (Gray 1837) | 22;*1;20;29* |
| *Spisula rugosa* (Helbl.) | *8* |
| *Spisula solanderi* (Gray, 1837) | *9;22* |
| **MESODESMATIDAE** | |
| *Atactodea glabrata* (Gm., 1791) | 29;1;23;24;25;*22;2;29;28* |
| *Paphies corneum* Lam. | *28* |
| *Paphies trigonum* Des. | *28* |
| **SOLENIDAE** | |
| *Solen acutangulus* Dunker | 8 |
| *Solen cylindraceus* Hanley 1843 | 5;4;20 |
| *Solen ceylonensis* (Leach) | 6 |
| *Solen corneus* Lam. | 29 |
| *Solen gouldi* Conrad | 3;8;9 |
| *Solen rosemaculatus* Pilsbury | 5;3;8;9 |
| *Solen vaginoides* Lam. | 29 |
| **CULTELLIDAE** | |
| *Cultellus pellucidus* Pen. | 3;8 |
| *Phaxas (Ensiculus) philippianus* (Dunker) | 1 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Phaxas (Ensiculus) cultellus* (L., 1758) | 9;*29* |
| *Siliqua fasciata* (Spengler, 1794) | 20 |
| *Siliqua polita* (Wd., 1828) | 3;8;9 |
| *Siliqua radiata* (L.) | 9 |
| **TELLINIDAE** | |
| *Acropagia fimbriata* (Hanley, 1845) | 2;*22* |
| *Cadella roblini* (Sow.) | 23 |
| *Cadella semen* (Hanley, 1845) | 23;25 |
| *Clathrotellina carnicolor* (Hanley) | 23;*22* |
| *Gastrana matadoa* (Gm.,1791) | 4;20;*3*;*8*;*9*;*28* |
| *Macoma clathrata* (Des., 1835) | 20;*23* |
| *Macoma dubia* Des. | 29 |
| *Macoma edentula* (Spengler) | 1 |
| *Macoma litoralis* (Krauss ,1848) | 4;9;20 |
| *Macoma retrorsa* (Sow., 1867) | 9;20 |
| *Macoma subovata* Sow. | 29 |
| *Morella (Donacilla) africana* Turton | 9 |
| *Morella (Donacilla) delagoae* Barnard | 9 |
| *Strigilla carnaria* L. | 28 |
| *Strigilla tomlini* (Smith) | 1 |
| *Tellina aethiopica* Jackael & Thiel, 1931 | 22 |
| *Tellina alfredensis* Bartsch, 1915 | *22*;*3*;*8*;*9* |
| *Tellina apelina* Gm., 1791 | 20 |
| *Tellina asperrima* Hanley, 1844 | 2 |
| *Tellina capsoides* Lam., 1818 | 3;4;8;20 |
| *Tellina chinensis* Hanley | 28 |
| *Tellina decussata* Lam. | 29 |
| *Tellina diaphana* (Des.) | 1 |
| *Tellina difficilis* | 22 |
| *Tellina dispar* Conrad, 1837 | 28;22;9;23;25;20 |
| *Tellina elegans* Gray | 22;28 |
| *Tellina emarginata* Sow., 1825 | 1 |
| *Tellina fabrefacta* Pilsbury | 23 |
| *Tellina foliacea* L. | 22;28 |
| *Tellina (Quodrans) gargadia* (L.) | 1;23 |
| *Tellina hilaris* Hanley | 28;29 |
| *Tellina immaculata* Phil. | 9 |
| *Tellina inflata* Chemn. | 28 |
| *Tellina linguafelis* L. | 28;29;*23* |
| *Tellina ludwigii* Krauss | 9 |
| *Tellina opalina* Schroter | 29 |
| *Tellina palatum* Iredale, 1929 | 22;*2*;*23*;*25*;*18* |
| *Tellina pellucida* Phil. | 28 |
| *Tellina perna* Spengler | 22;1;8;*29* |
| *Tellina pinguis* (Hanley, 1844) | 1 |
| *Tellina planissima* (Sow.) | 1 |
| *Tellina prismatica* Sow., 1897 | 20 |
| *Tellina pristis* Lam. | 8;29 |
| *Tellina pulcherrima* Sow. | 22 |
| *Tellina rastellum* (Hanley) | 22;1;8;28 |
| *Tellina remies* L. | 28 |
| *Tellina resecta* (Des.) | 1 |
| *Tellina rhomboides* Quoy & Gaimard | 22;28;29 |
| *Tellina robusta* Hanley | 28; 23;*25* |
| *Tellina rostrata* L. | 28;*23* |
| *Tellina rousi* Sow., 1892 | 20 |
| *Tellina rubella* Des. | 28 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Tellina rugosa* (Born) | 22;26;28;29 |
| *Tellina rutila* (Dunker) | 22 |
| *Tellina salamensis* Thiel & Jaeckel, 1931 | 22 |
| *Tellina scalpellum* Hanley | 22 |
| *Tellina scobinata* (L.) | 1;8;28;29;2;*23* |
| *Tellina semilaevis* Martens | 28 |
| *Tellina (Quodrans) spinosa* (Hanley) | 23 |
| *Tellina staurella* Lam. | 22;28;29;1;*23*;*25*;*2* |
| *Tellina striatula* Lam. | 28 |
| *Tellina subpallida* Smith, 1891 | 22 |
| *Tellina subtruncata* Hanley | 28 |
| *Tellina trifasciata* Rve. | 22 |
| *Tellina trotteriana* Sow. | 22 |
| *Tellina vestalis* Hanley | 28 |
| *Tellina virgata* L., 1758 | 28;29;26;1;2;8;*23* |
| *Tellina vulsella* (Chemn. & Hanley) | 1;28 |
| **DONACIDAE** | |
| *Donax aemulus* Smith | 22;9;29 |
| *Donax abbreviatus* Lam. | 29 |
| *Donax australis* Lam. | 28 |
| *Donax bicolor* Lam. | 28 |
| *Donax bertini* Dautz. | 29 |
| *Donax bipartitus* Sow., 1892 | 20;29 |
| *Donax brazieri* Smith | 29 |
| *Donax burmupi* Sow., 1894 | 4;20 |
| *Donax casta* A. Ad. | *22* |
| *Donax cuneata* L., 1758 | 8;23 |
| *Donax elegans* Odhner, 1919 | 2 |
| *Donax exaratus* Krauss | 22 |
| *Donax faba* Gm., 1791 | 22;1;5;3;2;8;23;26;9;28 |
| *Donax incarnatus* Schröter | 22;1;2;8;9 |
| *Donax lubricus* Hanley, 1845 | 22;2;4 |
| *Donax madagascariensis* Wd., 1828 | 4;9;20;22;29;*1* |
| *Donax nitidus* Des. | 22 |
| *Donax pallidus* Gould, 1850 | 2 |
| *Donax simpex* Sow., 1897 | 20 |
| *Donax triradiata* Des. | 28 |
| *Donax veruinus* Hedley | 28 |
| **SOLECURTIDAE** | |
| *Selenocurtus exaratus* Phil. | 29 |
| **PSAMMOBIIDAE** | |
| *Asaphis deflorata* (L.) | 1;23;28;29;*2* |
| *Asaphis dichotoma* (Anton) | 26;9 |
| *Florisarka* (*Soletellina*) *atrata* (Des.) | 1 |
| *Gari contraria* (Des., 1863) | *3*;*8* |
| *Gari maculosa* (Lam., 1818) | 2 |
| *Gari pulcherrima* (Des.) | 23 |
| *Gari radiata* Des. | 28 |
| *Heterodonax ludwigii* (Krauss, 1848) | 20 |
| *Hiatula lunata* (Des., 1855) | 4;20 |
| *Hiatula clouei* Bertin, 1880 | 20 |
| *Psammotaea elongata* (Lam.) | 1 |
| *Psammobia lunulata* (Des.) | 9 |
| *Psammobia radiata* (Des.) | 23 |
| *Psammobia valdiviae* Jaeckel & Thiel, 1931 | 22 |
| *Psammobia weinkauffi* Crosse | 8;*23* |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| **SEMELIDAE** | |
| *Ervilia bisculpta* (Gould) | 23 |
| *Iacra lactea* Dunker | 29 |
| *Iacra petiti* Dautz., 1923 | 20;29 |
| *Iacra seychellarum* (A. Ad., 1856) | 23;9;20 |
| *Iacra trotteriana* (Sow., 1894) | 20 |
| *Leptomya psittacus* Hanley | 9 |
| *Leptomya rostrata* Hanley | 25;23 |
| *Semele bourbonica* (Des.) | *22* |
| *Semele carnicolor* (Hanley, 1845) | 1 |
| *Semele cordiformis* Wd. | 22 |
| *Semele crenulata* Sow. | 28;29 |
| *Semele jukesii* A. Ad. | 28;*22* |
| *Semele obscura* (Des.) | *22* |
| *Semele striata* (Rve., 1853) | 20;*5*;*8*;*9*;*29* |
| *Theora lata* (Hinds, 1843) | 20 |
| *Theora opalina* Hinds | 22 |
| *Thyellisca (Thyella) lamellosa* A. Ad. | 22 |
| **TRAPEZIIDAE** | |
| *Coralliophaga coralliophaga* (Gm., 1791) | 22;*28* |
| *Coralliophaga decussata* (Rve.) | 1;23 |
| *Trapezium angulatum* Lam. | 28;*29* |
| *Trapezium bicarinatum* Schum., 1817 | 22;2;*1*;*29* |
| *Trapezium dolodum* Des. | 28 |
| *Trapezium guinaicum* Lam. | 28 |
| *Trapezium obesa* (Rve., 1843) | 2 |
| *Trapezium oblongum* L., 1758 | 22;23;*28* |
| *Trapezium rostratum* Lam., 1887 | 28 |
| **VESICOMYIDAE** | |
| *Isocardia moltkiana* Chemn. | 28 |
| *Isocardia lamarckii* Rve. | 28 |
| *Mediocardia tetragona* (Ad. & Rve., 1850) | 2;*28* |
| **VENERIDAE** Ref. source: 14 | |
| *Amiantis grata* (Des.) | 23 |
| *Amiantis umbonella* (Lam., 1818) | 14 |
| *Anomalocardia kockii* (Phil.) | 1;*9* |
| *Anomalocardia paupercula* (Dill.) | 1;23;*22*;*5*;*4*;*20*;*3*;*8* |
| *Anomalocardia manolei* Vanatta, 1901 | 14 |
| *Antigona lamellaris* (Schum., 1817) | 23;14 |
| *Antigona purpurea* (L., 1771) | 14;*1*;*23* |
| *Antigona reticulata* (L., 1758) | 14;*1*;*8*;*9*;*29* |
| *Bassina calophylla* (Phil., 1846) | 6 |
| *Bassina foliacea* (Phil., 1846) | *1* |
| *Callista erycina* (L., 1767) | 14 |
| *Callista costata* (Dill., 1817) | 2;28 |
| *Callista erycina* (L., 1767) | 14;28 |
| *Callista florida* (Lam., 1818) | 22;1;28;29;*9* |
| *Callista laeta* L. | 28 |
| *Callista obliquata* Hanley | 28 |
| *Callista varians* Wd. | 28 |
| *Chione embrithes* (Melvill) | 1 |
| *Chione toreuma* Gould | 6;*22* |
| *Circe callipyga* (Born, 1780) | 14;*29* |
| *Circe corrugata* (Chemn., 1784) | 14;*1* |
| *Circe nana* Melvill, 1898 | 14 |
| *Circe plana* Odhner, 1917 | 14 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Circe scripta* (L., 1758) | 14;1;8;9;*28* |
| *Circe sulcata* Gray, 1838 | 14 |
| *Circomphalus casina* (L., 1758) | 14 |
| *Clausiella foliacea* (Phil., 1846) | 14;*3*;*8*;*9* |
| *Clementia papyracea* (Gray, 1825) | 22;1;9;14 |
| *Comus platyaulax* (Tomlin, 1924) | 20;14 |
| *Dosinia hepatica* (Lam., 1818) | 22;1;3;4;8;9;20;29;14 |
| *Dosinia histrio* (Gm., 1791) | 14;22;28;*23*;*28* |
| *Dosinia isocardia* Dunker | 28 |
| *Dosinia parva* Sow. | 28 |
| *Dosinia sanata* Fischer-Piette & Delmas, 1967 | 14 |
| *Dosinia tumida* (Gray, 1838) | 14;*8*;*9*;*29* |
| *Dosinia trigona* Rve. | 29 |
| *Gafrarium aduncum* Romer | 8;*29* |
| *Gafrarium arabicum* (Lam.) | 1 |
| *Gafrarium corrugatum* Chemn. | 28 |
| *Gafrarium dispar* (Dill.) | 1;23;25;*28* |
| *Gafrarium distors* (Spengler) | 8 |
| *Gafrarium divaricatum* (Gm., 1791) | 22;5;3;9;20;1 |
| *Gafrarium gibbium* Lam. | 28 |
| *Gafrarium pectinatum* (L.,1758) | 18;4;1;2;23;9;20;25;28;*29*;*23*;*25* |
| *Gomphina undulosa* (Lam., 1818) | 14;*28* |
| *Irus irus* (L., 1758) | 20;14;*22*;*1*;*9*;*23*;*29* |
| *Lioconcha castrensis* (L., 1758) | 6;14;30 |
| *Lioconcha fastigiata* (Sow.) | 8 |
| *Lioconcha philippinarum* (Hanley, 1844) | 14 |
| *Lioconcha picta* (Lam., 1818) | 28;26;14;*22*;*23*;*2* |
| *Lioconcha tigrina* (Lam., 1819) | 2 |
| *Macrocallista semisulcata* (Sow.) | 1 |
| *Marcia paupercula* Chemn. | 14 |
| *Marcia opima* (Gm., 1791) | 14 |
| *Meretrix hebraea* (Sow.) | 3;8 |
| *Meritrix meretrix* (L.) | 5;4;14 |
| *Paphia gallus* (Gm.) | 5 |
| *Paphia malabarica* Chemn. | 14 |
| *Paphia textile* (Gm., 1791) | 2;14 |
| *Periglypta* (*Antigma*) *clathrata* (Des.) | 1 |
| *Periglypta crispata* (Des., 1853) | 2 |
| *Pitar abbreviatus* (Krauss, 1848) | 4;20 |
| *Pitar affinis* (Gm., 1791) | 22;2;23;14;*29* |
| *Pitar hebraea* (Lam., 1818) | 14;9;22;*1* |
| *Pitar madecassinus* (Fischer-Piette & Delmas, 1967) | 14;20 |
| *Pitar manillae* (Sow., 1851) | 14;22;9 |
| *Pitar obliquata* Hanley, 1844 | 22;*1*;*23* |
| *Pitaria* (*Pitarina*) *subpellucidum* (Sow.) | 1 |
| *Placamen isabellina* (Phil., 1849) | 2 |
| *Placamen tiara* Dill., 1817 | 22 |
| *Psammocula castrensis* (Spengler) | 23 |
| *Samarangia quadrangularis* (Ad. & Rve., 1850) | 2 |
| *Sunetta bruggeni* Fischer-Piette, 1973 | 14;*1*;*9*;*20*;*8* |
| *Sunetta effosa* (Hanley, 1842) | 14 |
| *Sunetta meroe* L. | 28 |
| *Sunetta truncata* Des. | 8;29 |
| *Tapes sulcarius* (Lam., 1818) | 1 |
| *Tapes deshayesii* (Hanley, 1844) | 14;1;20;22;*28* |
| *Tapes kochi* Phil. | 29 |
| *Tapes geographica* Gm. | 28 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Tapes literatus* (L.) | 1;5;23;26;*28* |
| *Tapes malabarica* (Chemn.) | 8;9 |
| *Tapes papillionacea* Chemn. | 28 |
| *Tapes punctata* Chemn. | 28 |
| *Tapes quadriradiata* Desh. | 8 |
| *Tapes sulcarius* (Lam., 1818) | 1;20;14;*8* |
| *Tapes sulcosa* (Phil.) | 1 |
| *Timoclea arakana* (Nevill, 1871) | 20;22 |
| *Timoclea costellifera* (Ad. & Rve., 1850) | 14;*8*;*9* |
| *Timoclea lavrani* Fischer-Piette 1974 | 20 |
| *Timoclea levicostata* (Kuroda) | 8 |
| *Timoclea marica* (L., 1758) | 14;1;23;*26*;*26*;*28*;*29* |
| *Timoclea platyanalax* (Tomlin) | 1 |
| *Timoclea recognita* (Smith, 1885) | 14;22;*8* |
| *Timoclea valdiviae* (Thiel & Jeckel, 1931) | 14 |
| *Tivela compressa* (Sow. ,1851) | 3;8;14 |
| *Tivela damaoides* (Wood, 1828) | 14;*9*;*20*;*22* |
| *Tivela lamyi* Dautz. | 29 |
| *Tivela natalensis* Dunker, 1858 | 3;8;20;14 |
| *Tivela petiti* Dautz. | 29 |
| *Tivela ponderosa* (Koch, 1844) | 14;*22* |
| *Tivela rejecta* Smith, 1914 | 14;20;22 |
| *Tivela transversa* Sow., 1897 | 14 |
| *Transennella platyaulax* (Tomlin) | 1 |
| *Venerupsis carditoides* Lam. | 28 |
| *Venerupsis corrugata* (Gm., 1791) | 14 |
| *Venerupsis derelicta* Des. | 28 |
| *Venus cancellata* Chemn. | 28 |
| *Venus crispata* Des. | 28 |
| *Venus listeri* Gray | 28 |
| *Venus lamellaris* (Schum.) | 9 |
| *Venus puerpera* L. | 28;*29* |
| *Venus scabra* Hanley | 28 |
| *Venus toreuma* Gould | 14;28;*29* |
| *Venus verrucosa* L., 1758 | 3;4;8;20;22;28 |
| **PETRICOLIDAE** | |
| *Petricola brugieri* (Hanley) | 1 |
| *Petricola divaricata* Gm. | 22 |
| *Petricola divergens* Gm., 1791 | 22 |
| *Petricola fabagella* Lam., 1818 | 22;29 |
| *Petricola lapicida* (Gm., 1791) | *28*;*29*;*1* |
| *Petricola ponsonbyi* Sow., 1892 | 20 |
| *Petricola robusta* Sow. | 3;8 |
| *Petricola typica* Jonas, 1844 | 22 |
| **MYIDAE** | |
| *Sphenia similis* Smith | 22 |
| **CORBULIDAE** | |
| *Corbula acutangula* Issel | 29 |
| *Corbula rugifera* (Smith 1903) | 1;20 |
| *Corbula subquadrata* Melvill & Standen, 1907 | 23 |
| *Corbula taitensis* Lam., 1818 | 8 |
| *Lepton cumingi* (A. Ad.) | 1 |
| **GASTROCHAENIDAE** | |
| *Gastrochaena cunieformis* (Spengler, 1783) | 23;9;28;29 |
| *Gastrochaena dubia* Penn. | 3;8 |

Table 7. (continued)

| Taxa | Reference sources |
|---|---|
| *Gastrochaena gigantea* Des., 1830 | 6 |
| *Gastrochaena mytiloides* Lam. | 27;28 |
| *Gastrochaena retzi* Des. | 28 |
| **PHOLADIDAE** | |
| *Barnea manilensis* (Phil., 1847) | 1;9;20 |
| *Martesia multistriata* Sow. | 29 |
| *Martesia striata* (L., 1758) | 1;9;20 |
| *Parapholsa quadrizonata* (Spengler) | 1 |
| *Pholas erythraea* Rve. | 29 |
| *Pholas silucula* Lam. | 28 |
| **TEREDINIDAE** | |
| *Dicyathifer* (*Teredo*) *mannii* (Wright) | 9 |
| *Bankia carinata* (Gray ,1827) | 4;20 |
| *Lyrodus massa* (Lamy, 1923) | 20;9 |
| *Teredo* sp. | 1 |
| *Teredo affinis* Des. | 22 |
| *Teredo brevis* Sow. | 22 |
| *Teredo clava* Gm. | 9;28 |
| *Teredora princesae* (Sivickis 1928) | 20;9 |
| *Uperotus clavus* (Gm.1791) | 20 |
| **LATERNULIDAE** | |
| *Laternula anatina* (L., 1758) | 22 |
| **THRACIIDAE** | |
| *Thracia* sp. | 1 |
| **CUSPIDARIIDAE** | |
| *Cuspidaria macrorynchus* Smith | 28 |
| **CLAVAGELLIDAE** | |
| *Brechites attrahens* (Lightfoot, 1786) | |
| *Bryopa aperta minima* Sow., 1889 | 22;28 |
| *Penicillus giganteus* (Sow.) | 1 |

## CHECKLIST REFERENCE SOURCES

**Prosobranchia** (Table 5).

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3. Macnae & Kalk (1969)
4. Branch *et al* (1994)
5. Fischer *et al* (1990)
6. Richmond & Rabesandratana (1997)
7. Richmond, M.D. collected spm. - Zanzibar.
8. Cernhorsky (1973)
9. Hinton (1972)
10. Price (1971)
11. Gosliner *et al* (1996)
12. Oliver (1975)
13. Rehder (1973)
14. Barnard (1959)
15. Barnard (1963)
16. Barnard (1963)
17. Houbrick (1992)
18. Barnard (1969)
19. Barnard (1958)
20. Kilburn & Rippey (1982)
21. Emerson & Cernhorsky (1973)
22. NMW -Cardiff: collection list.
23. Talmadge (1974)
24. Schimdt & Bellec (1994)
25. Roberston (1973)
26. Michel (1988)
27. Smith (1953)
28. Dance (1992)
29. Emerson (1990)
30. Abbott & Dance (1982)
31. Powell (1973)
32. Cernohorsky (1981)
33. Berry (1954)
34. Burgess (1970)
35. Copley (1945)
36. Dance (1974)
37. Viader (1937)
38. Dautzenberg (1932)
39. Houbrick (1978)
40. Harasewych (1997)
41. Herbert (1996)
42. Lawson (1969)
43. Liversidge (1963)
44. Houart (1984)
45. McClanahan (1990)
46. McClanahan (1994)
47. McClanahan (1997)
48. Powell (1967)
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51. Reid (1986)
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63. Verdcourt (1959)
64. Verdcourt (1960)
65. Houbrick (1985)
66. Robertson (1985)
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69. Abbott (1960)
70. Abbott (1967)
71. Hartnoll (1976)
72. Chelazzi & Vannini (1980)

**Polyplacophora** (Table 6).

1. Kaas (1986)
2. Kaas & Van Belle (1988)
3. Kilburn & Rippey (1982)
4. Barnard (1963)
5. Hodgkin & Michel (1960)
6. Chelazzi & Vannini (1980)
7. Viader (1937)

**Bivalvia** (Table 7).

1. Spry (1964)
2. Drivas & Jay (1988)
3. Macnae & Kalk (1969)
4. Branch *et al* (1994)
5. Fischer *et al* (1990)
6. Richmond & Rabesandratana (1997)
7. Richmond, M.D. collected spm. - Zanzibar.
8. Castro-Fernandez (1981)
9. Barnard (1964)
10. Price (1971)
11. Gosliner *et al* (1996)
12. Oliver (1992)
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14. Fischer-Piette (1973)
15. Rosewater (1961)
16. Rosewater (1961)
17. Hartnoll (1976)
18. Chelazzi & Vannini (1980)
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20. Kilburn & Rippey (1982)
21. Lawson (1969)
22. NMW -Cardiff: collection list.
23. Taylor (1968)
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26. Michel (1988)
27. Smith (1953)
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# DISCUSSION

The mollusc checklist is the first prepared for the western Indian Ocean and though certainly includes errors and duplication, does allow for comment on some of the better-known, larger, shallow-water and conspicuous groups.

The overall figure of about 3,100 species of molluscs recorded (excluding Opisthobranchia) in the present study can be compared to others areas of the Indo-Pacific. The coasts of western Australia are home to about 2,000 species of shelled molluscs (Wells & Bryce, 1988) with the entire Australian fauna likely to comprise about 10,000 species as recently suggested by Wilson (1993), who admits that the Australian fauna still remains incompletely known. The southern African fauna is thought to include fewer than 1,600 species of littoral molluscs (Kilburn & Rippey, 1982). The Hawaiian fauna is estimated to include about 1,000 species (Kay, 1979) and the south Pacific Islands about 1,200 species (Cernhorsky, 1967, 1972, 1978).

**a) Polyplacophora**

The class Polyplacophora is reasonably known and the 39 species recorded from the region derive mostly from littoral and shallow sublittoral sites. Of these the most conspicuous are the large upper eulittoral *Acanthopleura brevispinosa* and *A. gemmata* which are widespread and common on cliffs and rocky shores in the region. The former is restricted to the western Indian Ocean with the latter wide-spread throughout the Indo-Pacific. The difficulty associated with identification of chitons, relying as it does on dissection of the plates and microscopic examination of the girdle and spicules, has resulted in a paucity of records of this group in the literature for the region. Melvill & Standen (1901,1906) reporting on the molluscs of the Arabian Sea and adjacent areas failed to include a single chiton record (see Kass & van Belle, 1988). Fifteen of the species recorded from the region were only described in the last 30 years. Nevertheless, the composition of species from the region, though doubtless incomplete, has led one of the few chiton workers familiar with the fauna of the western Indian Ocean (Ferreira, 1983) to conclude that as far as chitons are concerned, the tropical western Indian Ocean (from and including the Red Sea to Natal) constitutes a definite zoogeographical province. From the adjacent Arabian Sea area only

12 species are reported (Kass & van Belle, 1988), whilst from southern Africa, Kilburn & Rippey (1982) report 26 species, including deep water species. The Indo-Malaysia region however, appears to maintain the highest diversity. For the genus *Acanthopleura* alone, 5 species are found (Ferreira, 1986).

**b) Prosobranchia**

A comparison of the findings of the present study (which recorded 2,550 species) with similar data from other regions within the Indo-Pacific is possible for a few families (see Table 8). The minimum species numbers for each family from the present study have been re-evaluated to include a second set of calculations based on species for which there are 2 or more records (WIO b). In preparing these figures, it becomes apparent that a considerable number of the single records for most species are derived from the study by Viader (1937) suggesting that his analysis of the fauna of Mauritius and its dependencies includes many synonyms which have yet to be resolved.

The comparison made in Table 8 reveals some marked differences between the localities. In general the number of species from the various families in the western Indian Ocean (WIO a) are greater than recorded from the other regions listed. The edited species numbers (WIO b) tend to agree more closely with what might be expected, and the true figures for the western Indian Ocean are likely to lie between these 2 data sets. Only further analysis of the synonymies of these families can attempt to resolve these differences. Nevertheless, 2 marked differences are evident which deserve attention. Numbers of species for the Trochidae appears to be higher for the western Indian Ocean for reasons which cannot at present be explained, though possibly the findings from the present study include many more deeper water species than those included in comparative works. The Volutidae by contrast reveals a marked lack of species, compared to the Australian region and vicinity. As Wells (1990) explains, these species deposit their eggs in masses on the seabed from which crawling juveniles hatch, a feature which accounts for the high number of endemic species of this family in Australian waters. This family is altogether absent from Hawaiian waters for the same reason (Scheltema, 1986).

Table 8. Number of shallow-water species of 20 families of prosobranch molluscs recorded from different geographical provinces. Abbreviations: WIO (western Indian Ocean: present study) – WIOa: minimum species number, WIOb records from more than a single source; NAST (northern Australia), AUS-NG-IND (northern Australia, New Guinea and Indonesia), the latter from Wells (1990); Guam data from Kay (1995); na: no available data.

| Family | WIOa | WIOb | NAUST | AUS-NG-IND | Guam |
|---|---|---|---|---|---|
| Haliotidae | 11 | 4 | 6 | 6 | 5 |
| Trochidae | 92 | 58 | 24 | 25 | 46 |
| Turbinidae | 33 | 14 | 17 | 20 | 20 |
| Neritidae | 24 | 15 | 10 | 10 | 24 |
| Littorinidae | 22 | 12 | 18 | 28 | 9 |
| Strombidae | 27 | 26 | 35 | 39 | 21 |
| Naticidae | 63 | 29 | 24 | 25 | 9 |
| Cypraeidae | 97 | 69 | 73 | 87 | 61 |
| Cassidae | 14 | 11 | 9 | 11 | 2 |
| Tonnidae | 17 | 9 | 9 | 11 | 2 |
| Muricidae | 187 | 67 | 47 | 97 | 56 |
| Columbellidae | 87 | 28 | 14 | 15 | 29 |
| Nassariidae | 77 | 31 | 50 | 84 | na |
| Fasciolaridae | 78 | 48 | 26 | 27 | na |
| Olividae | 65 | 26 | 23 | 35 | 9 |
| Mitridae | 210 | 76 | 83 | 109 | 72 |
| Costellariidae | 69 | 35 | 59 | 95 | 74 |
| Volutidae | 5 | 3 | 28 | 32 | na |
| Conidae | 198 | 92 | 93 | 127 | 89 |
| Terebridae | 88 | 41 | 66 | 94 | 43 |
| Total | 1,305 | 694 | 754 | 977 | na |

**c) Bivalves**

This class is generally poorly covered by field surveys and has attracted the attention of few workers in the past (Morton, 1983) thus comparisons with other regions cannot be made at present due to the lack of data. Of the estimated 667 species reported in the present study a margin of error is certain to exist, though the extent of that cannot be determined without further analysis of the synonymies. For the Red Sea, despite the lengthy period during which molluscan studies have been conducted there, few comprehensive texts on the molluscan fauna exist, with the exception of Oliver (1992) who provides the first comprehensive treatise on the bivalve fauna. He concludes that of the over 800 names applied in the existing literature for Red Sea bivalve shells, only 411 species can been retained as valid taxa. The figure from the present study can therefore be viewed as being of the right order of magnitude, considering the greater diversity of habitats, far greater tidal range and closer proximity to the Malay-Indonesian province for the western Indian Ocean as compared to the Red Sea. The problem of synonymies is not restricted to the Mollusca.

In an analysis of the coral fauna of the Indian Ocean Sheppard (1987) examined 796 entities from which he confirmed the presence of 439 species.

Far fewer species of bivalves than prosobranchs have been observed in most localities in the Indo-Pacific (see Kay, 1995). The ratio from her compilation of data across the south Pacific appears to be approximately 7 : 1 (prosobranchs : bivalves). The data from the present study, with 2,550 prosobranchs reported provides a ratio of approximately 4 : 1. One of the reasons for the greater portion of bivalves in the present study is the far larger tidal range and thus habitat suitable for bivalves along western Indian Ocean shores. This agrees with the findings by Kohn (1971) from an analysis of the molluscan fauna of tropical continental and oceanic islands. He found a ratio of prosobranchs to bivalves of 2.2 : 1 for continental islands and 4.8 : 1 for oceanic islands, providing further evidence that in continental environments, a greater diversity and contribution of bivalves is manifest. Bivalves probably evolved in shallow, coastal, continental waters rich in suspended material (Salvat, 1967; Taylor, 1971) and their adaptive radiation into coral reef habitats has only been achieved by a few families involving relatively fewer genera (Morton, 1983).

**Endemicity**

For the western Indian Ocean few estimates of endemicity exist at present. However, Drivas & Jay (1988) state that of the 2,500 species reported from Reunion Island and 3,500 species from Mauritius, only 10 % are considered to be endemic to those islands. Kabat (1996) found that no genera of Naticinae (subfamily of the Naticidae) were endemic to regions within the Indo-Pacific, though at the species level the bulk of the endemicity observed occurred in the western Indian Ocean (including Sri Lanka and India). Kay (1990) found 23 species of cowries, out of a total of 150 species in the Indo-Pacific, endemic to the Indian Ocean, approximately 15 %. One common, upper eulittoral species which lives on the trunks of mangrove trees is *Cerithidea decollata* (L.). This species appears to be endemic to the western Indian Ocean though absent from smaller islands. In Australia it is replaced by *C. largillierti* (Philippi). Similarly, *Bullia* spp. are restricted to continental margins (Taylor, 1971), absent from the western Indian Ocean islands, but found on the west coast of Madagascar and east Africa.

Kilburn & Rippey (1982) observed that southern Africa (covering South Africa and Namibia) has fewer than 1,600 species of littoral species of molluscs. This region they divide into 4 provinces, with northern Natal (Zululand) and Moçambique referred to as the Indo-Pacific province. The latter region is characterised by having the only coral reefs in South Africa, and in terms of molluscan fauna, a marked reduction in the presence of endemic species (probably less than 14 %) with about 85 % of the fauna comprised of genuinely Indo-Pacific species. They also note that an accurate analysis of the composition of the fauna cannot be made because the Zululand molluscs are in general very poorly known and concentrated on submerged coral reefs which have so far been little explored. Herbert (1998) gives figures for the entire South African fauna as follows: Gastropoda (marine) 2,183 species (58 % endemics); Bivalvia 560 species (48 % endemics).

**Fossil evidence**

The fossil record can do much to elucidate the origin and location of species and explain the observed patterns of distribution found today especially as mollusc shells are particularly suited to fossil study. For example, Abbott (1960) found that *Strombus aurisdianae* is abundant in the mid Indian Ocean from East Africa to Sumatra and he suggests that this species may be a recent migrant from Africa into the western Pacific as far as Okinawa and the Solomons. This species was found to be relatively abundant in east African fossil records, but absent from Indonesian fossil beds. It is also the only species in the western Pacific which abruptly stops at the Solomons. The populations of this species on Indian Ocean islands show great instability in shell character and he believes this represents a potential isolation and further development of Indian Ocean species or subspecies in the geological future.

For some taxa diversity has been shown to reduce over geological time. This is conspicuously true of the giant clams *Tridacna*. Currently only 2 species are known with certainty from the region, *Tridacna squamosa* and *T. maxima* (the record of *Hippopus* from Mauritius by Viader (1937) needs confirmation). The fossil record however, reveals that a total of 5 species were present amongst the younger limestone cliffs of Aldabra (Taylor, 1971) including the distinctive *T. gigas* which has become extinct in the last 125,000 years, though it widely present in the Malay-Indonesia province and across parts of the western

Pacific. Taylor (1971) suggests that possibly the Malay-Indonesia area, rather than a being centre for dispersal for the Indo-Pacific as accepted by many (e.g. Ekman, 1953), is more likely to be an area where survival has been maintained, or accumulated, when other areas suffered losses of diversity accompanying a reduction in habitat availability caused by sea-level changes. Kohn (1967) found similar evidence for the distribution of *Conus* species where no diversity gradient towards Malay-Indonesia is observed, concluding that habitat complexity is a greater determinant of species diversity than isolation or distance from faunistic centre. Emerson (1990) observed a not dissimilar pattern for members of the genus *Morum* (Harpidae). These were widely distributed during the Tertiary, but presently only 16 species are found in the Indo-Pacific, with only a single endemic species occurring in the western Indian Ocean. The remainder are concentrated in the Malay-Indonesian / Australian region, with a single endemic species in the Marshall Islands.

**Island versus mainland species**

One area of research which could provide further biogeographic information is an examination of the differences between the species diversity of the western Indian Ocean islands and that of the continental margins. As discussed above, the bivalve populations are likely to differ markedly due to habitat requirements. Taylor (1971) was one of the first to highlight the differences between island mollusc diversity and that of the mainland of Africa, with the latter supporting larger biodiversity than the islands. This observation has received further support by numerous workers. Abbott (1960) for example found that certain species of *Strombus* in the Pacific showed a clear preference for continental, high nutrient environments whilst others were found only on coral island environments. Abbott (1968) also found similar preferences among members of the Cassidae. Kay (1990) found a greater number of species of cowries (41) common to the continental margins of western Indian Ocean compared with those on the islands (33 species). With respect to the differences between island and continental species diversity, Taylor (1971) concludes that the islands within the region have a very uniform fauna composed of species with larvae capable of surviving pelagic transport. He also concludes that the fringes of the region demonstrate a higher degree of endemicity while experiencing a latitudinal decrease in species diversity.

## Further studies

As Spry (1961) admits, many shells remain to be found, particularly among the smaller species, while the deep water species are still unknown. Study is especially needed of the Fissurellidae, the Vermetidae, the Calyptracea (Hipponicidae, Crepidulidae and Capulidae), the Lamellariidae, in addition to several Opisthobranchia families (notably Melanellidae and Siphonariidae). To fully ascertain the molluscan diversity of the western Indian Ocean further taxonomic work and regional collecting must be undertaken. The task of eliminating synonyms in the literature must be pursued and the present checklist amended. Present work has identified the location of the most comprehensive collections for the region (e.g. those of Winckworth and Spry now held at the Natural History Museum, London; the Melvill-Tomlin collection at the National Museum of Wales; the Viader collection at Port Louis, Mauritius; and the collections held at the National Museum of Tanzania, Dar es Salaam, and the Institut Halietique et des Sciences Marines, Tulear, Madagascar), and although a significant task, further examination of these collections should clarify the molluscan biodiversity for the western Indian Ocean region.

# CHAPTER 5

# THE DIVERSITY AND DISTRIBUTION OF THE SHALLOW-WATER ECHINODERM FAUNA OF THE WESTERN INDIAN OCEAN

# INTRODUCTION

By the middle of this century the systematics of the echinoderm fauna of the Indian Ocean (and indeed the bulk of the world) could be said to be based on a reasonably sound footing. The reasons for this are that they are relatively few in numbers, with current estimates at about 7,000 species globally (Pawson, 1995), they are mostly of a medium size (3-50 cm), they have a long fossil history, dating to the Lower Cambrian (over 500 million year ago) and their taxonomy is, on the whole, fairly robust. For the Indo-Pacific region the phylum includes about 1,300 species from nearshore and shallow waters (Pawson, 1995).

Within the western Indian Ocean and adjacent waters (e.g. Arabian Sea, Arabian Gulf, northern Indian Ocean, Red Sea and southern African waters), there have been numerous studies on echinoderms over the last two hundred years. James (1976) provides a review of echinodermology of the Indian Ocean which began in 1743 with reports from Goa (west coast of India) by Plancus and Gaultire. Various expeditions which collected and catalogued diverse taxa, including echinoderms, subsequently visited the region. These include the Challenger Expedition (1873-74), the Deutchen Tiefsee Expedition (1902-03), the Percy Sladen Trust Expedition (1904), the Willebrod Expedition (1929) and the John Murray Expedition (1933-34). The reports which resulted from these voyages greatly contributed to knowledge of the fauna of the Indian Ocean and adjacent waters. Several independent studies have similarly taken place over the first quarter of this century.

The landmark monograph of Clark & Rowe (1971) for the entire Indo-Pacific shallow-water species (from less than 20 m depth) collated and updated the taxonomy and distribution of the fauna of this region and has since served as a sound basis for further research. This monograph includes all relevant literature up to 1969. From then onwards the most significant studies in the western Indian Ocean and adjacent waters which have added to the knowledge of the fauna are summarised here. From southern Africa (including the southern portion of Moçambique) the work of Thandar (1977-94), Cherbonnier (1970) and Clark & Courtman-Stock (1976) help in providing a thorough appraisal of the echinoderms from those waters. The asteroid assemblage of Inhaca Island (southern Moçambique) has been examined by Jangoux (1973) and more recently by Walenkamp (1990). Madagascar's holothurians have been extensively studied by Cherbonnier (1988); the ophiuroid fauna by

Cherbonnier & Guille (1978) and the crinoids by Marshall & Rowe (1981). Humphreys (1981) provides a summary of the fauna mainly from the Watamu Marine Park (northern Kenya) and Herring (1972) examined the ecology and distribution of the echinoid fauna of the shores on the west coast of Zanzibar (Tanzania). From the western Indian Ocean islands a few recent echinoderm works have been forthcoming, all from the Seychelle islands. These include Sloan *et al.* (1979) and Clark (1984). Clark (1980) also examined the ophiuroids of the Seychelles and Inhaca Island. The echinoderms of the northern part of the Indian Ocean, notably around India and the Andaman Islands, have been studied by Daniel & Halder (1974) and more extensively by James (1969-89). In addition, the four reports from the recent *Sinbad Voyage* (1980-81) have contributed significantly to the knowledge of the northern Indian Ocean echinoderm fauna, from sites at Muscat (Oman), the Maldives, Lakshadweep Islands, India, Sri Lanka and northern Sumatra (see Price & Reid, 1985; Marsh & Price, 1991; Price & Rowe, 1996, and Crossland & Price *in press*). The knowledge of the echinoderm fauna of Diego Garcia (Chagos Archipelago) has been updated by Clark & Taylor (1971) and the asteroid fauna of the Maldives has been examined recently by Jangoux & Aziz (1984) which included material from the Seychelles, and by Moosleitner (1997). Arabian Gulf echinoderms have been examined by Price (1981) and those of the southern Oman coast by Campbell & Morrison (1988). Subsequent to Clark & Rowe (1971) the Red Sea echinoderms have been examined by James & Pearse (1969), Roman (1979) and have been the subject of a comprehensive analysis by Price (1983) who includes analysis of the fauna from the Arabian Sea and Arabian Gulf. Numerous other studies which include examination of material from the western Indian Ocean tend to focus on specific echinoderm families, genera or species groups. Relevant examples include Campbell & Rowe (1997) on a new species of asteroid from Oman, and Rowe *et al.* (1986) on a revision of some comasterid crinoids.

The recent studies on the echinoderm faunas of the western Indian Ocean and adjacent waters described above provide a comprehensive understanding of the diversity of the phylum over much of this region, though some parts of the region have either been only sparsely covered or not at all (e.g. the Comoros and other islands in the Moçambique Channel, northern Moçambique, Tanzania, Mauritius and Réunion). Furthermore, a few taxonomic problems do continue to exist and stem in part from the lack of adequate type material of some of the species first described in the mid to late 1800's. For example Koehler and Sluiter were known to use the type material as part of student dissection

practials after which specimens were discarded (Rowe *pers. com.*). Clark (1907) laments that for some holothurians the incomplete characterisation of the genera and loss of type material adds to the difficulties. With time the few inconsistencies are being resolved and the fauna as a whole benefits from a far more solid basis that of the Polychaeta or Mollusca for example (see Chapters 3 and 4). One aspect of echinoderm taxonomy which certainly helps reduce taxonomic ambiguities is the seemingly widespread dismissal of the need for varieties and subspecies (e.g. Clark, 1907; Rowe *pers. com*) in contrast to mollusc systematics where these lower levels are commonly encountered.

For the western Indian Ocean, no comprehensive analysis of the fauna exists and the numerous site-specific studies do not generally examine their fauna in the broader context of this region as a whole. This study attempts to bring together all the relevant taxonomic research on the echinoderm fauna of the western Indian Ocean in order to provide an overview of its diversity and distribution. More specifically, the objectives of this study are to:

1. Establish the identity of the species of echinoderms present in the western Indian Ocean;

2. Produce a summary of the diversity of western Indian Ocean echinoderm species as a contribution to the Field Guide;

3. Examine the distribution of the species of echinoderms found in the western Indian Ocean and attempt to explain the observed patterns.

# METHODS

## Field Surveys

Collections of echinoderms were made in Zanzibar, Tanzania between January 1992 and June 1997. Detailed quantitative samples of intertidal soft substrates were taken in Zanzibar, Tanzania (as described in Chapter 3), and Jubail (Saudi Arabia) in the Arabian Gulf (see Richmond, 1994), combined with brief collections and field surveys in other parts of the region. Sites where brief field surveys were conducted include Watamu (Kenya), Mafia Island (Tanzania), Inhaca Island (Moçambique), Durban and northern Natal (South Africa), Gran Comores (Comoros), Tulear (SW Madagascar), Nose Be (NW Madagascar), Mahé and La Digue Islands (Seychelles), Yanbu (Saudi Arabia, NE Red Sea) and SW Papua New Guinea.

Most survey and collecting efforts were concentrated in the littoral zone, though shallow coral reefs and sublittoral seagrass beds were also examined. Field annotations and photographs accompany much of the collection. Specimens were preserved in alcohol or dry and catalogued, with the bulk of the material collected deposited at the Institute of Marine Sciences (University of Dar es Salaam). Material at the Institut Halietique et des Sciences Marines, Tulear, Madagascar and at the Inhaca Marine Laboratory Museum (Universidade Eduardo Mondlane, Moçambique) was also examined. The identification of parts of the collection made in Zanzibar were verified by Dr. Frank Rowe and deposited in Natural History Museum (London).

## Preparation of the Species Checklist

An echinoderm faunal checklist was complied for the western Indian Ocean using data from numerous works. Pre-1969 records were taken from Clark & Rowe (1971) and, where necessary, modified following discussions with Dr. Frank Rowe, for example to elucidate synonyms established since 1971. Un-published records of material collected from the region were also included. Doubtful records presented in Clark & Rowe (1971) are indicated as '?' and excluded from the analysis here. Records are included only for species

which are reported from depths shallower than 100 m. The distribution of the fauna was established by dividing the Indo-Pacific region and adjacent waters into thirteen provinces, and the western Indian Ocean records have been separated into those from the East Africa mainland (and including Madagascar) and those from the western Indian Ocean islands (Seychelles and the Mascarenes). Thus fifteen provinces are defined (see below). The records given are in most cases the earliest published and most reliable, though in many cases subsequent publications confirmed the first record. Only a single record for species presence at each province is included. The term 'province' is used here only with reference to a geographical area and not to a biogeographically distinct region. Systematic arrangement of families follows Clark & Rowe (1971) with genera listed alphabetically.

**Descriptions of Geographic Provinces**

The provinces are roughly similar to those provided in Clarke & Rowe (1971) with minor alterations to group similar land masses (e.g. the Lakshwadeep Islands are grouped with the Maldives and Chagos), to reduce the overall number of provinces considered (e.g. the Arabain Gulf is grouped with the Arabian Sea) and to accord with the recent literature which summarises fauna for particular regions (e.g. Australia, China-Japan and the Pacific Islands). It is accepted that the extent of shorelines, habitats (and their complexity), as well as the quantity and level of research conducted in each province, and within the two sub-provinces of the western Indian Ocean vary considerably. Given this caveat, analysis of the diveristy of echinoderm species in each, and their wider distribution can be examined. The definition of the fifteen provinces used in this study are depicted in Figure 1 and summarised below:

**A East Africa** (A sub-province of the western Indian Ocean) - from approximately 7 $^{0}$ N in central Somalia to Durban (South Africa) at approximately 30 $^{0}$ S, including Kenya, Tanzania, Comoros and Madagascar and the Moçambique Channel. This area corresponds with 'E Africa & Madagascar' in Clark & Rowe (1971).

**B Western Indian Ocean islands** (A sub-province of the western Indian Ocean) - Seychelles, Mauritius and dependencies and Réunion. This area includes the provinces of 'Is. of the W Indian Ocean' and 'Mascarene Is.' in Clark & Rowe (1971).

**C Southern Africa** - south of Durban.

**D Arabian Sea** - from central Somalia at approximately 7 $^{0}$ N to the entrance of the Red Sea, and extending eastwards to the border between Iran and Pakistan, thus including all of Oman, and also including the Arabian Gulf. This province includes the 'SE Arabia' and 'Persian Gulf' defined in Clark & Rowe (1971).

**E Red Sea** – from the southen entrance at the Straits of Bab el Mandeb to the northern extreme and Gulf of Suez. Ditto Clark & Rowe (1971).

**F Western India** - from the border between Iran and Pakistan, extending to the southern tip of mainland India. Ditto Clark & Rowe (1971).

**G Lakshadweep-Chagos** – both these island groups and the Maldives. This province corresponds with 'Maldives area' in Clark & Rowe (1971).

**H Sri Lanka-Bay of Bengal** – the island of Sri Lanka, east coast of India and Bay of Bengal extending to southern Burma and including the Andaman and Nicobar islands. This province includes 'Ceylon area' and 'Bay of Bengal' in Clark & Rowe (1971).

**I Malay-Indonesia** – including Malaysia, Indonesia, Papua New Guniea and the Philippines. This province includes 'East Indies' and 'Philippines Is.' in Clark & Rowe (1971).

**J Northern Australia** – from the central west coast to the southern extreme of the Great Barrier Reef on the east coast. Ditto Clark & Rowe (1971).

**K China-Japan** – southern Japan, the Ryukyu Islands, Bonin Islands and the coast of China from Korea to Hainan and the east coast of Vietnam. Ditto Clark & Rowe (1971).

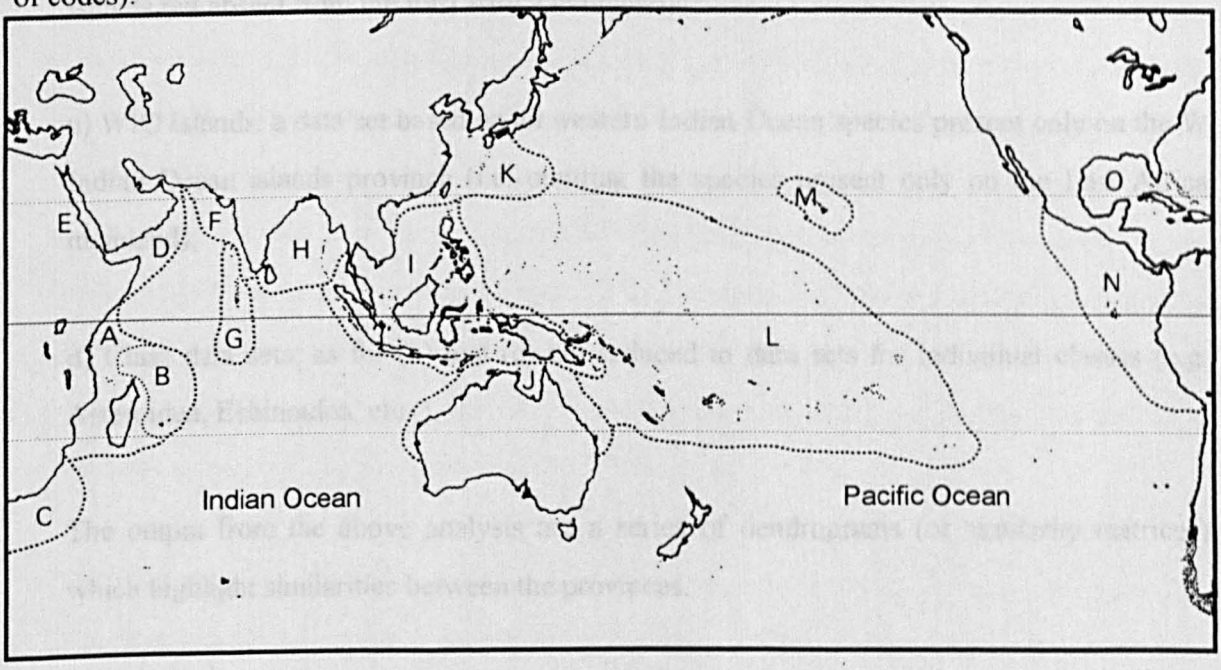
**L Pacific Islands** – all islands extending from the Marianas, Palau, Solomons and New Caledonia in the western Pacific to the Pitcairn Islands group in the central south Pacific. Ditto Clark & Rowe (1971).

**M Hawaii** – all islands in the Hawaiian group. Ditto Clark & Rowe (1971).

**N Eastern Pacific Ocean** – the tropical coastlines of Peru, Ecuador (including the Galápagos), central America and Mexico.

**O Tropical Atlantic**

Figure 1. Provinces within and adjacent to the Indian and Pacific Oceans (see text for explantion of codes).




## Non-parametric data analysis

The species checklist was converted to a presence-absence data set which includes only those species found in the western Indian Ocean and their presence or absence from the other provinces defined here. Cluster analysis of the data set was performed using the Bray-Curtis Similarity program 'Primer' developed by Clarke & Warwick (1994). It should be emphasized here that the resulting similarity values relate only to the species found in the western Indian Ocean, and not to the fauna of the entire region. Compiling an up-to-date

species checklist for the entire region is a task which is beyond the scope of this study. In some instances the data sets were modified and reduced to allow factors which may be affecting the relationship between the various provinces to be examined in more detail, as summarised below:

a) Entire western Indian Ocean fauna: the entire data set with all 15 provinces;

b) East African fauna: a data set based on all western Indian Ocean species present on the East Africa mainland province (i.e. omitting the species present on the W Indian Ocean islands but absent from the East Africa mainland);

c) WIO Islands: a data set based on all western Indian Ocean species present only on the W Indian Ocean islands province (i.e. omitting the species present only on the East Africa mainland);

d) Class data sets: as for (b) and (c) but reduced to data sets for individual classes (e.g. Asteroidea, Echinoidea, etc..).

The output from the above analysis are a series of dendrograms (or similarity matrices) which highlight similarities between the provinces.

# RESULTS

## GENERAL

The faunal list of echinoderms found in the western Indian Ocean, and their distribution, is shown in Table 1. The detailed checklist showing the source for each species record for each province and details of the 58 sources used are presented in Appendix 2. A total of 419 species were recorded from the western Indian Ocean, with 354 species recorded from East Africa (including Madagascar) and 206 species recorded from the western Indian Ocean islands. Sections below describe the findings for each class (Crinoidea, Asteroidea, Ophiuroidea, Echinoidea and Holothuroidea) and provide details of species with doubtful records from the western Indian Ocean which have been excluded from the analysis. Details of synonyms adopted from the recent literature and applied to species recorded in the present study are also given in the Appendix 2. A summary of the findings are presented by Rowe & Richmond (1997) with illustrations of 119 species accompanied by general descriptions of the organisms with details on their habitats and wider distribution, and brief notes on a further 73 species encountered in the region.

The cluster analysis for the complete data set on species presence is shown in Figure 2a. The dendrogram reveals that the faunal assemblage of the western Indian Ocean islands differs from that of the East Africa mainland (including Madagascar), although both sub-provinces are clearly and strongly associated (at the 60 % similarity level) with each other and the adjacent Indo-Pacific provinces, but decreasingly associated with Hawaii, western India, the eastern Pacific and tropical Atlantic, and South Africa. The reasons for the difference between the two western Indian Ocean sub-provinces include the difference in overall species number between the two areas (354 and 206), and the number and proportion of endemics in each. Of the total of 107 endemic species found in the entire western Indian Ocean province, 81 occur exclusively on the mainland/Madagascar subprovince, with only 15 recorded from the islands. Analysis of the faunal data set based only on those species recorded from the western Indian Ocean islands (Figure 2b) reveals that the echinoderm assemblage of this sub-province is more strongly associated with the East Africa mainland than any other province, supporting the possibility that the large

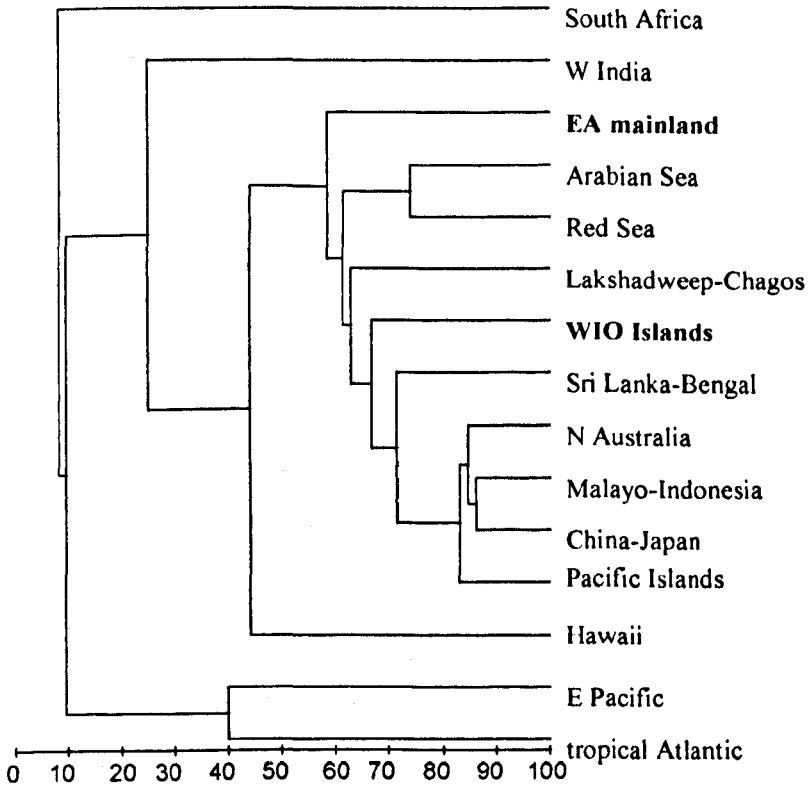



Figure 2a. Bray-Curtis similarity matrix for the Echinodermata recorded in the western Indian Ocean.

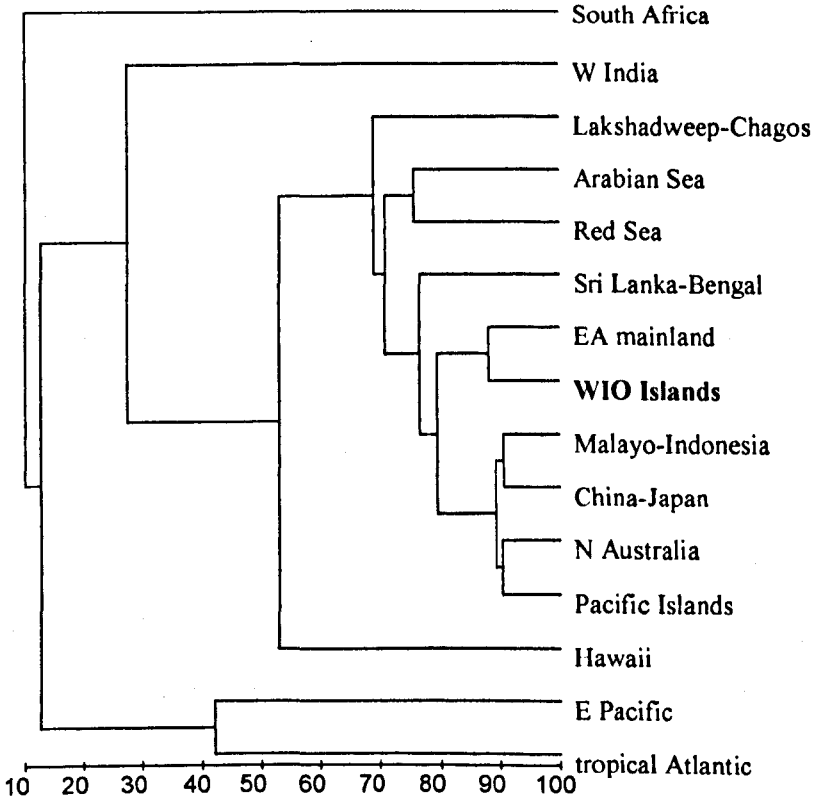



Figure 2b. Bray-Curtis similarity matrix for the Echinodermata recorded from the western Indian Ocean islands only.

number of endemic species recorded from the mainland and Madagascar have caused the separation of these two sub-provinces observed in Figure 2a. Analysis of the data set based only on species found on the mainland (i.e. excluding species occurring on western Indian Ocean islands but not on East Africa or Madagascar) does not differ from Figure 2a, and is not included here.

**Class CRINOIDEA**

A total of 19 species was found in the western Indian Ocean, of which seven are endemic to the region (see Table 1). Of the seven endemic species, only two are also found on the islands. Nine species (47 % of the total) are present in both sub-provinces of the western Indian Ocean and of the remainder, seven species occur at more than two provinces east of the Bay of Bengal. Compared to the central Indo-Pacific (e.g. Papua New Guinea) very few species were observed in the western Indian Ocean, and those which where most common, such as *Comanthus walhbergi* and *Stephanometra indica* were mostly encountered at night on shallow reefs, whereas in Papua New Guinea crinoids were conspicuous by their presence during the daytime.

The presence of only a few species, which include a large proportion of endemics (37 %) results in a weak association with the adjacent provinces and the cluster analysis performed on this class does not reveal any significant associations.

**Class ASTEROIDEA**

A total of 58 species of asteroids was found to occur in the western Indian Ocean with 7 species endemic to the province (see Table 1). Twenty-nine species occur in both sub-provinces of the region, yet the diversity of species for each is very similar, with 54 species found to occur in East Africa and 46 on the western Indian Ocean islands. Twenty nine species (or 50 % of the total for the province) were found in both sub-provinces, and 32 species (55 %) occur at more than two provinces east of the Bay of Bengal.

The cluster analysis performed on the data set for all records reveals that the two sub-provinces within the western Indian Ocean are closely associated (at 70 %) as shown in

Figure 3, with a 63 % association with the adjacent provinces of the Lakshadweep-Chagos group, Sri Lanka-Bay of Bengal and the central Indo-Pacific and west Pacific provinces. A weaker association with the Arabian Sea and Red Sea is found, followed by less significant association with the outlying provinces considered. Analysis of the faunas present only on the islands, and only on the mainland do not differ from the associations shown in Figure 3.

**Notes:** Additional species which were not included in the analysis include an intertidal species of *Asterina* collected from Zanzibar which awaits further examination. This genus is troubled by taxonomic uncertainties and the species may prove to be *A. limboonkengi* G.A. Smith, recently accepted as a valid species in southern China (Liao & Clark, 1995). Similarly, the species *Patiriella exigua* (Lamarck), closely related to members of the genus *Asterina*, is thought to comprise more than one species (see Clark & Rowe, 1971) and further examination of material from the western Indian Ocean (e.g. Clark & Courtman-Stock, 1976; Walenkamp, 1990) is required to determine its true identity.

Records for the goniasterid *Stellaster equestris* (Retzius) reported in Clark & Rowe (1971) for the western Indian Ocean have subsequently been accepted by Clark (1993) as having been based on mistaken identificaton for the valid species *Stellaster childreni* Gray which is included in this study.

**Class OPHIUROIDEA**

One hundred and thirty-two species of brittlestars were found to occur in the western Indian Ocean (see Table 1). The mainland assemblage includes 123 species while the islands were found to support only 60 species. Nevertheless, of the total, 51 species (39 %) were present in both sub-provinces. Thirty-three species are endemic to the region, the majority of which (25 species) were found to occur only on the mainland sub-province and only 3 on the islands, with 5 species found in both sub-provinces. Seventy-two species (i.e. 55 %) occur at more than one province east of the Bay of Bengal.

The similarity analysis supports observed difference between the two sub-provinces, clearly separating these from each other at the 42 % level of similarity (Figure 4a) and revealing a weak association of the islands' fauna with that of South Africa. When the faunal list is

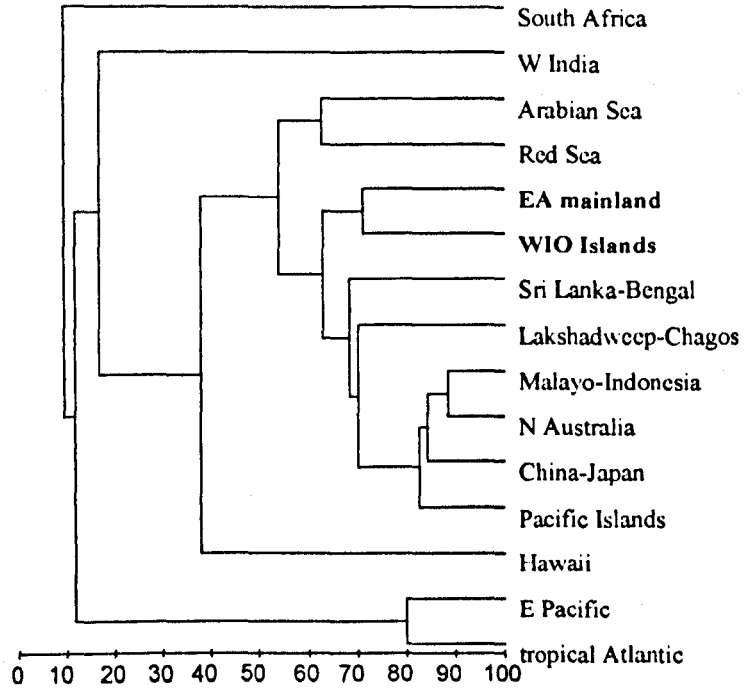



Figure 3. Bray-Curtis similarity matrix for the Asteroidea recorded in the western Indian Ocean.

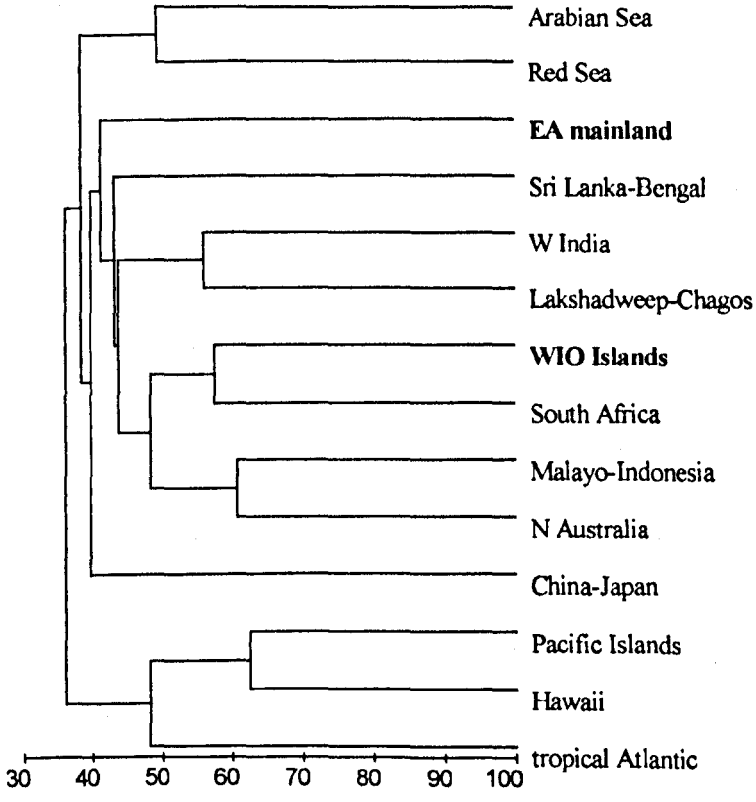



Figure 4a. Bray-Curtis similarity matrix for the Ophiuroidea recorded in the western Indian Ocean.

modified to include only those species present on the mainland, a stronger, but nevertheless still weak similarity (54%) with the island fauna is revealed, and a 50% association with the Red Sea (Figure 4b). When only the fauna present on the isalnds are treated in the same way, the association between the islands and the mainland is increased slightly (to 52 %) with a greater association shown for the assemblage from the islands with that for South Africa and the Arabian Sea (Figure 4c).

The disparity between the ophiuroid faunal assemblage of the islands and that of the mainland (including Madagascar) may reflect two major differences between the two sub-provinces. Firstly, the different physiographical attributes between these two sub-provinces, including the availabity and diversity of suitable habitats, may contribute to the observed differences. Secondly, the relative difference in taxonomic research conducted on this group in the two areas may play a role. Of the 123 species found on the mainland (including Madagascar) 50 species were reported from Madagascar by Cherbonnier & Guille (1978) including 22 new species. The comprehensive treatise of this group by these authors has not been matched for any other part of the western Indian Ocean and is likely to contribute significantly to the observed differences.

**Notes:** Rowe & Gates (1995) suggest that *Ophiactis lymani* Ljungman and *Ophiactis macrolepidota* Marktanner-Turneretscher may prove to be junior synonyms for *Ophiactis plana* Lyman resulting in the species being of pantropical distribution.

The record of *Amphioplus (Amphiopsis) stenaspis* H.L. Clark by Cherbonnier & Guille (1978) is considered by Price & Rowe (1996) to be doubtful and is not included in this study. *Amphira ficta* Koehler also recorded in Madagascar by Cherbonnier & Guille (1978) is for depths between 100-500m and is similarly excluded. *Ophiarachnella infernalis* (Müller & Troschel) reported in Clark & Rowe (1971) is also excluded since, as they describe, the origins of the record from Zanzibar derive from H.L. Clark (1909, 1915a,b) who subsequently refers to it as an East Indies species H.L. Clark (1938, 1946).

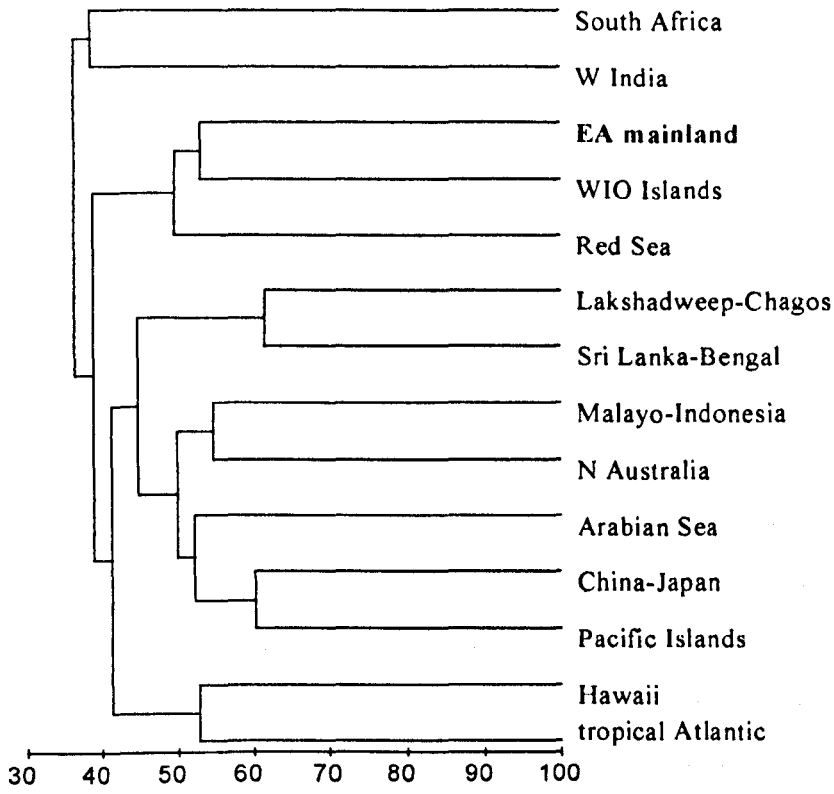



Figure 4b. Bray-Curtis similarity matrix for Ophiuroidea fauna recorded from the East Africa mainland only (including Madagascar).

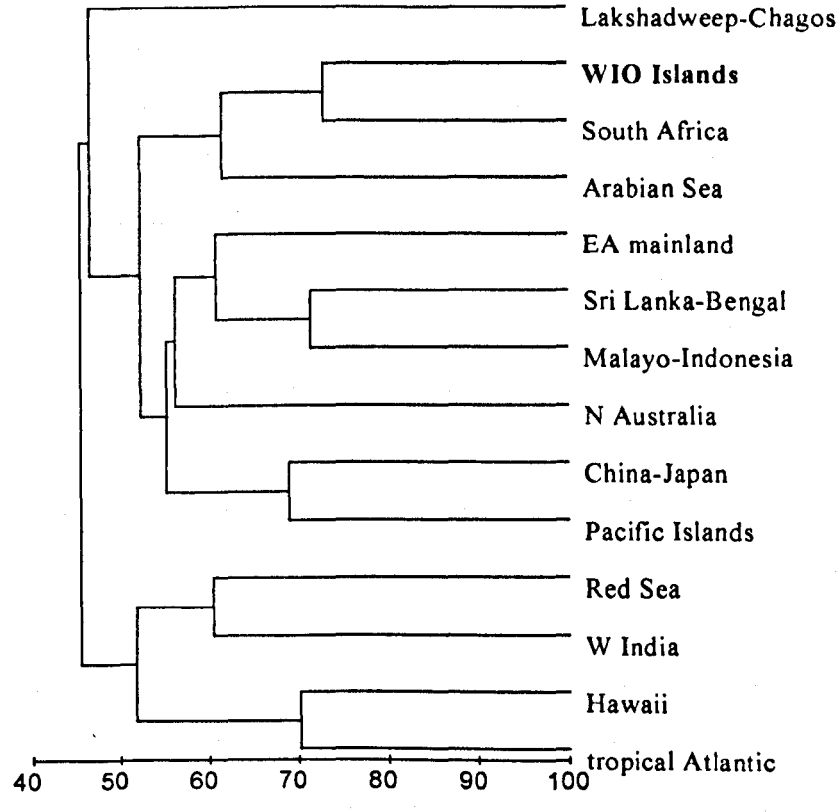



Figure 4c. Bray-Curtis similarity matrix for Ophiuroidea fauna recorded from the western Indian Ocean islands only.

## Class ECHINOIDEA

The above class is represented in the western Indian Ocean by 62 species. The mainland fauna comprises 52 species while that of the islands includes 48 species, with 38 species (i.e. 61 % of the total) common to both sub-provinces. Three species are found to be endemic to the region, two of which are found only on the islands. Forty-nine of the species present in the western Indian Ocean (79 %) are also encountered at more than one province east of the Bay of Bengal.

Data from the provinces of South Africa and the tropical Atlantic, which include, of the western Indian Ocean assemblage, only two species and a single pantropical species (*Echinoneus cyclostomus* Leske) respectively, were removed from the analysis tp reduce distortion of the comparisons. The overall analysis associates the assemblage from the islands with that of the mainland at the 65 % similarity level (Figure 5a). The mainland assemblage is more closely associated with the depauperate fauna of western India and that of the Lakshwadeep-Chagos islands (both of which have relatively few species which are mostly among those found along the mainland and Madagascar shores). The fauna of the western Indian Ocean islands is shown to be slightly more closely related to that of the central Indo-Pacific than with the East African mainland. When the analysis is perfomed on the assemblage based on only those species which occur on the mainland sub-province, the association with the western Indian Ocean islands is shown to increase to about 70 %, as revealed in Figure 5b. Conversely, when the analysis is performed on the assemblage from the western Indian Ocean islands, the fauna of the latter is associated more closely with that of Sri Lanka-Bay of Bengal and the central Indo-Pacific provinces than with East Africa and Madagascar (Figure 5c). Nevertheless, the associations between the echinoderm fauna of the two sub-provinces in the western Indian Ocean are consistently greater than 65 %.

**Notes:** The cidariid urchin *Stereocidaris squamosa* Mortensen recorded from Durban and reported from the Saya de Malha Bank in Clark & Courtman-Stock (1976) as 'sd' (meaning shallow-deep) is thought to be a typographical error which should read 'vd' meaning 'very deep' (Rowe *pers. com.*) and is thus omitted from this study. A further species, the irregular urchin *Echinocyamus megapetalus* H.L. Clark. is reported in Clark & Rowe (1971) from the Mascarene islands as a doubtful record since the type locality is not known with certainty, and is thus omitted from this study.

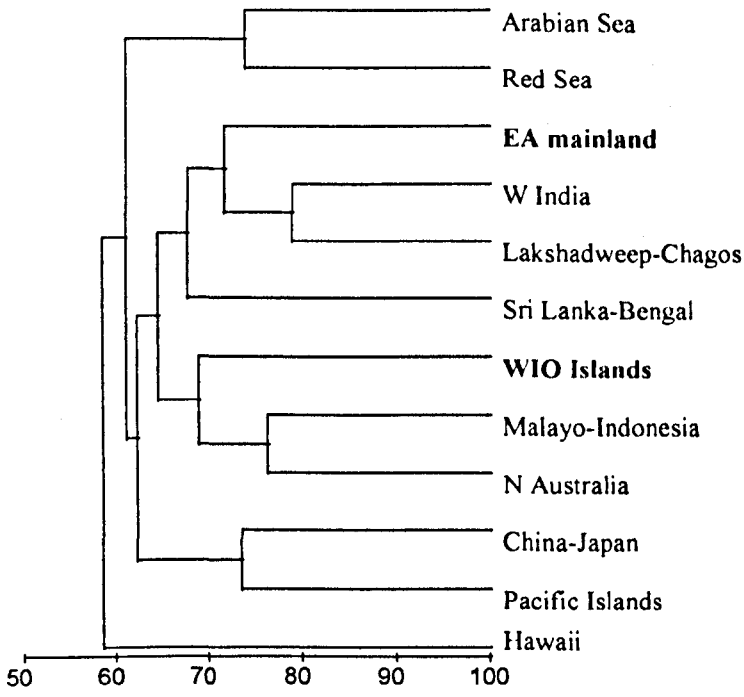



Figure 5a. Bray-Curtis similarity matrix for Echinoidea recorded in the western Indian Ocean.

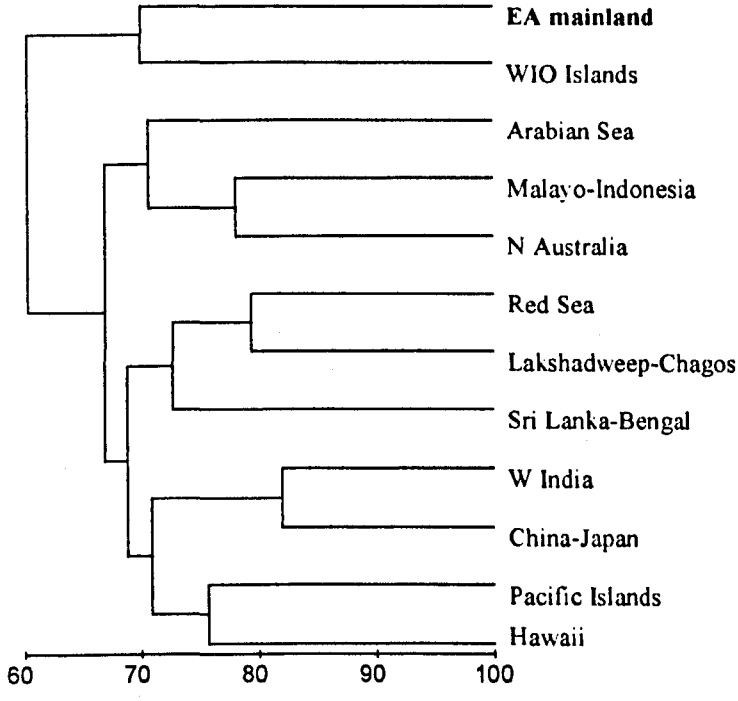



Figure 5b. Bray-Curtis similarity matrix for Echinoidea recorded from the East Africa mainland only (including Madagascar).

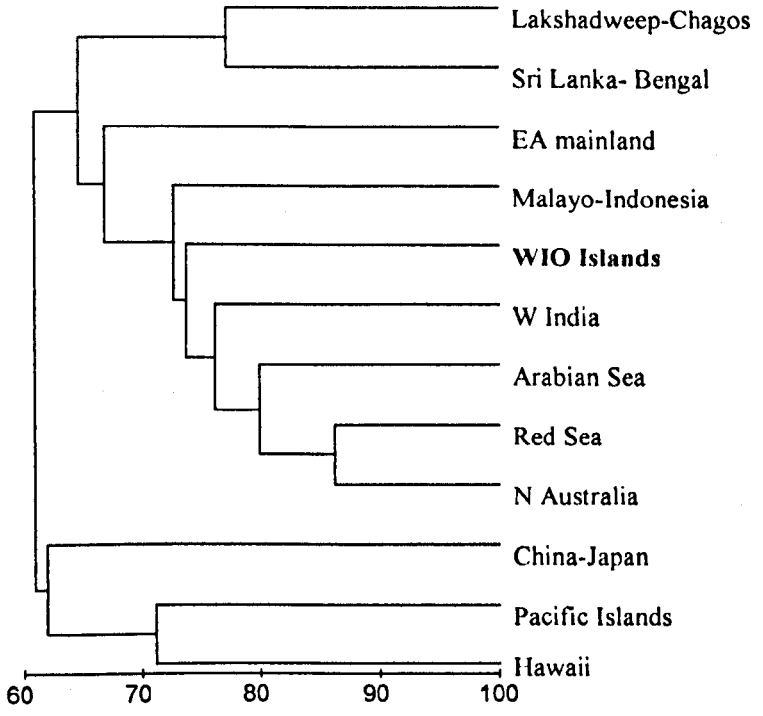



Figure 5c. Bray-Curtis similarity matrix for Echinoidea recorded from the western Indian Ocean Islands only.

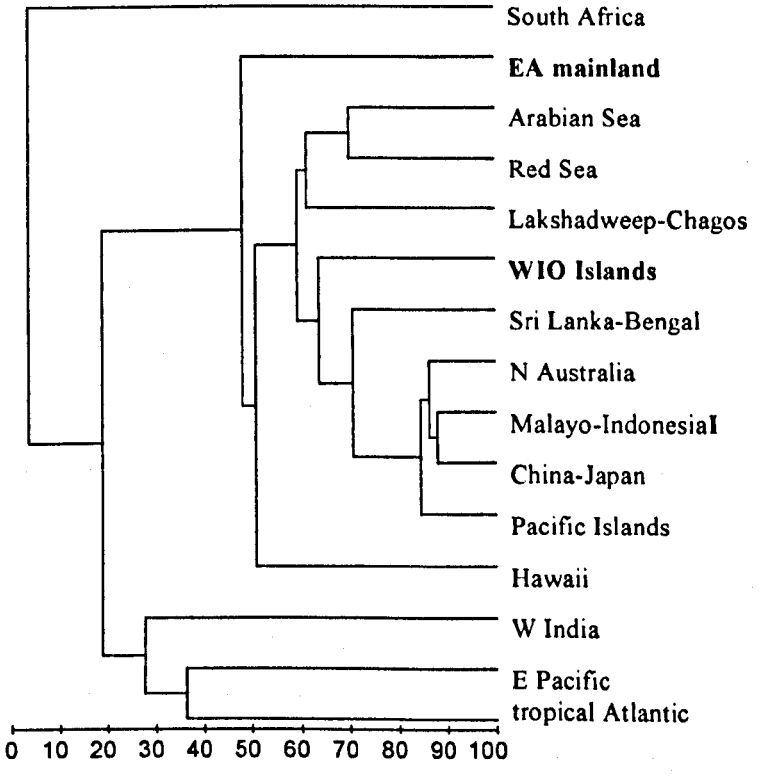



Figure 6a. Bray-Curtis similarity matrix for Holothuroidea recorded in the western Indian Ocean.

## Class HOLOTHUROIDEA

Holothurians are represented in the western Indian Ocean by 148 species, with 57 species (39 %) endemic to this area. The mainland (including Madagascar) supports the majority, with 136 species, while the islands were found to comprise only 51 species of holothurians. Thirty-nine species (26 %) are common to both sub-provinces of the western Indian Ocean and 70 species (47 %) are present at more than one province east of the Bay of Bengal.

The cluster analysis reveals a weak (48 %) association between the western Indian Ocean islands' fauna and that of the mainland, as shown in Figure 6a. Also evident is a stronger association of the islands' fauna with that of Sri Lanka-Bay of Bengal and the central Indo-Pacific provinces. The fauna of the mainland clusters with all the Indo-Pacific provinces from the Red Sea to Hawaii (and including the western Indian Ocean islands) at the 48 % level of similarity. When the analysis is conducted using only those species which occur on the mainland there are virtually no significant differences in the clusters as shown in Figure 6b. However, when a similar analysis is conducted using only those species which occur on the islands (i.e. omitting species present on the mainland but absent from the islands) the island fauna relates more closely to the mainland than to any other province (Figure 6c). These analyses confirm the observed differences between the fauna of the islands and that of the mainland which supports a greater overall number of species including many endemics.

The large number of holothurians recorded from the mainland can be attributed, as with the ophiuroids, to either the physiographical differences between the mainland and the western Indian Ocean islands, or to the unequal taxonomic effort conducted on this taxa in these two sub-provinces. As with the ophiuroids, the majority of the species recorded from the mainland sub-province are derived from a single study on Madagascar by Cherbonnier (1988) which accounts for a total of 74 records (i.e. 54 % of the total from the mainland sub-province) and which includes 47 species described by Cherbonnier, mostly from Madagascar. Surprisingly, though some of the species recorded by Cherbonnier (1988) are first published records for the western Indian Ocean, they are commonly seen elsewhere in the area (e.g. the holothurid *Personothuria graeffei* Semper is a common coral reef associate on Zanzibar reefs, as is the stichopodid *Thelanota anax* H.L. Clark).

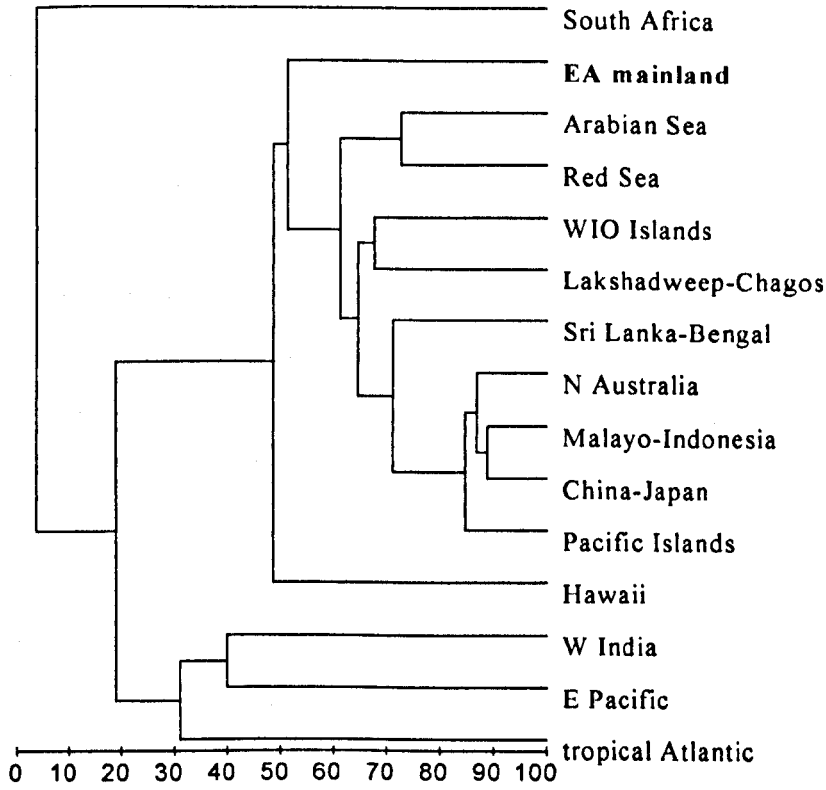



Figure 6b. Bray-Curtis similarity matrix for Holothuroidea recorded from the East Africa mainland only (including Madagascar).

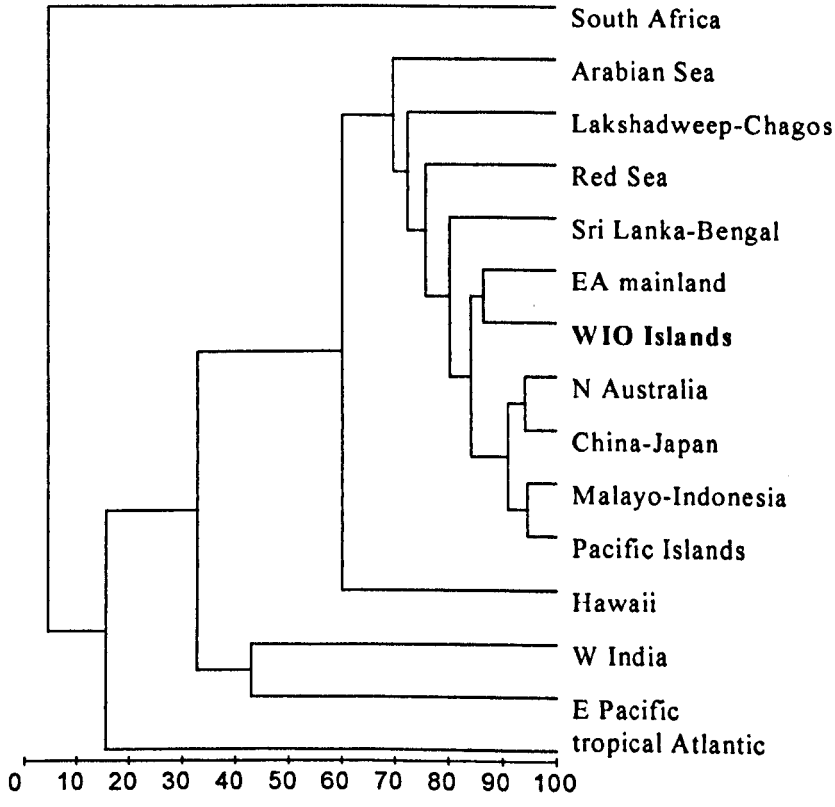



Figure 6c. Bray-Curtis similarity matrix for Holothuroidea recorded from the western Indian Ocean islands only.

**Notes:** *Bohadschia koellikeri* (Semper), *B. similis* (Semper), *B. tenuissima* (Semper) and *B. vitiensis* (Semper) are considered by Rowe & Doty (1977) to be synonyms of *B. marmorata* Jaeger, and further work is required to determine their validity according to Rowe & Gates (1995). *Holothuria (Theelothuria) hamata* Pearson recorded in Sloan *et al.* (1979) from Aldabra as doubtful is omitted from the present study. The record of *Holothuria (Thymiosycia) milloti* Cherbonnier recorded by Cherbonnier (1988) as a new species from northern Madagascar based on a single specimen from unspecified depth is also omitted. *Orbithyone megapodia* H.L. Clark was record from Aldabra by Hughes & Gamble (1977) and later regarded as a very doubtful record by Sloan *et al.* (1979) and is therefore also omitted from the faunal list.

The species *Holothuria scabra* Jaeger possibly comprises two species. Two forms appear to exist, with one form being consistently multi-coloured (with large reddish-brown patches interspersed with black and white, and a consistently flattened, white ventral base) and possessing Cuvierian tubules. The latter are absent from *H. scabra* though the spicules found are consistent with those described by Cherbonnier (1988) for *H. scabra* from Madagascar. The multi-coloured form has been collected from Zanzibar where it is common, and was observed in southern Madagascar. It is depicted in Rowe & Richmond (1997) where they have incorrectly labelled it as *Bohadschia subrubra*. Further analysis of a range of specimens is required to elucidate this inconsistency and determine whether or not this is a distinct species, as yet undescribed.

Table 1. The echinoderm fauna of the western Indian Ocean and its distribution.

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CRINOIDEA** | | | | | | | | | | | | | | | |
| **COMASTERIDAE** | | | | | | | | | | | | | | | |
| *Capillaster multiradiatus* (L.) | + | + | | | + | | + | + | + | | + | + | + | | |
| *Comanthus wahlbergi* (J. Müller) | + | + | + | + | + | | + | | | + | + | + | | | |
| *Comaster distinctus* (P.H. Carpenter) | + | | | | + | | | | + | + | + | + | | | |
| *Comaster multifidus* (J. Müller) | | + | | | | | + | | + | + | + | + | | | |
| **HIMEROMETRIDAE** | | | | | | | | | | | | | | | |
| *Heterometra africana* (A.H. Clark) | + | | | + | | + | | | | | | | | | |
| *Heterometra delagoae* Gislen | + | | | | | | | | | | | | | | |
| *Heterometra gravieri* A.H. Clark | + | | | | | | | | | | | | | | |
| *Heterometra joubini* (A.H. Clark) | + | | | | | | | | | | | | | | |
| *Heterometra madagascarensis* (A.H. Clark) | + | | | | | | | | | | | | | | |
| **MARIAMETRIDAE** | | | | | | | | | | | | | | | |
| *Dichrometra flagellata* (J. Müller) | + | | + | | | | | | + | + | + | + | | | |
| *Lamprometra klunzingeri* (Hartlaub) | + | + | | + | + | | | | | | | | | | |
| *Stephanometra indica* (Smith) | + | + | | | + | + | + | + | + | + | + | + | | | |
| **COLOBOMETRIDAE** | | | | | | | | | | | | | | | |
| *Cenometra emendatrix* (Bell) | + | + | | | | | | | | | | | | | |
| *Decametra modica* A.H. Clark | + | + | | | | | | | | | | | | | |
| *Oligometra serripinna* (P.H. Carpenter) | + | + | | + | + | | + | + | + | + | + | + | | | |
| **TROPIOMETRIDAE** | | | | | | | | | | | | | | | |
| *Tropiometra carinata* (Lamarck) | + | + | + | + | + | | | + | + | | | | | | |
| **ANTEDONIDAE** | | | | | | | | | | | | | | | |
| *Antedon arabica* A.H. Clark & A.M. Clark | + | | | + | | | | | | | | | | | |
| *Dorometra mauritiana* A.H. Clark | + | + | | | | | + | | | | | | | | |
| *Iridometra malagasiensis* Marshall & Rowe | + | | | | | | | | | | | | | | |
| **ASTEROIDEA** | | | | | | | | | | | | | | | |
| **LUIDIIDAE** | | | | | | | | | | | | | | | |
| *Luidia hardwicki* (Gray) | | + | | + | | | | + | + | + | + | | | | |
| *Luidia maculata* M. & T. | + | + | + | + | + | | + | + | + | + | + | + | | | |
| *Luidia mauritiensis* Koehler | | + | | | | | | | | | | | | | |
| *Luidia savignyi* (Auduoin) | + | + | | | + | | | + | + | | | + | | | |
| **ASTROPECTINIDAE** | | | | | | | | | | | | | | | |
| *Astropecten antares* Doderlein | + | | + | | | | | | | | | | | | |
| *Astropecten granulatus* M. & T. | + | | + | | | | | | + | + | | | | | |
| *Astropecten hemprichi* M. & T. | + | + | | + | + | | | | | | | | | | |
| *Astropecten mauritianus* Gray | | + | | | | | | | | | | | | | |
| *Astropecten monacanthus* Sladen | + | | | + | + | | + | + | + | + | + | | | | |
| *Astropecten polyacanthus* M. & T. | + | + | | + | + | | + | + | + | + | + | + | + | | |
| **ARCHASTERIDAE** | | | | | | | | | | | | | | | |
| *Archaster angulatus* M. & T. | + | | + | | | | | | + | + | + | + | | | |
| *Archaster lorioli* Sukarno & Jangoux | | + | | | | | + | | | | | | | | |
| **GONIASTERIDAE** | | | | | | | | | | | | | | | |
| *Stellaster childreni* Gray | + | | | + | + | | | + | + | + | + | | | | |
| *Stellasteropsis colubrinus* Macan | + | | | + | | | | | | | | | | | |
| **ASTERODISCIDIDAE** | | | | | | | | | | | | | | | |
| *Asterodiscides belli* Rowe | + | + | | | | + | | + | | | | | | | |
| *Asterodiscides tessellatus* Rowe | | + | | | | | | | | | | | | | |
| **OREASTERIDAE** | | | | | | | | | | | | | | | |
| *Choriaster granulatus* Lutken | + | + | | | + | | + | | + | + | + | + | | | |
| *Culcita schmideliana* (Retzius) | + | + | | + | | | + | + | | | | | | | |
| *Halityle regularis* Fisher | + | | | + | | | | | + | + | | + | | | |
| *Monachaster sanderi* Meissner | + | | | + | + | | | | | | | | | | |

Table 1 (continued)

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Pentaceraster horridus* (Gray) | + | + | | | | | | | | | | | | | |
| *Pentaceraster mammillatus* (Auduoin) | + | | | + | + | | | | | | | | | | |
| *Pentaceraster tuberculatus* (M. & T.) | + | | | + | + | | | | | | | | | | |
| *Protoreaster lincki* (de Blainville) | + | + | | + | | | | + | + | + | | | | | |
| *Protoreaster nodosus* (L.) | + | + | | | | | | + | + | + | + | + | | | |
| **OPHIDIASTERIDAE** | | | | | | | | | | | | | | | |
| *Andora faouzii* (Macan) | | + | | + | | + | + | | | | | | | | |
| *Cistina columbiae* Gray | | + | | | | | + | | | + | | + | | | |
| *Dactylosaster cylindricus* (Lamarck) | + | + | | + | | | + | + | + | + | + | + | + | | |
| *Ferdina flavescens* Gray | | + | | | | | + | | | | | | | | |
| *Fromia milleporella* (Lamarck) | + | + | | + | | | + | + | + | + | + | + | | | |
| *Fromia monilis* Perrier | + | | | | + | | + | + | + | + | + | + | | | |
| *Fromia nodosa* A.M. Clark | | + | | | | | + | + | | | | + | | | |
| *Gomophia egyptiaca* Gray | + | + | | | + | | + | + | + | + | + | + | | | |
| *Leiaster coriaceus* Peters | + | + | | | + | | | | + | + | | + | | + | |
| *Leiaster glaber* Peters | + | | | | | | | + | | | | | + | | |
| *Leiaster leachi* (Gray) | | + | | + | + | | + | | + | + | + | + | + | | |
| *Linckia guildingi* Gray | + | + | | + | | | + | + | + | + | + | + | + | + | + |
| *Linckia laevigata* (L.) | + | + | | | | | + | + | + | + | + | + | | | |
| *Linckia multifora* (Lamarck) | + | + | | + | + | + | + | + | + | + | + | + | + | | |
| *Nardoa frianti* Koehler | | + | | | | | + | + | + | + | + | + | | | |
| *Nardoa variolata* (Retzius) | + | + | | + | | | | | | | | | | | |
| *Neoferdina offreti* M. & T. | + | + | | | | | + | + | + | | + | + | | | |
| *Ophidiaster duncani* de Loriol | + | + | | | | | | | | + | | | | | |
| *Ophidiaster hemprichi* M. & T. | + | + | | | + | | + | | + | + | + | + | | | |
| *Ophidiaster perrieri* de Loriol | + | + | | | | | | | | | | | | | |
| *Ophidiaster cribrarius* Lutken | | + | | | | | | | | + | | + | | | |
| *Tamaria lithosora* H.L. Clark | + | + | | | | | | | | | | | | | |
| *Tamaria marmorata* (Michelin) | + | + | | | | | | | | | | | | | |
| **ASTEROPSEIDAE** | | | | | | | | | | | | | | | |
| *Asteropsis carinifera* (Lamarck) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Valvaster striatus* (Lamarck) | | + | | | | | | + | + | + | | + | + | | |
| **ASTERINIDAE** | | | | | | | | | | | | | | | |
| *Asterina burtoni* Gray | + | + | | + | + | | | | | | | | | | |
| **ACANTHASTERIDAE** | | | | | | | | | | | | | | | |
| *Acanthaster planci* (L.) | + | + | | + | + | + | + | + | + | + | + | + | + | | |
| **PTERASTERIDAE** | | | | | | | | | | | | | | | |
| *Euretaster cribrosus* (v. Martens) | + | + | | + | + | | | + | + | | | | | | |
| **MITHRODIIDAE** | | | | | | | | | | | | | | | |
| *Mithrodia clavigera* (Lamarck) | + | + | | | + | | + | | + | + | + | + | | + | + |
| *Thromidia seychellesensis* Pope & Rowe | | + | | | | | | | | | | | | | |
| **ECHINASTERIDAE** | | | | | | | | | | | | | | | |
| *Echinaster callosus* v. Marenzeller | + | + | | | + | | | + | + | + | + | + | | | |
| *Echinaster purpureus* (Gray) | + | + | | + | + | | | + | | | | | | | |
| **ASTERIIDAE** | | | | | | | | | | | | | | | |
| *Stolasterias calamaria* (Gray) | + | + | + | | | | | | | + | + | + | | | |
| **OPHIUROIDEA** | | | | | | | | | | | | | | | |
| **OPHIOMYXIDAE** | | | | | | | | | | | | | | | |
| *Ophiomyxa australis* Lutken | + | + | | + | + | | | + | + | + | + | + | | | |
| **EURYALIDAE** | | | | | | | | | | | | | | | |
| *Euryale aspera* Lamarck | + | | | | | | | + | + | + | + | + | | | |
| **GORGONOCEPHALIDAE** | | | | | | | | | | | | | | | |
| *Astroboa clavata* (Lyman) | + | + | | + | + | | + | + | | + | + | | | | |
| *Astroboa nuda* (Lyman) | + | | | + | + | | | | + | + | + | + | | | |

Table 1 (continued)

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Astrocladus exiguus* (Lamarck) | + | | | | | | | + | + | + | + | | | | |
| *Astroboa granulatus* H.L. Clark | + | | | | | | | | | + | | + | | | |
| *Astrocladus tonganus* Doderlein | + | | | | | | | | | | | + | | | |
| *Astroglymma sculptum* (Doderlein) | | + | | | | | | | + | + | + | + | | | |
| **OPHIACANTHIDAE** | | | | | | | | | | | | | | | |
| *Ophiacantha gracilis* (Studer) | + | | | | | | | | + | + | | | | | |
| **AMPHIURIDAE** | | | | | | | | | | | | | | | |
| *Amphilycus scripta* (Koehler) | + | | | + | + | | | + | | | + | | | | |
| *Amphiodia dividua* (Mortensen) | + | + | | | | | | | | | | | | | |
| *Amphiodia picardi* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphiodia microplax* Burfield | + | | | + | + | | | | | + | + | | | | |
| *Amphioplus impressus* (Ljungman) | + | + | | | | | | | + | + | + | | | | |
| *Amphioplus cyrtacanthus* H.L.Clark | + | | | | | | | | + | | + | | | | |
| *Amphioplus heptagonus* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphioplus longuscutum* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphioplus lucidus* Koehler | + | | | | | | | | + | + | + | | | | |
| *Amphioplus margueritae* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphioplus parvitus* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphioplus polymorphus* Cherb. | + | | | | | | | | | | | | | | |
| *Amphioplus spinosus* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphioplus thomassini* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphioplus titubantius* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphioplus hastatus* (Ljungman) | + | + | | + | + | | | | | + | | | | | |
| *Amphioplus integer* (Ljungman) | + | + | + | | + | | | | | | | | | | |
| *Amphioplus laevis* (Lyman) | + | | | + | + | | | | + | + | + | + | | | |
| *Amphioplus furcatus* Mortensen | + | | | | | | | | | | | | | | |
| *Amphipholis littoralis* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphipholis loripes* Koehler | + | | | | | | | | + | | + | | | | |
| *Amphipholis serrataspina* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphipholis sigillata* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphipholis squamata* (D.Chiaje) | + | + | + | + | + | + | | | + | + | + | + | + | | + |
| *Amphiura acrisia* H.L. Clark | + | | | | | | | | | + | | | | | |
| *Amphiura capensis* Ljungman | + | | + | | | | | | | | | | | | |
| *Amphiura candida* Ljungman | + | + | | | | | | | | | + | | | | |
| *Amphiura clausadae* Cherb. & Guille | + | | | | | | | | | | | | | | |
| *Amphiura corona* Cherb. & Guille | + | | | | | | | | | | | | | | |
| *Amphiura crispa* Mortensen | + | | | + | | | | | | | | | | | |
| *Amphiura dejectoides* H.L. Clark | + | + | | | + | | | | + | | | | | | |
| *Amphiura duncani* Lyman | + | | | | | | | + | + | + | + | + | | | |
| *Amphiura leptotata* H.L. Clark | + | | | | | | | | + | + | | + | | | |
| *Amphiura madecassae* Cherb. & Guille | + | | | | | | | | | | | | | | |
| *Amphiura micra* H.L. Clark | + | | | | | | | | + | + | | | | | |
| *Amphiura plantei* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Amphiura sexradiata* Koehler | + | | | | | | | | + | | | | | | |
| *Amphiura africana* (Balinsky) | + | | | | | | | | | | | | | | |
| *Amphiura octacantha* (H.L. Clark) | + | | | | | | | | | + | + | | | | |
| *Amphiura tenuis* (H.L. Clark) | + | | | + | | + | | | | + | + | | | | |
| *Ophiocentrus asper* (Koehler) | + | | | | | | | | + | + | | + | | | |
| *Ophiocentrus crassuspinosus* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Ophiocentrus dilatatus* (Koehler) | + | | | | | | + | | + | + | | + | | | |
| *Ophiocentrus inequalis* (H.L. Clark) | + | | | | | | | | + | + | + | | | | |
| *Ophiocentrus spinacutus* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Paracrocnida sacensis* (Balinsky) | + | | | | | | | | | | | | | | |

Table 1 (continued)

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OPHIACTIDAE** | | | | | | | | | | | | | | | |
| *Ophiactis carnea* Ljungman | + | | + | + | + | | | | | | | | | | |
| *Ophiactis crosnieri* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Ophiactis delagoa* Balinsky | + | | | | | | | | | | | | | | |
| *Ophiactis hemiteles* H.L. Clark | + | | | | | | | | | + | | | | | |
| *Ophiactis lymani* Ljungman | + | | | | | | | | | | | | | | + |
| *Ophiactis modesta* Brock | + | | | | | + | | + | + | + | + | + | + | | |
| *Ophiactis macrolepidota* Mark.Turn. | + | | | + | + | | | | | + | + | | | | |
| *Ophiactis plana* Lyman | + | | | | + | | | | | | | | | | |
| *Ophiactis picteti* (de Loriol) | + | + | | | | | | | + | | + | | | | |
| *Ophiactis savignyi* M. & T. | + | + | | + | + | + | + | + | + | + | + | + | + | | + |
| *Ophiactis versicolor* H.L. Clark | + | + | | | + | | | | | | | | | | |
| *Ophiosphaera insignis* Brock | + | + | | | | | | | + | + | | + | | | |
| **OPHIOTRICHIDAE** | | | | | | | | | | | | | | | |
| *Macrophiothrix demessa* (Lyman) | + | + | | + | + | | + | | + | + | + | + | + | | |
| *Macrophiothrix hirsuta* (M. & T.) | + | | | + | + | | | + | + | | | + | | | |
| *Macrophiothrix longipeda* (Lamarck) | + | + | | | | | + | + | + | + | + | + | | | |
| *Macrophiothrix robillardi* (de Loriol) | | + | | | | | | | + | + | + | + | | | |
| *Macrophiothrix nereidina* (Lamarck) | + | + | | | | | | + | + | + | + | + | | | |
| *Macrophiothrix propinqua* Lyman | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Ophiocnemis marmorata* (Lamarck) | + | | | | | | | + | + | + | + | | | | |
| *Ophiomaza cacaotica* Lyman | + | | | + | + | | | + | + | + | + | + | | | |
| *Ophiothela danae* Verrill | + | + | | + | + | + | + | + | + | + | + | + | | | |
| *Ophiothela tigris* Lyman | + | + | | | | | | | | | | | | | |
| *Ophiothela venusta* (de Loriol) | + | | | + | | | | | + | + | | | | | |
| *Ophiothrix comata* M. & T. | + | | | | | | | | + | | | | | | |
| *Ophiothrix echinotecta* Balinsky | + | | | + | | | | | | | | | | | |
| *Ophiothrix exigua* Lyman | + | | | | | | + | + | + | + | + | + | | | |
| *Ophiothrix foveolata* Mark.Turn. | + | | | | | | + | + | + | + | | + | | | |
| *Ophiothrix picturata* de Loriol | | + | | | | | | | | | | | | | |
| *Ophiothrix savignyi* (M. & T.) | + | + | | + | + | + | + | | | | | + | | | |
| *Ophiothrix tricuspida* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| *Ophiothrix trilineata* Lutken | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Ophiothrix tristis* de Loriol | | + | | | | | | | | | | | | | |
| *Ophiothrix vitrea* Doderlein | | + | | | | | | + | + | | + | | | | |
| *Ophiothrix proteus* Koehler | + | | | + | + | | | + | + | + | + | + | | | |
| *Ophiothrix purpurea* Martens | + | + | | + | + | | + | + | + | + | + | + | | | |
| **OPHIOCOMIDAE** | | | | | | | | | | | | | | | |
| *Ophiarthrum elegans* Peters | + | + | | + | + | | | + | + | + | + | + | | | |
| *Ophiarthrum lymani* de Loriol | | + | | | | | | | | | | | | | |
| *Ophiocoma brevipes* Peters | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Ophiocoma dentata* M. & T. | + | + | | + | | | + | + | + | + | + | + | + | | |
| *Ophiocoma doederleini* de Loriol | + | + | | | | | | | | + | | + | | | |
| *Ophiocoma erinaceus* M. & T. | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Ophiocoma pica* M. & T. | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Ophiocoma pusilla* (Brock) | + | + | | + | + | | | | + | + | + | + | | | |
| *Ophiocoma scolopendrina* (Lamarck) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Ophiocoma valenciae* M. & T. | + | + | | + | + | | | | | | | | | | |
| *Ophiocomella sexradia* (Duncan) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Ophiomastix caryophyllata* Lutken | + | + | | | | | | | + | + | + | + | | | |
| *Ophiomastix koehleri* Devaney | + | + | | | | | | | | | | | | | |
| *Ophiomastix palaoensis* Murakami | + | | | | | | | | | + | | + | | | |
| *Ophiomastix variablis* Koehler | + | + | | | + | | + | | + | + | + | + | | | |
| *Ophiomastix venosa* Peters | + | + | | + | | | | + | + | | | | | | |

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| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Ophiopsila paucispina* Koehler | + | | | | | | | | | | | | | | |
| *Ophiopsila timida* Koehler | + | | | | | | | | + | | | | | | |
| **OPHIONEREIDAE** | | | | | | | | | | | | | | | |
| *Ophionereis australis* (H.L. Clark) | + | | | | | | | | | + | | | | | |
| *Ophionereis degeneri* (A.H. Clark) | + | | | | | | | | | | | | + | | |
| *Ophionereis dubia* (M. & T.) | + | + | + | + | + | + | + | + | + | + | + | + | | | |
| *Ophionereis hexactis* H.L. Clark | + | | | | | | | | | + | | | | | |
| *Ophionereis porrecta* Lyman | + | + | + | | + | | + | + | + | + | + | + | + | | |
| *Ophionereis thryptica* (Murakami) | + | | | | | | | | | | | + | | | |
| *Ophionereis vivipara* Mortensen | + | + | | | | | | | | | | | | | |
| *Ophioneroides granum* Cherb. & Glle. | + | | | | | | | | | | | | | | |
| **OPHIODERMATIDAE** | | | | | | | | | | | | | | | |
| *Cryptopelta granulifera* H.L. Clark | | + | | | | | + | | + | + | | | | | |
| *Ophiarachna affinis* Lutken | + | + | | | | | | | + | + | | + | | | |
| *Ophiarachna incrassata* (Lamarck) | + | + | | | + | | | + | + | + | + | + | + | | |
| *Ophiarachna robillardi* de Loriol | | + | | | | | | + | | | | | | | |
| *Ophiarachnella gorgonia* (M. & T.) | + | + | | + | | | | + | + | + | + | + | | | |
| *Ophiarachnella macracantha* H.L. Clark | | + | | | | | | | | + | | + | | | |
| *Ophiarachnella septemspinosa* (M. & T.) | + | + | | | | | + | + | + | + | + | + | | | |
| *Ophiochaeta hirsuta* Lutken | + | + | | | | | + | | + | | | + | | | |
| *Ophioconis cincta* Brock | + | + | | + | + | | | | + | + | + | + | | | |
| *Ophiopeza fallax* Peters | + | + | | + | + | + | | | + | | | | | | |
| *Ophiopeza spinosa* (Ljungman) | + | + | | + | + | | + | | + | + | + | + | + | | |
| **OPHIURIDAE** | | | | | | | | | | | | | | | |
| *Ophiolepis cincta* M. & T. | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Ophiolepis irregularis* Brock | + | | | | | | | | + | | + | + | | | |
| *Ophiolepis superba* H.L. Clark | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Ophioplocus imbricatus* M. & T. | + | + | | + | | + | | + | + | + | + | + | + | | |
| *Ophiura kinbergi* (Ljungman) | + | + | | + | + | + | | + | + | + | + | + | + | | |
| **ECHINOIDEA** | | | | | | | | | | | | | | | |
| **CIDARIDAE** | | | | | | | | | | | | | | | |
| *Eucidaris metularia* (Lamarck) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Phyllacanthus imperialis* (Lamarck) | + | + | | | + | | | + | + | + | + | + | | | |
| *Prionocidaris baculosa* (Lamarck) | + | + | | + | + | + | + | + | + | + | + | + | | | |
| *Prionocidaris pistillaris* (Lamarck) | + | + | + | + | | | | | | | | | | | |
| *Prionocidaris verticillata* (Lamarck) | + | + | | + | | | + | + | + | + | + | + | + | | |
| **ECHINOTHURIDAE** | | | | | | | | | | | | | | | |
| *Asthenosoma varium* Grube | + | | | + | + | | + | + | + | + | + | + | | | |
| **DIADEMATIDAE** | | | | | | | | | | | | | | | |
| *Astropyga radiata* (Leske) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Diadema savignyi* Michelin | + | + | | + | | | + | + | + | + | + | + | | | |
| *Diadema setosum* (Leske) | + | + | | + | + | | | + | + | + | + | + | | | |
| *Echinothrix calamaris* (Pallas) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Echinothrix diadema* (L.) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| **STOMOPNEUSTIDAE** | | | | | | | | | | | | | | | |
| *Stomopneustes variolaris* (Lamarck) | + | + | | + | | + | + | + | + | + | + | + | | | |
| **TEMNOPLEURIDAE** | | | | | | | | | | | | | | | |
| *Microcyphus maculatus* L. Agassiz | | + | | | | | | | | | | | | | |
| *Microcyphus rousseaui* L. Agassiz | + | | | + | + | | | | | + | | | | | |
| *Salmaciella dussumieri* L. Agassiz | + | + | | + | + | | | + | + | + | + | + | | | |
| *Salmacis bicolor* L. | + | + | | + | + | + | + | + | + | | + | | | | |
| *Temnopleurus reevesi* (Gray) | + | | | | | | | | + | | + | | | | |
| *Temnopleurus toreumaticus* (Leske) | + | | | + | + | + | + | + | + | + | + | + | | | |
| *Temnotrema siamense* (Mortensen) | + | + | | + | | | + | + | + | + | + | | | | |

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| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOXOPNEUSTIDAE** | | | | | | | | | | | | | | | |
| *Cyrtechinus verruculatus* (Lütken) | | + | | | | | | | + | + | + | + | + | | |
| *Gymnechinus robillardi* (de Loriol) | + | + | | + | | | | + | | | | | | | |
| *Pseudoboletia indiana* (Michelin) | + | + | | | | | | + | + | + | + | + | + | | |
| *Toxopneustes pileolus* (Lamarck) | + | + | | + | + | | | + | + | + | + | + | | | |
| *Tripneustes gratilla* (L.) | + | + | + | + | + | | + | + | + | + | + | + | + | | |
| **PARASALENIIDAE** | | | | | | | | | | | | | | | |
| *Parasalenia gratiosa* A. Agassiz | + | + | | | | | + | | + | + | + | + | | | |
| **ECHINOMETRIDAE** | | | | | | | | | | | | | | | |
| *Colobocentrotus atratus* (L.) | + | + | | + | | | | + | + | | | | + | | |
| *Echinometra mathaei* (de Blainville) | + | + | | + | + | + | + | + | + | + | + | + | + | | |
| *Echinostrephus molaris* (de Blainville) | + | + | | + | + | + | + | + | + | + | + | + | | | |
| *Heterocentrotus mammillatus* (L.) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Heterocentrotus trigonarius* (Lamarck) | + | + | | + | + | | | | + | | + | + | | | |
| **ECHINONEIDAE** | | | | | | | | | | | | | | | |
| *Echinoneus abnormalis* de Loriol | | + | | | | | | | + | | + | + | + | | |
| *Echinoneus cyclostomus* Leske | + | + | | + | | | + | + | + | + | + | + | + | | + |
| **CLYPEASTERIDAE** | | | | | | | | | | | | | | | |
| *Clypeaster fervens* Koehler | + | + | | + | + | | | + | + | | + | | | | |
| *Clypeaster humilis* (Leske) | + | | | + | + | + | | + | + | + | | + | | | |
| *Clypeaster rarispinus* de Meijere | + | | | + | + | + | + | + | + | | | | | | |
| *Clypeaster reticulatus* (L.) | + | + | | + | + | + | + | + | + | + | + | + | + | | |
| **FIBULARIIDAE** | | | | | | | | | | | | | | | |
| *Echinocyamus crispus* Mazetti | + | + | | + | + | | + | + | + | + | + | | + | | |
| *Echinocyamus grandis* H.L. Clark | | + | | | | | | | | | | | | | |
| *Fibularia ovulum* Lamarck | + | + | | | + | | + | + | + | + | + | + | | | |
| *Fibularia volva* A. Agassiz | | + | | + | + | + | | | + | + | + | + | | | |
| **LAGANIDAE** | | | | | | | | | | | | | | | |
| *Laganum depressum* Lesson | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Laganum joubini* (Koehler) | + | + | | | + | | | | | | | | | | |
| **ASTRICLYPEIDAE** | | | | | | | | | | | | | | | |
| *Echinodiscus auritus* Leske | + | + | | + | + | + | | + | + | + | + | | | | |
| *Echinodiscus bisperforatus* Leske | + | | | + | + | | | + | + | | | + | | | |
| **ECHINOLAMPADIDAE** | | | | | | | | | | | | | | | |
| *Echinolampas alexandri* de Loriol | | + | | + | + | | | + | + | | | + | | | |
| *Echinolampas ovata* (Leske) | | + | | | + | | | + | + | + | | | | | |
| **SPATANGIDAE** | | | | | | | | | | | | | | | |
| *Maretia planulata* (Lamarck) | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Pseudomaretia alta* (A. Agassiz) | | + | | | | | + | + | + | | + | | | | |
| **LOVENIIDAE** | | | | | | | | | | | | | | | |
| *Lovenia elongata* (Gray) | + | | | + | + | | + | + | + | + | + | + | | | |
| *Lovenia subcarinata* (Gray) | + | | | | | | | + | + | | + | | | | |
| **SCHIZASTERIDAE** | | | | | | | | | | | | | | | |
| *Diploporaster barbatus* Mort. | + | | | | | | | | | | | | | | |
| *Diploporaster savignyi* (Fourtau) | + | | | | + | | | | | | | | | | |
| *Moira stygia* Lutken | + | | | | + | | | + | + | | | | | | |
| *Paraster gibberulus* (L. Agassiz) | + | | | | + | | | + | | | | | | | |
| *Prymnaster investigatoris* Koehler | | + | | | | | | + | | | | | | | |
| *Schizaster lacunosus* (L.) | + | + | | | + | | + | | + | + | + | + | | | |
| **BRISSIDAE** | | | | | | | | | | | | | | | |
| *Brissopsis luzonicus* (Gray) | + | | | | + | + | + | + | + | + | + | + | + | | |
| *Brissus latecarinatus* (Leske) | + | + | | | + | | + | + | + | + | + | + | + | | |
| *Metalia dicrana* H.L. Clark | | + | | | | | | | + | + | + | + | | | |
| *Metalia robillardi* (de Loriol) | + | + | | | | | | | | | + | | | | |

Table 1 (continued)

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Metalia spatagus* (L.) | + | + | | + | + | | | + | + | + | + | + | + | | |
| *Metalia sternalis* (Lamarck) | + | + | | + | + | | | + | + | + | + | + | + | | |
| **HOLOTHURIOIDEA** | | | | | | | | | | | | | | | |
| **HOLOTHURIIDAE** | | | | | | | | | | | | | | | |
| *Actinopyga bacilla* Cherb. | + | | | | | | | | | | | | | | |
| *Actinopyga bannwarthi* Panning | + | | | + | + | | | | | + | | | | | |
| *Actinopyga echinites* (Jaeger) | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Actinopyga lecanora* (Jaeger) | + | + | | + | | | | + | + | + | + | + | | | |
| *Actinopyga mauritiana* (Q. & G.) | + | + | | + | + | + | + | + | + | + | + | + | + | | |
| *Actinopyga miliaris* (Q. & G.) | + | + | | | + | | | + | + | + | + | + | | | |
| *Actinopyga obesa* (Selenka) | + | | | | | | | | + | + | + | + | + | | |
| *Actinopyga serratidens* Pearson | + | + | | | + | | | + | + | + | | | | | |
| *Bohadschia argus* Jaeger | + | + | | | | | + | + | + | + | + | + | | | |
| *Bohadschia cousteaui* Cherb. | + | | | | + | | | | | | | | | | |
| *Bohadschia koellikeri* (Semper) | + | + | | | | | | | | | | + | | | |
| *Bohadschia marmorata* Jaeger | + | + | | | + | | | + | + | + | + | + | | | |
| *Bohadschia mitsionensis* Cherb. | + | | | | | | | | | | | | | | |
| *Bohadschia similis* (Semper) | | + | | | | | | | + | | | + | | | |
| *Bohadschia subrubra* (Q. & G.) | + | + | | | | | | | | | | | | | |
| *Bohadschia temissima* (Semper) | + | | | | + | | + | + | + | | + | + | | | |
| *Bohadschia vitiensis* (Semper) | + | | | | | | | + | + | + | + | + | + | | |
| *Holothuria mammosa* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria rigida* (Selenka) | + | + | | + | + | | + | | + | + | + | + | | + | |
| *Holothuria atra* (Jaeger) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Holothuria edulis* Lesson | + | | | + | + | | + | + | + | + | + | + | + | | |
| *Holothuria pulla* Selenka | + | | | | | | | | + | | | + | | | |
| *Holothuria duoturricula* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria hawaiiensis* Fisher | + | | | | | | | | | + | | + | + | | |
| *Holothuria pardalis* Selenka | + | + | | + | + | + | + | + | + | + | + | + | + | + | |
| *Holothuria verrucosa* Selenka | + | + | | | | | | | + | + | + | + | + | | |
| *Holothuria albofusca* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria fuscorubra* Théel | | + | | + | | | | | | + | + | | + | | |
| *Holothuria leucospilota* (Brandt) | + | + | | + | + | + | + | + | + | + | + | + | + | + | |
| *Holothuria albiventer* Semper | + | | | | + | | + | | + | + | + | + | | | |
| *Holothuria fuligina* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria martensi* Semper | + | | | + | + | | + | + | + | + | + | | | | |
| *Holothuria scabra* Jaeger | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Holothuria fuscopunctata* Jaeger | + | | | | | | | | + | + | + | + | | | |
| *Holothuria nobilis* (Selenka) | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Holothuria whitmaei* Bell | + | | | | | | | | | + | + | + | + | | |
| *Holothuria crosnieri* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria difficilis* Semper | + | + | | | + | | + | + | + | + | + | + | + | + | |
| *Holothuria excellens* (Ludwig) | + | | | | | | | | | | | + | | | |
| *Holothuria insolita* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria samoana* Ludwig | + | | | | | | | | | + | | + | | | |
| *Holothuria bacilla* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria erinaceus* (Brandt) | + | | | + | | | | + | + | + | | + | | | |
| *Holothuria moebii* Ludwig | | + | | | | | | + | + | + | + | + | | | |
| *Holothuria parva* Krauss in Lampert | + | + | | + | + | | | + | | | | | | | |
| *Holothuria spinea* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria vittalonga* Cherb. | + | | | | | | | | | | | | | | |
| *Holothuria cinerascens* (Brandt) | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Holothuria flavomaculata* Semper | + | | | | + | | | + | + | + | + | + | | | |
| *Holothuria granosa* Cherb. | + | | | | | | | | | | | | | | |

Table 1 (continued)

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Holothuria dofleini* Augustin | + | | | | | | | | + | + | + | + | + | | |
| *Holothuria fuscocinerea* Jaeger | + | + | | | + | | | + | + | + | + | + | | + | |
| *Holothuria pervicax* Selenka | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Holothuria olivaceus* Ludwig | + | | | | + | | | | + | + | + | + | + | | |
| *Holothuria maculosa* Pearson | + | + | | | | | | | | | | + | | | |
| *Holothuria arenicola* Semper | + | + | | + | + | + | + | + | + | + | + | + | + | + | + |
| *Holothuria comusalba* Cherb. & Féral | + | | | | | | | | + | + | | + | | | |
| *Holothuria gracilis* Semper | + | | | | | | | | + | + | + | + | | | |
| *Holothuria hilla* Lesson | + | + | | + | + | | + | + | + | + | + | + | + | + | |
| *Holothuria impatiens* (Forskål) | + | + | | + | + | | + | + | + | + | + | + | + | + | + |
| *Holothuria remollescens* Lampert | | + | | | + | | | + | | + | | | | | |
| *Holothuria strigosa* Selenka | + | | | + | + | | | | | | | | | | |
| *Labidodemas pertinax* (Ludwig) | + | | | | | | + | | + | + | + | + | | | |
| *Labidodemas rugosum* (Ludwig) | + | + | | + | | | + | + | + | + | | + | | | |
| *Labidodemas semperianum* (Selenka) | + | | | + | + | | | + | + | + | + | + | + | | |
| *Pearsonothuria graeffei* (Semper) | + | | | | + | | + | | + | + | + | + | | | |
| **STICHOPODIDAE** | | | | | | | | | | | | | | | |
| *Neostichopus grammatus* (H.L. Clark) | + | | + | | | | | | | | | | | | |
| *Stichopus chloronotus* Brandt | + | + | | + | + | | + | + | + | + | + | + | + | | |
| *Stichopus hermanni* Semper | + | | | | | | | | + | + | | + | | | |
| *Stichopus horrens* Selenka | + | + | | | | | + | + | + | + | + | + | + | | |
| *Stichopus monotuberculatus* (Q. & G.) | + | + | | + | + | | | | + | + | + | + | | | |
| *Thelenota ananas* (Jaeger) | + | + | | | | | + | | + | + | + | + | | | |
| *Thelenota anax* H.L. Clark | + | | | | | | | | + | + | + | + | | | |
| **PSOLIDAE** | | | | | | | | | | | | | | | |
| *Psolus appendiculatus* de Blainville | | + | | | | | | | | | | | | | |
| **CUCUMARIIDAE** | | | | | | | | | | | | | | | |
| *Colochirus quadrangularis* (Lesson) | + | | | | | | | + | + | + | + | | | | |
| *Cucumella decaryi* Cherb. | + | | | | | | | | | | | | | | |
| *Koehleria unica* Cherb. | + | | | | | | | | | | | | | | |
| *Plesiocolochirus cylindricus* (Semper) | | + | | | | | | | | | | | | | |
| *Plesiocolochirus dispar* (Lampert) | + | | | + | + | | | | | + | | | | | |
| *Plesiocolochirus tantulus* (Cherb.) | + | | | | | | | | | | | | | | |
| *Plesiocolochirus tesselera* (Cherb.) | + | | | | | | | | | | | | | | |
| *Plesiocolochirus verrucula* (Cherb.) | + | | | | | | | | | | | | | | |
| *Pseudocnella sinorbis* (Cherb.) | + | | + | | | | | | | | | | | | |
| *Pseudocnella sykion* (Lampert) | + | | + | | | | | | | | | | | | |
| *Pseudocolochirus violaceus* (Theel) | + | | | | + | | | + | + | + | + | | | | |
| *Psolidium ornatum* (Ed. Perrier) | + | | | | | | | | | | | | | | |
| *Roweia frauenfeldi* (Ludwig) | + | | + | | | | | | | | | | | | |
| *Trachythyone crucifera* (Semper) | + | + | + | + | + | | | + | | | | | | | |
| **SCLERODACTYLIDAE** | | | | | | | | | | | | | | | |
| *Afrococumis africana* (Semper) | + | + | | + | | | + | + | + | + | + | + | | | |
| *Cladolabes acicula* (Semper) | | + | | | | + | | + | + | + | + | + | + | | |
| *Cladolabes bifurcatus* (Deichmann) | + | | + | | | | | | | | | | | | |
| *Cladolabes pichoni* Cherb. | + | | | | | | | | | | | | | | |
| *Globosita murrea* Cherb. | + | | | | | | | | | | | | | | |
| *Ohshimella ehrenbergi* (Selenka) | + | | | + | + | + | + | + | | | + | | | | |
| *Ohshimella mauritiensis* Heding & Panning | | + | | | | | | | | | | | | | |
| **PHYLLOPHORIDAE** | | | | | | | | | | | | | | | |
| *Athyone exila* Cherb. | + | | | | | | | | | | | | | | |
| *Athyone maculispara* Cherb. | + | | | | | | | | | | | | | | |
| *Parathyone incurva* Cherb. | + | | | | | | | | | | | | | | |
| *Havelockia ferali* Cherb. | + | | | | | | | | | | | | | | |

Table 1 (continued)

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay.-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | tropic. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Havelockia turripinea* Cherb. | + | | | | | | | | | | | | | | |
| *Havelockia versicolor* (Semper) | + | | | | | | | + | + | + | + | | | | |
| *Hemithyone semperi* (Bell) | + | | | | | + | | + | + | + | | | | | |
| *Lipotrapeza ambigua* Cherb. | + | | | | | | | | | | | | | | |
| *Lipotrapeza incurva* Cherb. | + | | | | | | | | | | | | | | |
| *Lipotrapeza ventripes* (Joshua & Creed) | + | | | | | | | | | | | | | | |
| *Neothyonidium dissimilis* Cherb. | + | | | | | | | | | | | | | | |
| *Phyllophorus anomalia* Cherb. | + | | | | | | | | | | | | | | |
| *Phyllophorus contractura* Cherb. | + | | | | | | | | | | | | | | |
| *Phyllophorus brocki* Ludwig | + | | | | | | | + | + | + | | | | | |
| *Phyllophorus oculus* Cherb. | + | | | | | | | | | | | | | | |
| *Phyllophorus tenuis* Haacke | | + | | | | | | | | | | | | | |
| *Selenkiella paradoxa* Cherb. | + | | | | | | | | | | | | | | |
| *Stolus buccalis* (Stimpson) | + | | | + | + | + | | + | + | + | + | | | | |
| *Thyone avenusta* Cherb. | + | | | | | | | | | | | | | | |
| *Thyone carens* Cherb. | + | | | | | | | | | | | | | | |
| *Thyone comata* Cherb. | + | | | | | | | | | | | | | | |
| *Thyone crebrapodia* Cherb. | + | | | | | | | | | | | | | | |
| *Thyone curvata* Lampert | + | | | | + | | | | | | | | | | |
| *Thyone guillei* Cherb. | + | | | | | | | | | | | | | | |
| *Thyone longicornis* Cherb. | + | | | | | | | | | | | | | | |
| *Thyone sineturra* Cherb. | + | | | | | | | | | | | | | | |
| *Thyone vadosa* Cherb. | + | | | | | | | | | | | | | | |
| *Thyone venusta* Selenka | + | | | | + | | | | | + | | + | | | |
| *Thyonidiella exigua* Cherb. | + | | | | | | | | | | | | | | |
| *Thyonidiella oceana* Heding & Panning | + | + | | | | | | | + | | | + | | | |
| **SYNAPTIDAE** | | | | | | | | | | | | | | | |
| *Anapta gracilis* Semper | + | | | | | | | + | + | | + | + | | | |
| *Euapta godeffroyi* (Semper) | + | + | | | + | | + | | + | + | + | + | + | | |
| *Leptosynapta geyserensis* Cherb. | + | | | | | | | | | | | | | | |
| *Leptosynapta oblonga* Cherb. | + | | | | | | | | | | | | | | |
| *Leptosynapta tantula* Cherb. | + | | | | | | | | | | | | | | |
| *Opheodesoma grisea* (Semper) | + | + | | + | + | | | + | + | + | + | + | + | | |
| *Opheodesoma serpentina* (J. Müller) | + | | | | | | | | + | | | | | | |
| *Opheodesoma sinevirga* Cherb. | + | | | | | | | | | | | | | | |
| *Patinapta crosslandi* Heding | + | | + | | + | | | | | | | | | | |
| *Patinapta ooplax* von Marenzeller | + | | | | | | + | | + | | + | + | | | |
| *Patinapta vaughani* Cherb. | | + | | | | | | | | | | | | | |
| *Polyplectona kefersteini* (Selenka) | | + | | | + | | | | + | + | + | + | + | + | |
| *Protankyra picardi* Cherb. | + | | | | | | | | | | | | | | |
| *Synapta maculata* (Chamisso & Eysenhardt) | + | + | | + | + | | + | + | + | + | + | + | | | |
| *Synaptula mortenseni* Heding | + | | | | | | | | | | | | | | |
| *Synaptula reciprocans* (Forskal) | + | | | + | + | | | | | | | | | | |
| **CHIRODOTIDAE** | | | | | | | | | | | | | | | |
| *Chiridota eximia* Haacke | | + | | | | | | | | | | | | | |
| *Chiridota rigida* Semper | + | | | | | | | | + | + | + | + | | | |
| *Chiridota stuhlmanni* Lampert | + | + | | | + | | + | | + | | + | + | | | |
| *Chiridota violacea* J. Müller | + | + | | | | | + | | + | | | | | | |
| *Polycheira rufescens* (Brandt) | + | + | + | | | | | + | + | + | + | + | | | |
| *Trochodota mira* Cherb. | + | | | | | | | | | | | | | | |
| *Trochodota vivipara* Cherb. | + | | | | | | | | | | | | | | |

# DISCUSSION

In a study of the fauna of the Seychelles, Clark (1984) concluded by stating that 'it is clear that the echinoderm fauna of the western Indian Ocean is relatively limited in comparison to the rich fauna of the Malaysian/Indonesian area, having few characteristic species and only a small proportion of the widespread ones.' The findings of this study demonstrate that this is in fact no longer the case. Of the total of 419 echinoderm species reported in this study (compared to 151 in the above study by Clark), over 100 are considered to be endemic to the region and a large proportion of the fauna is comprised of widespread Indo-Pacific species.

The measure of the progress of research and knowledge of the echinoderm fauna of the western Indian Ocean is best initially gauged by comparing the findings of the present study with those in the monograph of Clark & Rowe (1971). A cautionary note which is appropriate at this point is that, as with all taxonomic studies, continuous progress is underway to elucidate confusing species, synonyms and describe new species, thus the science is automatically outdated the moment it is put to paper. Though no major restructuring of the systematics of the Indo-Pacific echinoderm fauna has been undertaken in the last 30 years, a few changes have been made to the status of some of the taxa. All these cannot be detailed here but it is sufficient that it be understood that analyses of the echinoderm fauna from any part of the Indo-Pacifc over the last few decades will be slightly out of date with respect to the identity of a few species.

The comprehensive and invaluable work of Clark & Rowe (1971) is restricted to include species which occurred at depths shallower than 20 m. Nevertheless, despite the present study including a few records (less than 2 %) from depths to 100 m, the comparison is still a valid one.

Table 2 shows an increase over 29 years of 156 new species records for the region, equivalent to an increase of 59 %. This is in part attributed to the many new species and records by Cherbonnier & Guille (1978) for ophiuroids (50 species, including 22 new species) and Cherbonnier (1988) for holothurians (74 records, of which 47 were considered new species). Even if all the new species described by these authors are omitted (and there

are no valid reasons for doing so) the increase in the number of species known from the western Indian Ocean is 328 – an increase of 25 % on the Clark & Rowe (1971) findings.

Table 2. Comparison of the number of echinoderm species for each class from Clark & Rowe (1971) with that of the present study.
* indicates overall percentage increase.

| | W Indian Ocean Clark & Rowe (1971) | W Indian Ocean present study | % increase |
|---|---|---|---|
| Crinoidea | 15 | 19 | 28.2 |
| Asteroidea | 52 | 58 | 12.0 |
| Ophiuroidea | 70 | 132 | 89.0 |
| Echinoidea | 58 | 62 | 7.0 |
| Holothuroidea | 68 | 148 | 120 |
| Totals | 263 | 419 | 59* |

The increase in species richness shown in Table 2 is not wholly surprising. A single study of Aldabra echinoderms (Sloan *et al.*, 1979), only 10 years after the monograph data ceased to be collected, added 30 species to the records of the Seychelles based on the published data in Clark & Rowe (1971). The increase of the known species over this period is not exceptional to the western Indian Ocean. Pawson (1995) in a recent update of the echinoderm fauna of the Pacific islands found that the records of species diversity of that province had increased by 38 %, largely attributed to the detailed work around the New Caledonia reefs by Guille *et al.* (1986). An increase in the known total number of species from southern China waters from 298 in Clark & Rowe (1971) to 457 is shown by Liao & Clark (1995), resulting in an increase of 53 %, and Price (1982) demonstrated an increased species diversity for the Red Sea from the figure of 183 in Clark & Rowe (1971) to 231, an increased of 26 %.

While the present study did not undertake to establish which species are most widely distributed within the western Indian Ocean, and thus characteristic to this province, the number of species found in the two sub-provinces and the number of endemic species are worthy of further comment (see Table 3). The islands clearly support fewer species than the mainland and, of the total of 107 endemic species reported for the western Indian Ocean (approximately 25 % of the total), only 11 of these (3 %) are common to both the mainland (including Madagascar) and the western Indian Ocean islands. Reasons for these differences may be related to the massive differences in the sizes of the two sub-provinces and thus attributable to an 'area-effect', as well as to the unequal sampling efforts between

these two sub-provinces. The relatively high level of endemism supports the findings of Kay (1984) who, based on studies of molluscs, echinoderms and fish, recognises the Indian Ocean as a major area of endemism. Possible reasons for this endemism among the echinoderm fauna of the western portion of this Ocean will be considered below. In contrast, the recent update of the echinoderm fauna in the Pacific demonstrated that endemics comprise a virtually non-existent component of the fauna (Pawson, 1995), contradicting Kay's (1984) suggestion that the Pacific basin should also be a major area of endemism. Thandar (1989b) found that for southern Africa (south of the Tropic of Capricorn) the level of endemism accounts for 47 % of the echinoderm fauna (including deep water species). This is not surprising given the unique geographical position of southern Africa, benefitting as it does from temperate and tropical elements. Indeed, Thandar notes that 37 % of the southern African fauna is comprised of western Indian Ocean species. The recent study of the echinoderm fauna of the southern China and Japanese waters by Liao & Clark (1995) found that of the 457 species present in that province, 20 % were endemic.

Table 3. Summary of species richness and endemicity in the western Indian Ocean.
Abbreviations are EA: East Africa-Madagascar; WIO Is.: western Indian Ocean islands .

| Taxa | EA totals | WIO Is. Totals | EA endemics | WIO Is. endemics | Endemics in common | Endemic totals |
|---|---|---|---|---|---|---|
| Crinoidea | 18 | 10 | 5 | 0 | 2 | 7 |
| Asteroidea | 44 | 46 | 0 | 4 | 3 | 7 |
| Ophiuroidea | 123 | 60 | 25 | 3 | 5 | 33 |
| Echinoidea | 52 | 48 | 1 | 2 | 0 | 3 |
| Holothuroidea | 136 | 51 | 50 | 6 | 1 | 57 |
| Totals | 373 | 215 | 81 | 15 | 11 | 107 |

Differences among the classes and their broader presence within the western Indian Ocean were identified by examining the data in Table 1 and by the cluster anlaysis subsequently performed. The crinoid fauna, though sparse, was common to both sub-provinces, with about 50 % of the species shared between the islands and the mainland. Among the asteroids and the echinoids close association between the islands and mainland also exist. The two classes for which there has been extensive work, on Madagascar (the ophiuroids and holothurians), again show the greatest differences between the two sub-provinces, which cannot be commented on more at this stage without examination of the species and

the precise habitats from which they were recorded. Notwithstanding, of the 45 species found on the islands but not on the mainland (nor on Madagascar), 15 are endemic as shown in Table 3. An additional 5 species, the starfish *Archaster lorioli*, *Cistina columbiae*, *Fromia nodosa* and *Ophiaster cribrarius* together with the brittlestar *Ophiarachnella macracantha* were recorded only from the Lakshwadeep-Chagos groups, northern Australia and the Pacific islands. If the sites in northern Australia from which these are found are off-shore, oceanic reefs, then all these species may be considered to be truly 'island species'.

In examining the overall diversity, direct comparisons of the western Indian Ocean fauna can be made with that of other provinces within or adjacent to the Indo-Pacific from where recent studies have been conducted. Table 4 shows that, as stated by Clark (1984) and many others, the Malay-Indonesia province is the richest as regards echinoderm diversity, though the western Indian Ocean fauna is by no means poor by comparison.

Table 4. Echinoderm diversity for provinces within and adjacent to the Indo-Pacific.
Sources: 1. Thandar (1989b); 2. Price (1982); 3. Clark & Rowe (1971); 4. Liao & Clark (1995); 5. Pawson (1995).

| | WIO present study | Southern Africa[1] | Arabian Sea[2] | Red Sea[2] | Malay-Indonesia[3] | Northern Australia[3] | China Japan[4] | Pacific islands[5] |
|---|---|---|---|---|---|---|---|---|
| Crinoidea | 19 | 17 | 15 | 18 | 91 | 46 | 62 | 40 |
| Asteroidea | 58 | 99 | 51 | 29 | 108 | 102 | 78 | 105 |
| Ophiuroidea | 132 | 124 | 77 | 49 | 157 | 128 | 131 | 103 |
| Echinoidea | 62 | 59 | 45 | 48 | 89 | 70 | 85 | 90 |
| Holothuroidea | 148 | 108 | 45 | 80 | 161 | 114 | 101 | 114 |
| Total | 419 | 407 | 233 | 224 | 606 | 460 | 457 | 452 |

A summary of the general distribution of the non-endemic species and their occurence within broad geographical areas, based on distribution data presented in Table 1, is shown in Tabe 5. It can clearly be seen that the western Indian Ocean shares a greater proportion of its echinoderm fauna with the central Indo-Pacific than any other area, perhaps surprisingly more so than with the adjacent northern Indian Ocean where the similarity, though high (71 %) is lower than that for the central Indo-Pacific (84 %). Rowe (1985a), studying Australia's non-endemic echinoderm fauna found that 73 % (116 species) was shared with East Africa (including Madagascar), 55 % with the Mascarene islands (88 species) and 59 % (94 species) with the Seychelles. The present study, despite the increase in 49 non-endemic species, continues to support those findings. The questions which immediately arise are firstly, why is the non-endemic component of the western Indian Ocena fauna so closely related to the central Indo-Pacific, and secondly, how has that come about ? The answers may include aspects related to the origin of the fauna (and its

distribution within the Tethyan Sea), the reproductive and larval dispersion strategy of each species in question, and the ocean currents present within the Indian Ocean. Equally possible is the alternative that the fauna of the northern Indian Ocean was at one time more diverse than present, and that the 41 non-endemic species which occur in the western Indian Ocean and in the cental Indo-Pacific have subsequently become extinct from the northern borders of the Indian Ocean. Finally, anthropogenic factors (notably shipping) may contribute to aiding dispersal or extinction.

Table 5. Summary of the distribution of W Indian Ocean non-endemic echinoderm species. Percentage figures in parenthesis. Northern Indian Ocean includes the Arabian Sea, Lakshwadeep Is, Maldives and Chagos to Bay of Bengal; Central Indo-Pacific comprises Malay-Indonesia, northern Australia and the W Pacific Islands, excluding Hawaii.

| Taxa | W Indian Ocean non-endemic fauna | Red Sea | Northern Indian Ocean | Central Indo-Pacific |
|---|---|---|---|---|
| Crinoidea | 12 | 6 (50) | 10 (83) | 8 (67) |
| Asteroidea | 51 | 23 (45) | 43 (84) | 35 (69) |
| Ophiuroidea | 99 | 42 (42) | 60 (61) | 87 (88) |
| Echinoidea | 59 | 41 (69) | 49 (83) | 53 (90) |
| Holothuroidea | 91 | 47 (52) | 61 (67) | 79 (87) |
| Totals | 312 | 159 (51) | 223 (71) | 262 (84) |

Initially it is worth considering the reproductive strategies of the echinoderm fauna. Rowe (1985a) found surprisingly little to be known of the pre-metamorphic life spans of echinoderms and states that according to Thorson (1961) most have relatively short (4-6 weeks) pre-metamorphic lives. A little more has become known since then, and is mostly summarised in the volume on echinoderm reproduction edited by Giese *et al.* (1991) from which most of the findings below are derived.

Among a few species of Crinoidea free-swimming larvae last for a few days (Holland, 1991), yet these larvae are exclusively non-planktotrophic (i.e. are not capabale of obtaining food from their environment) (Strathman, 1978; Breimer, 1978; Jablonski & Lutz, 1983). Within the Asteroidea, brooding species exist, as well as those with pelagic lives lasting 30 days (Chia & Walker, 1991), though no measure of the proportions within the class are given. The Ophiuroidea include viviparous species and those with relatively long-lived planktotrophic larvae, as well as those which cling to neuston (e.g. Panikkar & Prashad, 1954). As a group, however, they are considered to be largely weak swimmers, with brief life spans, incapable of long-distance dispersal (Thorson, 1961; Tommasi, 1967), though

some may survive for months (see Hendler, 1991; Scheltema, 1971). Brooding is nevertheless a more common feature of tropical species than those of cold waters (Hendler, 1991). Reproduction among the Echinoidea is equally confusing and lacking in generalities. The class was reviewed by Pearse & Cameron (1991) who found that 103 of 154 species (from the literature) undergo planktotrophic larval developemnt and 51 are either lecithotrophic or brood their young. Most regular urchins have planktotrophic larvae and among the irregulars the ratio between those species with planktotrophic and lecithotrophic larva was approximately 50:50. These authors go on to conclude that "planktonic transport and survival, which are notoriously difficult to estimate, are too poorly known to advance simple generalities relating larval abundance and distributiion to recruitment, however, glimpses are beginning to emerge". Finally, among the Holothuroidea the study by Smiley *et al* (1991) records that the families Holothuridae, Stichopodidae and Synaptidae have pelagic auricularia larvae, as do the apopodids (e.g. *Polycheria rufescens*, *Synapta maculata*, *Phiodesoma grisea* and *Patinapta taiwanenseis* as found by Chao *et al.*, 1995). The pelagic period from spawning to settlement spans from two weeks to two months (McEuen, 1986). All shallow-water dendrochirotids have lecithotrophic larvae (Smiley *et al.*, 1991; Chao *et al.*, 1995).

Eastern Africa is about 5,000 nautical miles from the Malay-Indonesia area and fed by the Equatorial Current at about 12° South. All year long the current flows from east to west, and though there is no detailed information of net transport rates, the data from the Admiralty Chart 4071 (Indian Ocean northern part), Leetmaa & Truesdale (1972) and Neumann (1968) produce figures ranging from 0.5-2.5 nautical miles per hour westward. Nothing is known of the deeper water currents. Assuming an echinoderm larva happened to find itself in this surface current, travelling at the maximum velocity of 2.5 nautical miles an hour, it would have to remain afloat and survive for 83 days (2 ½ months) before reaching the coastal waters of eastern Africa or Madagascar. With respect to what is known of the larval longevity described above, this means of arrival in eastern Africa can only be considered as a viable possibility for a few species of brittlestars, sea urchins and sea cucumbers, and then only if they are capable of feeding in the generally poorly productive mid-ocean waters. Starfish and crinoids would appear to rely on other factors. The non-endemic members of these two groups do commonly occur in the northern Indian Ocean (Table 4) and their

presence in the western Indian Ocean may be due to a stepping-stone dispersal across the northern Indian Ocean.

Anomalies associated with the distribution and larval behaviour of echinoderms do, however, exist. Yamaguchi (1977) invokes differences in behaviour patterns of planktonic larvae to account for differences in present-day distribution patterns of adult seastars. Larvae that display negative geotaxis represent widely distributed species e.g. *Acanthaster planci* while positively geotactic larvae represent species that are less widely distributed e.g. *Protoreaster nodosus*. The latter is, however, present in the western indian Ocean and common across the Indo-Pacifc. Pawson (1995) suggests that this may be worthy of further research, but points out that the viviparous brittlestar, *Amphiopholis squamata*, with no apparent means of dispersal, inexplicably has a cosmopolitan distribution pattern. This species is known to bear live young and may be one that relies wholly on drifting material. The brown alga *Sargassum* spp. is common throughout the Indo-Pacific and is often seen floating in large masses sometimes with several species of invertebrates and fish associated with it.

The possibility that a large proportion of the western Indian Ocean echinoderm fauna was present during the Tethyan period, as part of a widespread fauna, should not be considered lightly, even though it partly contradicts the conclusion by Ekman (1953) and Ladd (1960) who suggested that the Malay-Indonesia area was a centre of origin. Recent advances in biogeography, some from the fossil record, lend support to an ancient, wider echinoderm fauna. Rose & Olver (1979) describe a fossil echinoid (from a spine) in Australia dating from the Jurassic, which significantly extends the geographical range of early echinoids which were known from fossils elsewhere. Durkin (1979) describes how the Saleniinae (Echinoidea) rose from a Jurassic Tethyan stock which then diversified and became widely distributed at all depths during the Cretaceous. Following the Cretaceous-Tertiary boundary event, the sublittoral dwellers suffered near extinction, while species adapted to the warm mid-Atlantic ridge flanks survived. He suggests that it is likely that survival was limited to two main regions, namely the Caribbean and Indonesia, and that the populations in these regions today are relicts of the more widespread late Cretaceous communities. Similarly, Ghiold & Hoffman (1986), studying clypeasteroid echinoids of the Indo-Pacific, found that this region includes mostly local endemics and broadly distributed species that gradually

drop out across the longitudinal gradient. They found that clypeasteroid species distributions seem to represent a mosaic, with areas of endemism located not only in the Malay-Indonesia area, but also around Japan, Australia and western Indian Ocean, and with the ranges of non-endemic species overlapping to the highest degree in the centrally-located Malay-Indonesia area. Furthermore, they contend that the very high clypeasteroid species richness in the Malay-Indonesia focus may also be at least partly due to historical factors, such as the merging of SE Asia and Australian faunas, brought about by the northwards drift of the Australian plate in the Cenozoic. Finally, they suggest that the Malay-Indonesia area appears with respect to its very high diversity of clypeastroids in the historical biogeographical perspective as a museum rather than a cradle; its clypeasteroid fauna includes apparently numerous immigrant groups, but not a single indigenous genus. Rowe (1985a) agrees that the Malay-Indonesia area is not 'a centre of origin' (Ekman, 1953) for an Indo-Pacific fauna, based on the extensive distribution patterns of at least 15 echinoderm species, which would have been possible prior to the final restriction of the Tethyan seaway. In an analysis of fish, molluscs and echinoderms, Kay (1984), suggests that the central Indo-Pacific area is one of accumulation rather than export of species.

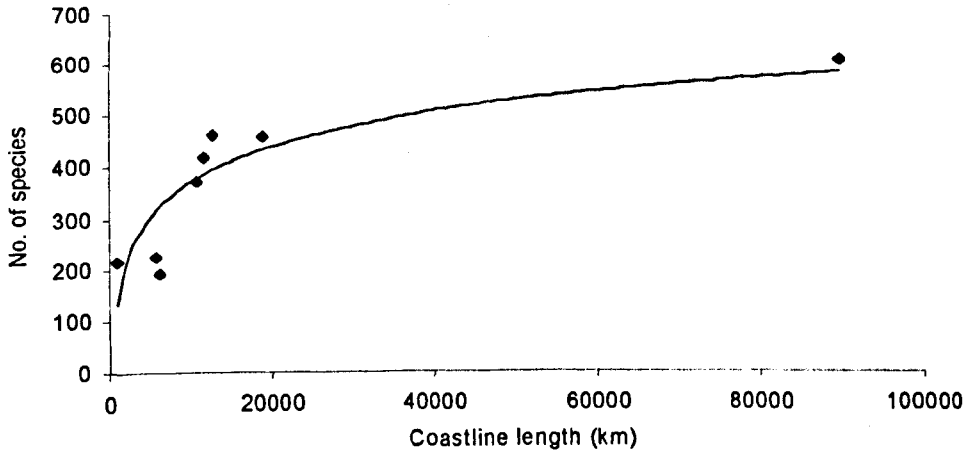
The central Indo-Pacific region is characterised by thousands of islands of varying sizes and geology, a wide continental shelf and a rich diversity of coastal habitats. It was noted earlier that the geographical areas (provinces) defined in the present study differed greatly in size and habitat diversity and extent and therefore direct comparisons of echinoderm diversity cannot easily be made. Abele (1982) demonstrated that the overall area of the four large tropical regions he examined (eastern Atlantic, western Atlantic, eastern Pacific and Indo-West Pacific) accounted for 98 % of the variation in the number of crustacean species from these regions. He also found that shrimp species number in the West Indies was strongly related to the perimeter length of the islands. While estimates of the coastal areas for the Indo-Pacific provinces considered in Table 4 may be difficult to obtain, coastline length data are given in Table 7, together with species number for each of the provinces. Coastline length measurements for whole countries were mainly taken from Couper's (1989) *Times Atlas of the Oceans*, with portions of country coastlines forming part of provinces derived from estimates. Though these coastline length measurements may include an error of unknown dimension (but likely to be small, and equal to all data sets), they provide an opportunity to examine the presence of a relationship with echinoderm species number. A

plot of these data against the number of species is shown in Figure 7. The relationship between coastline length and echinoderm species number is given by the formula $y = 97.062 \ln(x) - 523.21$, with $R^2 = 0.741$, indicating that species number is a strong function of coastline length.

Table 7. Echinoderm species richness and coastline length for provinces within the Indo-Pacific. Sources: species number. from Table 4; Arabian Sea figure omits species recorded only from the Arabian Gulf; province coastline lengths based on Couper (1989) (see text); province codes relate to Figure 7.

| | WIO | E Africa Madag. | WIO Islands | Arabian Sea | Red Sea | Northern Australia | China Japan | Malay-Indonesia |
|---|---|---|---|---|---|---|---|---|
| Province codes | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Species no. | 419 | 373 | 215 | 191 | 224 | 460 | 457 | 606 |
| Coastline length (km) | 11,612 | 10,754 | 858 | 6,058 | 5,730 | 12,800 | 18,844 | 89,654 |

Figure 7. Echinoderm species number against coastline length of Indo-Pacific provinces (see Table 7 for province codes).




Explantions for the relationship shown in Figure 7 between coastline length and species diversity are certain to include the influence that coastline length has on habitat heterogeneity which is known to have a strong affect on species diversity (Ricklefs, 1979; Williamson, 1988) and must itself be a function of coastline length. However, certain coastlines in the Indian Ocean exist which are likely to fail to conform to the above. The western shores of India for example, though lengthy, are predominantly of fine sediments and prone to high freshwater influences, not suited to echinoderms. To test the reliability of the relationship shown in Figure 7 more data are needed, especially within the coastline length ranges of 20,000-80,000 km for which species diversity must also be ascertained.

It was shown earlier that knowledge of shallow-water echinoderm diversity has increased for many parts of the Indo-Pacific since the publication by Clark & Rowe (1971). The figures used in the coastline length-species diversity analysis (Table 7 and Figure 7) include data from Clark & Rowe (1971) for northern Australia and Malay-Indonesia, which can be assumed to be outdated. When an increase of 20 % is applied to the species number for these two provinces and plotted, the value of $R^2$ is reduced only slightly, from 0.741 to 0.725, reflecting the robustness of the function. Although it cannot be concluded from the relationship derived from this brief analysis that echinoderm species diversity is simply a function of the length of coastline sampled, the findings do indicate that further examination of this coastal perimeter effect may reveal interesting results.

In the final analysis, the echinoderm fauna of the western Indian Ocean is shown to be highly diverse, though with fewer species than the central Indo-Pacific, and supporting a large proportion of endemics. Of the non-endemics, the majority are widespread species, common to the northern Indian Ocean and to the central Indo-Pacific. Taxonomic uncertainties do exist with respect to the western Indian Ocean fauna, and further research is required to establish the true identify of a small component of the fauna.

On the issue of taxonomic uncertainties, Pawson (1995) discusses the "great difficulties in studying brittlestars, with problems of variability within and between populations, and in many cases, profound growth changes contribute to confusion". Smith *et al.* (1994) found some value in a combined morphological and molecular approach to the classification of brittlestars, but there are still many difficulties to overcome. Similar difficulties were described by Clark (1907) with respect to foot-less holothurians where many genera and species are described from a single specimen or at most a few, and nothing is recorded of their life histories. He adds that "especially is this true of the various East Indies species. Furthermore, many species have been described from fragments, the anterior end of the body being missing, and consequently the species are based wholly on the calcareous particles, which is of course unfortunate; for it ought to be clearly understood that the calcareous spicules in the skin in members of the Synaptidae (and indeed all holothurians) are more or less variable, and while each species usually has its own distinct sort, yet there is a very wide range of diversity, even in one individual, and the exact conformity to a given

type must not be expected or looked for". Perhaps an additional approach which would assist in strengthening the validity of the less rigid species would be to consider tabulating the morphological features, as discussed by Mackie (1996) (see Chapter 3) for polychaetes; this technique involves tabulating measurements and descriptions of a series of morphological features for specimens of various age classes and from different areas, depths and habitats.

The biogeographical and evolutionary analysis may benefit from examining in more detail the distribution of genera and the presence of sympatric species, while field efforts should be concentrated in those areas which have not been well sampled to date. These include southern Tanzania, northern Moçambique, the Comoros islands and the Mascarene Ridge. Lastly, ecological studies are also needed in order to attempt to explain the commonly observed outbreaks of the sea urchins *Echinometra mathaei*, *Echinothrix calmaris*, *E. diadema*, *Diadema setosum* and the notorious crown-of thorns *Acanthaster planci*, and to attempt to establish the role played by human activities in affecting the observed distribution of the fauna.

# CHAPTER 6

# GENERAL DISCUSSION

## INTRODUCTION

At the turn of the century Gardiner (1907) stated that ".. of all oceanic areas none seems so little known in 1905 as that between India and Madagascar". He then went on to lead the Percy Sladen Trust Expedition with H.M.S. 'Sealark' for 6 months, visiting mainly the western Indian Ocean islands, including Madagascar, from which numerous reports were produced. Despite these reports and those of later expeditions, in his landmark treatise of zoogeography, Ekman (1953) acknowledged that the "northern and western parts of the Indian Ocean are on the whole not so systematically investigated that their zoogeographical position can be determined." For much of the marine biota this is no longer the situation. Various taxonomic groups have received attention in the last 50 years and there has been a considerable growth of information. *A Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands* (Richmond, 1997) provides a recent, brief and concise summary of the many taxa which contribute to the diversity of the flora and fauna of the shores and shallow seas of that region and Sheppard *et al.* (1992) present an overview of available information on the Arabian Seas and adjacent Arabian waters. In Richmond (1997) over 1,600 species are described and illustrated from photographs of living organisms, or recently preserved specimens. This volume also eliminates many confusing synonyms of some of the taxa (e.g. molluscs, echinoderms), highlights groups where more research is required and provides a basis for continued documentation of marine taxa for the region. Though this work is by no means complete, it provides for most taxa, for the first time, a description of the species diversity - the essential basic component for the study of biogeography of the region.

## BIODIVERSITY

A summary from the various taxonomic sections in Richmond (1997) allows an estimate of the overall diversity of the taxa in the region to be ascertained (see Table 1). These figures when represented graphically permit the contribution of each taxa to be visualised with ease (Figure 1). The marine taxa occuring in the intertidal and shallow seas of the western Indian Ocean comprise 10,094 species. The Mollusca dominate the fauna (45 %), with the Prosobranchia contributing the greatest proportion to the fauna as well as being the most speciose taxon. For many taxa the figures can be largely regarded as conservative estimates of the true diversity of species for the region. As was shown with the polychaetes (Chapter

3), the presence of 'cosmopolitan' species may result in fewer species recorded than actually exist. Conversely, the problem of synonyms, as found with the Prosobranchia and Bivalvia, may produce species diversity estimates which are exaggerated. Figures for mangroves, seagrasses, macroalgae, scleractinian corals, most of the decapod crustaceans, echinoderms and fish can be regarded with more confidence. In a study of the Hawaiian marine diversity Paulay (1997) found similar proportions among the taxa, with a total of over 7,000 species recorded from those islands. Molluscs comprised about 20 % of the total species, though Paulay's study includes such groups as Nematoda and Protista which are excluded from the present study.

| Taxa | Minimum no. species | Taxa | Minimum No. species |
|---|---|---|---|
| Mangroves | 10 | Caridea | 150 |
| Seagrasses | 12 | Palinura | 20 |
| Macroalgae[1] | 1,011 | Thalassinidea | 20 |
| Porifera | 200 | Anomura | 50 |
| Scyphozoa | 30 | Brachyura | 100 |
| Ctenophora | 20 | Scaphopoda | 10 |
| Hydrozoa | 100 | Polyplacophora[3] | 39 |
| Octocorallia | 300 | Prosobranchia[3] | 2,500 |
| Ceriantharia | 20 | Opisthobranchia[4] | 400 |
| Actiniaria | 30 | Pulmonata | 20 |
| Corallimorpharia | 10 | Bivalvia[3] | 667 |
| Zoanthidea | 5 | Cephalopoda | 20 |
| Scleractinia | 200 | Echinoidea[5] | 62 |
| Antipatharia | 10 | Holothuroidea[5] | 148 |
| Platyhelminthes | 100 | Asteriodea[5] | 58 |
| Echiura | 22 | Ophiuroidea[5] | 132 |
| Sipuncula | 50 | Crinoidea[5] | 19 |
| Polychaeta[2] | 300 | Phoronida | 5 |
| Oligochaeta | 10 | Brachiopoda | 5 |
| Cirripedia | 30 | Bryozoa | 500 |
| Nemertea | 59 | Hemichordata | 20 |
| Amphipoda | 300 | Chaetognatha | 50 |
| Isopoda | 100 | Thaliacea | 30 |
| Stomatopoda | 30 | Ascidiacea[6] | 100 |
| Dendrobranchiata | 10 | Pisces | 2,000 |

**Table 1**. Summary of the minimum estimated species number for the taxonomic groups of macroflora and macrofauna of the littoral and shallow sublittoral waters of the western Indian Ocean. Data from Richmond (1997) unless indicated. 1 - Macroalgae: total from the website database by Silva *et al.* (1996) reporting known species records from the countries of the western Indian Ocean (excluding South Africa); 2 - Polychaeta: data from this study (Chapter 3); 3 – Polyplacophora, Prosobranchia and Bivalvia: data from from this study (Chapter 4) 4 - Opisthobranchia: estimated from Yonow (*pers com*); 5 – Echinoderms: data from present study (Chapter 5); 6 - Ascidiacea: estimates for species numbers for Moçambique are 100 according to Monniot (*pers com*) who indicated that any estimates for this group are highly unreliable as they are so little known from this region.

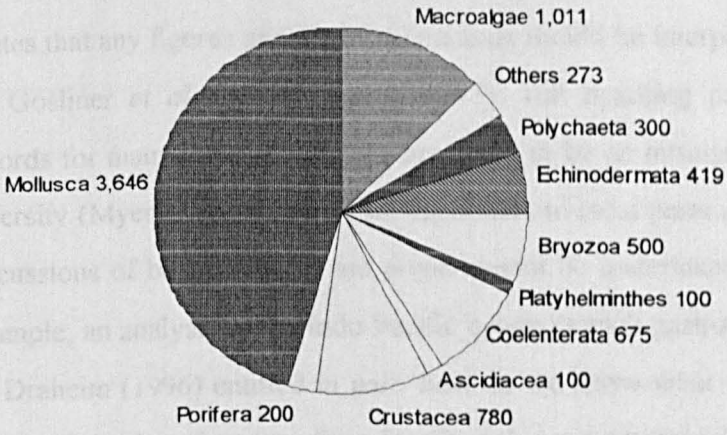



**Figure 1.** Numbers of species of the major benthic taxa from the western Indian Ocean (figures from Table 1, excluding fish and other neritic groups).

## MAINLAND AND ISLANDS

Differences between the biodiversity of the western Indian Ocean islands (Mascarenes and Seychelles) and that of the East Africa mainland and Madagascar are apparent (see Chapters 4 and 5). Particularly noticeable are the differences in diversity of molluscs (and of echinoderms) and the reduced diversity of bivalves recorded from the islands compared to the mainland and Madagascar which may be attributed to habitat requirements. This is not surprising given the differences in the physical properties (size, geological history and location) as outlined in the Chapter 1. Differences in habitat diversity and extent are also great. For example, the islands lack any significant development of mangrove forests and estuarine conditions common along parts of the mainland and Madagascar shores. The islands, however, contribute to the overall diversity of the region acting as features which favour endemism (see Barnes & Hughes, 1982) and the remoteness of many of the smaller islands from human habitation (and possible degradation as increasingly found on mainland shores) may also create reservoirs of intact communities and thus sources from which export of larvae to neighbouring degraded areas can take place.

## BIOGEOGRAPHY AND ENDEMISM

Three phenomena affect almost all aspects of biogeography: sampling, dispersal and evolution (Williamson, 1988). With regard to the origins and geographical distribution of

the western Indian Ocean (WIO) marine taxa, discrepancies arising from regionally unequal sampling indicates that any figures and observed patterns should be interpreted with caution (Veron, 1995; Gosliner *et al.*, 1996; Paulay, 1997). The resulting paucity of reliable distribution records for many invertebrate taxa continues to be an intrinsic problem for the study of biodiversity (Myers, 1996) and is still applicable to most parts of the tropics. For many taxa, discussions of biogeography and origin cannot be undertaken since so little is known. For example, an analysis of the Indo-Pacific opisthobranch gastropod biogeography by Gosliner & Draheim (1996) entitled in part 'how do we know what we don't know ?' points out the lack of baseline data even from localities that were believed to be well known (Hawaii) from which they claim the known diversity of opisthobranchs has increased by 75 % in the last 3 years alone. Similarly Sheppard (1998) recommends, with respect to Indian Ocean corals, that the taxonomy still requires considerable revision despite the substantial improvements achieved recently, a condition which may also apply to many other groups in the Indan Ocean.

The summary from Richmond (1997) found that of the 1,500 fully aquatic taxa for which reliable distribution information could be ascertained, the majority (70%) occur at sites extending to the western Pacific Ocean (half of which occur beyond and into the central Pacific). Of the total, 15 % were found to be endemic to the WIO. These figures indicate only a broad pattern since they represent only the most common and typical coastal species. Notwithstanding, this serves as a general estimate which will be examined more closely below. A similar approach was taken by Gosliner & Draheim (1996) who, in considering levels of endemism of Hawaiian opisthobranchs, regard the figure of 43% (of all species known to occur only in Hawaiian waters) to be less reliable than the estimate of 4 % endemicity derived from figures only for the larger, more conspicuous and better known species which they regard as less likely to be overlooked.

Earlier chapters in this thesis have examined the Polychaeta, Mollusca (Prosbranchia, Bivalvia and Polyplacophora) and Echinodermata in more detail. Of the collection of polychaetes from Zanzibar and Mafia islands, 29 % are found to occur at localities as far as the western Pacifc and 22 % are regarded as 'cosmopolitan'. The expected diversity of shallow water polychaetes for the WIO was estimated to be at least 300 species, though the confused taxonomy of a substantial proportion of the class provides little confidence for

biogeographical statements. Being soft-bodied, little is offered from fossil evidence (Valentine, 1967), and though the tubes of some groups can form large components of fossils, species identification is extremely difficult.

The shelled Mollusca on the other hand, though highly numerous in terms of species numbers, have been studied intensively by equally numerous malacologists around the world, often in isolation, with the result that confusing synonyms plague a large proportion of the fauna. Of those families which have been reviewed recently (e.g. Conidae, Cypraeidae, Cassidae, Littorinidae, and Strombidae) the trend seems to be that most genera are widespread and small-scale endemism is apparent in areas of the Indo-Pacific. For the WIO endemism varies between groups from 0-15 %, and some of these may be explained by larval dispersability and habitat. For example, Vermeij (1972, 1973a,b) found that many snails inhabiting the high intertidal zone have strikingly narrow geographical ranges compared to species lower down the shore. Citing examples from Kenya he described how 6 of 13 species (46 %) of snails found high on the limestone cliffs were restricted to the Indian Ocean while from the lower shore only one of 14 species was endemic to the Indian Ocean, with a similar pattern found in the northern Red Sea. Studies from Barbados, Hawaii and the Red Sea show that upper-shore gastropods exhibit a reduced planktonic phase or none at all and that the dispersal stage limits the spread of the species as a whole (Lewis, 1960; Kay, 1967). Vermeij (1978) also noted that the inshore gastropods adapted to harsh, sand-scoured shores in Brazil demonstrate more endemicity that those of the less harsh lower shore or occurring under boulders. Whether a similar pattern exists in the WIO remains to be determined.

The echinoderm data presented in Chapter 5 is considered to be relatively accurate and shows that ca. 25 % of the total of 419 species recorded from the WIO are endemic to this region (compare with figure for general taxa above derived from Richmond (1997)), and that 53 % occur at various sites eastwards to the central Indo-Pacific. Explanations for these patterns are associated with larval dispersal (across the Indian Ocean and along the northern shores), dispersal of adults on floating material and the presence of a widely-distributed ancient fauna.

Very little can be said at present for the distribution and species abundance of macroalgae, given the lack of comparative studies. This applies equally to the tropical Pacific (see Abbott, 1995). The Porifera have been investigated, and the WIO (in this case including the Red Sea and Arabian Sea) supports 683 species compared to 965 for the Malay-Indonesia area (Soest, 1994). Soest (1994) also found from his analysis of 411 Demospongiae that the WIO clusters closely with the Malay-Indonesia area. He suggests that for widespread genera (13 % of the total examined) their distributions are probably determined by historical and large scale geographic factors such as tectonic events and barriers associated with deep water, temperature and continental run-off.

As a result of the study of hermatypic corals of the Indian Ocean Rosen (1971) suggested that this region should be considered as a sub-province of the Indo-Pacific (based on the high coral diversities). However, the question as to whether the WIO constitutes a third centre (the other two being the Caribbean and the Indonesian-West Pacific) as a separate feature, or simply a western extension of the richly diverse belt that stretches from East Africa to the West Pacific could not be resolved until further studies in the western portion of the Indonesian area are conducted. Unlike the Pacific Ocean, the Indian Ocean does not reveal a pattern of decreasing concentric coral diversity levels radiating from the Malay-Indonesian region (Sheppard, 1998). What is found instead, is a band of high diversity stretching across the Indian Ocean, as proposed by Rosen (1971), with about half of the corals widespread in this ocean (from and including the Red Sea to South Africa and the western coasts of Australia and Malaysia), and only a few genera limited to the western extremes, though new species are continuing to be described (e.g. Riegl, 1995). Sheppard (1998) found that the WIO is relatively homogeneous (among corals) and that the observed limited distribution of a high proportion of species accounts for the strong grouping of Madagascar with the Mascarene islands and Aldabra. He also found evidence for a substantial substructure of differential species distributions which is important in biogeographic and conservation considerations, and noted that the mainland sites of Moçambique, Tanzania and Kenya are likely to have a closer similarity with the central and WIO areas once they have been sampled more thoroughly. Interestingly, one genus endemic to the Arabian Sea, *Parasimplastrea* is found only as fossils in Papua New Guinea (Sheppard *et al.*, 1992), providing yet another example of a more widespread relict fauna, in

this case, one which survived in the Arabian Sea and disappeared from the central Indo-Pacific region.

Among the Crustacea, the available evidence of high diversity of species for the WIO with a proportion of endemics is not clear, but may be largely related to larval dispersal. Among the Grapsidae and Ocypodidae from Tanzania and Madagascar, Hartnoll (1975) found a very limited level of endemism, with the majority of species occurring in both these sites and in the Malay-Indonesia area. Hartnoll suggests that larval transport across the Indian Ocean is a more likely explanation than movement across the northern borders of the Indian Ocean. Hogarth (1988) examined southern Oman porcellanids and paguridcans and observed a degree of heterogeneity in species distributions which does not appear to relate closely to larval dispersal ability. Myers (1997) reasons that crustaceans with planktonic larvae have the greatest potential for extending their distribution, yet for the development of endemism, colonization of new areas must be followed by a cessation of gene flow from donor regions to the new area for a sufficient period of time to allow genetic isolation mechanisms to act. If this is the case, and larvae of the widespread species are constantly being supplied, the lack of endemism among crabs and other crustaceans with long planktonic life periods (e.g. lobsters of the genus *Panulirus*) can be partly explained. Among caridean shrimps Bruce (1984) reported that of the 133 carideans found on the Seychelles, 16.5 % were endemic to the WIO and the remainder extended to the Malay-Indonesia area and beyond. However, Bruce (1998) later concluded that for the many coral–associated pontoniine shrimp species (which generally account for about half of the caridean fauna) the distributions are still not well known, due largely to the haphazard nature of collecting activities. For crustaceans with short larval stages, or none at all, the picture does appear to be somewhat different. Of the Amphipoda (which brood their young), Madagascar supports 9 % endemicity of genera and 45 % endemicity among species (Ledoyer, 1982, 1986). The same is true for freshwater decapods where endemicity is extremely high (Ng, 1986).

The fossil record provides evidence of invertebrate species with long-range larval dispersal such as *Cymatium nicobaricum* and *Thais haemastoma* which date back to the Oligocene and Miocene respectively, as well as inshore gastropod species with crawling larvae (and thus reduced powers of dispersal) (see Scheltema, 1977). This suggests that larval strategy

does not necessarily favour long-term survival of species. Both of the former gastropod species are found in the WIO. Pearse & Barksdale (1986) conclude that most species of invertebrates along the WIO shores have long-range dispersal larvae and are widespread throughout the Indo-Pacific region.

It would appear that from the above, with between 50-70 % of the WIO biota common to the central Indo-Pacific and beyond, widespread species do have extended larval lives. However, although the implication that those inverterbrate species which are endemic to the WIO have short-range dispersal larvae appears to be true for amphipods and some upper shore gastropods (as discussed above), this generalisation does not seem to apply to the echinoderms. For other faunal groups insufficent evidence is currently available. Myers (1992) concludes that despite the ubiquity of planktonic larvae amongst inshore marine animals and their dispersal potential, there does not seem to be a close correlation, in general, between the immigration rates of larvae and subsequent colonization. Finally, human-facilitated dispersal of species, either accidentally by shipping, or deliberate, apart from inviting potentially severe ecological and economic impacts (see Paulay, 1997), contributes to the general biogeographic picture of species distribution for some taxa.

Analysis of the coral reef fish of the entire Indo-Pacific confirms that the Indo-Australian Archipelago is a 'centre' of diversity with over 3,000 species of shorefish (Lieske & Myers, 1994). They also found that within the WIO, the Mascarene islands are characterised by a significant endemic element, and that species diversity in this region, although high, is less than that of the central Indo-Pacific. These observations cannot be wholly explained by larval dispersal as for some reef fish the relationship between larval longevity and observed distribution of adults is not obvious. For example, the larval duration of the damselfish (Pomacentridae) common on coral reefs is 1-39 days (Wellington & Victor, 1989) but their observed species distribution does not correlate with planktonic duration (Thresher *et al.*, 1989). A similar situation is also found for angelfish (Pomacanthidae) (Thresher & Brothers, 1985) suggesting some other mechanisms are involved. For Hawaiian shorefish Randall (1995) reported 24.3 % endemism and related the presence of some of the fauna to the geological history of the Pacific Plate rather than larval distibution.

From the WIO some taxa clearly do not show endemism (e.g. giant clams *Tridacna*) while endemism among many other groups does exist. An overall estimate for WIO endemicity of about 15 % (as noted above) may prove realistic although further taxonomic and biogeographical work is required, not only within the WIO but also throughout the Indo-Pacific to refine the observed levels of endemicity. The well known coelocanth (*Latimeria chalumnae*, Smith 1938) was considered endemic to the south-western Indian Ocean (Smith & Heemstra, 1995) until the discovery in July 1998 of this species from 100-150m depth off north Sulawesi (Indonesia), 10,000 km from its known population around the Comoros Islands (see Erdmann *et al.*, 1998). This discovery has major biogeographical and conservation implications for the fish, but also serves as a clear reminder to biogeographers of the continued need to give observed biogeographic patterns only as much confidence as a knowledge of the sampling efforts invested in providing the data on which patterns are based.

The question as to whether the central Indo-Pacific (encompasing the coastal waters of the Philippines, Indonesia and Papua New Guinea) should be considered as the 'centre and focus' from which other subregions of the Indo-Pacific are recruited as Ekam (1953) suggests has be examined by many (e.g. Ladd, 1960; Taylor, 1971; Briggs, 1974; Abele, 1982; Woodland, 1983; Kay, 1984; Rowe, 1985; Donaldson, 1985 and Emerson, 1990). A summary of these and other studies suggests that this region, undoubtedly the richest in species, has achieved this condition by maintaining a rich biodiversity derived from a widespread, warm, Tethyan Sea biota which was present up to the Late Eocene (Vermeij, 1978). At the same time further speciation occurred in some taxa and additional taxa from neighbouring areas were accumulated. An example of the former resulted from the drying of the Sunda Shelf in Indonesia during the Pleistocene which effectively separated the Pacific from the Indian Ocean. This in turn promoted speciation in a number of mangrove-associated taxa which after the post-glacial sea-level rise contributed to enhance the diversity of these groups (Vermeij, 1978). All other regions within the Indo-Pacific support less diversity. Examples of these less diverse areas include the central Pacific islands, the Red Sea and the WIO, each of which demonstrate high levels of endemism (see Gosliner *et al.*, 1996). These areas are likely to have begun with some of the widespread Tethyan biota, lost part of this during sea-level and other tectonic changes, and over time, accumulated additional species from the Malay-Indonesian region (which may have either existed since

Tethyan times or developed subsequently) as well as developed their own unique biota. In Chapter 5 the relationship between coastline length and echinoderm species diversity is examined and analyses of this type of relationship may provide further interesting, and controversial insights.

## FUTURE RESEARCH

To solve some of the above remaining queries regarding biodiversity and biogeography, further work should focus on the taxonomy and larval biology of the 'cosmopolitan' species (notably among polychaetes); compare the larval biology of widespread species with that of endemic; and evaluate the existence of sympatric (sister) species among the widespread and endemic fauna. To resolve differences between recent species establishment and those of Tethyan origin, a comparison of the biota from equivalent habitats from recently formed oceanic islands (e.g. Mauritius, Réunion) with that of older oceanic islands (e.g. those of the Seychelles granitic group) is required. Suitable studies would include the examination of isopod taxa caught using baited traps, or the diversity of butterfly fish (Chaetodontidae) using visual observations on coral reefs.

The mangroves, seagrasses, macroalgae, scleractinian corals, most of the decapod crustaceans, echinoderms and fish are taxonomic groups which can be considered to be reasonably well known. These account for about 50 % of the total estimate of species of shallow-water taxa for the region (see Table 1). For the remainder, further taxonomic work is a priority. Future studies on all taxa in the WIO will undoubtedly reveal new records for the region as well as new species. The elimination of synonyms among the mollusc fauna and other groups requires particular attention. The development of molecular genetic approaches will undoubtedly assist in such taxonomic and biogeographic studies. Genetic analyses have already been undertaken in parts of the world and are beginning to resolve the degree of divergence between species, the differences in populations of the same species, the possible origins of taxa, and act as a complimentary tool to traditional taxonomic methods based on morphological characters. Current examples include the studies on seaweeds (e.g. Pakker *et al.*, 1996), fiddler crabs *Uca* (Levinton *et al.*, 1996), the coconut crab *Birgus latro* (Lavery *et al.*, 1996), the mangrove crab *Scylla serrata* (Keenan

*et al.*, 1998); sea urchins (Palumbi, 1996), goatfish of the species complex *Mulloidichthys* (Stepien, 1994) and billfish (Graves & McDowell, 1995).

Physical oceanography, in particular with respect to the transport of larvae from different parts of the region and from adjacent areas should also be investigated, as should areas within the region which have not been sampled to date (e.g. Pemba Island coral reefs and the Pemba Channel, southern Tanzania, Comoros, NE Moçambique, eastern Madagascar, and the Mascarene Ridge). The effects of human development on the diversity of marine life in the WIO must also form an important focus for research in the future, aiming to document both the impact and its amelioration.

Finally, there is the need to revise species checklists for the region by making them widely available to specialists and thus continuing to catalogue biodiversity. The production of freely-distributed reports is currently being undertaken by SIDA (Swedish International Development Agency) (e.g. for mangroves, seagrasses and corals) using CD formats. This will greatly assist in the dissemination of information and will be expanded to cover other taxa. In addition, world, or regional, species lists and distribution now exists on the Internet for some groups (e.g. University of California Berkley for macroalgae for the Indian Ocean; Smithsonian Institution for freshwater and marine isopods of the world) making the information easily available globally. Chace (1969, in Abele, 1972) stated that "The time is far in the future when a tropical marine ecologist can identify the components of an ecosystem or a food chain from his handy pocket guide". It is hoped that *A Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands* (Richmond, 1997) goes some way to achieving that aim.

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# APPENDIX 1

Table 1. MHWS benthos samples (see main text for codes for sites and stations).
Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | MZ | MZ | MZ | MZ | MZ | MZ | MZ | MZ | MZ | HB | HB | HB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 | S1 |
| REPLICA | T1C1 | T1C2 | T1C3 | T2C1 | T2C2 | T2C3 | T3C1 | T3C2 | T3C3 | C1 | C2 | C3 |
| *Aphrogenia* sp. | | | | | | | | | | | | |
| *Iphione cf. muricata* (Savigny, 1818) | | | | | | | | | | | | |
| Harmothoinae sp. | | | | | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | | | | | | | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | | | | | |
| *Phyllodoce cf. castanea* (Marenz., 1879) | | | | | | | | | | | | |
| *Phyllodoce* sp. | | | | | | | | | | | | |
| *Ancistrosyllis parva* Day, 1963 | | | | | | | | | | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | | | | | | | | | | | | |
| *Syllis cf. amica* Quatrefages, 1865 | | | | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | | | | | | | | | |
| *Syllis comuta* Rathke, 1843 | | | | | | | | | | | | |
| *Syllis cf. gracilis* Grube, 1840 | | | | | | | | | | | | |
| *Syllis cf. prolifera* Krohn, 1852 | | | | | | | | | | | | |
| *Ceratonereis erythraensis* Fauvel, 1918 | | 13 | | | | | | | 2 | | | |
| *Ceratonereis mirabilis* Kinberg, 1866 | | | | | | | | | | | | |
| *Dendronereis arborifera* Peters, 1854 | | | | | | | | | | | | |
| *Namalycastis indica* (Southern, 1921) | | | | | | | | | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | | | | |
| *Nereis coutieri* Gravier, 1899 | | | | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | | | | 1 |
| *Nereis unifasciata* Willey, 1905 | | | | 8 | | | | | | | | |
| *Perinereis nuntia vallata* (Grube, 1857) | 3 | | 1 | | | 5 | | 1 | | | | 1 |
| *Platynereis isolita* Gravier, 1901 | | | | | | | | | | | | |
| *Platynereis pulchella* Gravier, 1901 | | | | | | | | | | | | |
| *Platynereis* sp. | | | | | | | | | | | | |
| *Glycera lancadivae* Schmarda, 1861 | | | | | | | | | | | | |
| *Eunice antennata* (Savigny, 1820) | | | | | | | | | | | | |
| *Eunice indica* Kinberg, 1865 | | | | | | | | | | | | |
| *Lysidice collaris* Grube, 1870 | | | | | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | | | | | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | | | | | | | |
| *Nematonereis unicornis* (Grube, 1840) | | | | | | | | | | | | |
| *Arabella iricolor iricolor* (Montagu, 1804) | | | | | | | | | | | | |
| *Notocirrus australis* Day, 1960 | | | | | | | | | | | | |
| *Oenone* sp. | | | | | | | | | | | | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | | | | | | | | | | | |
| *Diopatra cuprea cuprea* (Bosc, 1802) | | | | | | | | | | | | |
| *Aonides oxycephala* (Sars, 1862) | | | | | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | | | | |
| *Nerinides* sp. | | | | | | | | | | | | |
| *Prionospio cf. convexa* Imajima, 1990 | | | | | | | | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | | | | | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | | | | | | | | | |
| *Scolelepis squamata* (Müller, 1806) | | | | | | | | 1 | 24 | | | |
| *Spio* sp. | | | | | | | | | | | | |
| *Magelona* sp. | | | | | | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | | | | | | | |
| *Caulleriella* sp. | | | | | | | | | | | | |
| *Cirratulus* sp. | | | | | | | | | | | | |
| *Cirriformia* sp. | | | | | | | | | | | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | | | | | |
| *Scoloplos cf. uniramus* Day, 1961 | | | | | | | | | | | | |
| Orbinidae sp. | | | | | | | | | | | | |
| *Paraonis* sp. | | | | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | | | | | | | | | | | | |
| *Armandia leptocirrus* Grube, 1878 | | | | | | | | | | | | |
| *Armandia melanura* Gravier, 1905 | | | | | | | | | | | | |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | | | | | | | | | | |
| *Anatomastus* sp. | | | | | | | | | | | | |
| *Capitella cf. capitata* (Fabricius, 1780) | | | | | | | | | | | | |
| Capitellid sp. 1 | | | | | | | | | 1 | | | |
| *Dasybranchus caducus* (Grube, 1846). | | | | | | | | | | | | |
| *Heteromastides* sp. | | | | | | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | | | | |
| *Notomastus latericeus* Sars, 1851 | | | | | | | | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | | | | | | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | | | | | |
| Terebellid sp. 1 | | | | | | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | | | | | | | | | | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | | | | | | | | | |
| Total: | 3 | 13 | 1 | 8 | 0 | 5 | 0 | 2 | 27 | 0 | 0 | 2 |

Table 2a. MHW benthos samples (see main text for codes for sites and stations). Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | KS | KS | KS | KS | KS | MK | MK | MK | MK | MK |
|---|---|---|---|---|---|---|---|---|---|---|
| STATION | S2 | S2 | S2 | S2 | S2 | S2 | S2 | S2 | S2 | S2 |
| REPLICA | C1 | C2 | C3 | C4 | C5 | C1 | C2 | C3 | C4 | C5 |
| *Aphrogenia* sp. | | | | | | | | | | |
| *Iphione* cf. *muricata* (Savigny, 1818) | | | | | | | | | | |
| Harmothoinae sp. | | | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | | | | | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | | | |
| *Phyllodoce* cf. *castanea* (Marenz., 1879) | | | | | | | | | | |
| *Phyllodoce* sp. | | | | | | | | | | |
| *Ancistrosyllis parva* Day, 1963 | | | | | | | | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | | | | | | | | | | |
| *Syllis* cf. *amica* Quatrefages, 1865 | | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | | | | | | | |
| *Syllis cornuta* Rathke, 1843 | | | | | | | | | | |
| *Syllis* cf. *gracilis* Grube, 1840 | | | | | | | | | | |
| *Syllis* cf. *prolifera* Krohn, 1852 | | | | | | | | | | |
| *Ceratonereis erythraensis* Fauvel, 1918 | | | | | | | | | | |
| *Ceratonereis mirabilis* Kinberg, 1866 | | | | | | | | | | |
| *Dendronereis arborifera* Peters, 1854 | | | | | | 1 | | | 6 | |
| *Namalycastis indica* (Southern, 1921) | | | | | | 1 | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | | |
| *Nereis coutieri* Gravier, 1899 | | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | | |
| *Nereis unifasciata* Willey, 1905 | | | | | | | | | | |
| *Perinereis nuntia vallata* (Grube, 1857) | | | | | | | | | | |
| *Platynereis isolita* Gravier, 1901 | | | | | | | | | | |
| *Platynereis pulchella* Gravier, 1901 | | | | | | | | | | |
| *Platynereis* sp. | | | | | | | | | | |
| *Glycera lancadivae* Schmarda, 1861 | | | | | | | | | | |
| *Eunice antennata* (Savigny, 1820) | | | | | | | | | | |
| *Eunice indica* Kinberg, 1865 | | | | | | | | | | |
| *Lysidice collaris* Grube, 1870 | | | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | | | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | | | | | |
| *Nematonereis unicornis* (Grube, 1840) | | | | | | | | | | |
| *Arabella iricolor iricolor* (Montagu, 1804) | | | | | | | | | | |
| *Notocirrus australis* Day, 1960 | | | | | | | | | | |
| *Oenone* sp. | | | | | | | | | | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | | | | | | | | | |
| *Diopatra cuprea cuprea* (Bosc, 1802) | | | | | | | | | | |
| *Aonides oxycephala* (Sars, 1862) | | | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | | |
| *Nerinides* sp. | | | | | | | | | | |
| *Prionospio* cf. *convexa* Imajima, 1990 | | | | | | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | | | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | | | | | | | |
| *Scolelepis squamata* (Müller, 1806) | | | | | | | | | | |
| *Spio* sp. | | | | | | | | | | |
| *Magelona* sp. | | | | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | | | | | |
| *Caulleriella* sp. | | | | | | | | | | |
| *Cirratulus* sp. | | | | | | | | | | |
| *Cirriformia* sp. | | | | | | | | | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | | | |
| *Scoloplos* cf. *uniramus* Day, 1961 | | | | | | | | | | |
| Orbinidae sp. | | | | | | | | | | |
| *Paraonis* sp. | | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | | 1 | | | | | | | | |
| *Armandia leptocirrus* Grube, 1878 | | | | | | | | | | |
| *Armandia melanura* Gravier, 1905 | | | | | | | | | | |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | | | | | | | | |
| *Anatomastus* sp. | | | | | 7 | | | | | |
| *Capitella* cf. *capitata* (Fabricius, 1780) | | | | | | | | | | |
| Capitellid sp. 1 | | | | | | | | | | |
| *Dasybranchus caducus* (Grube, 1846) | | | | | | | | | | |
| *Heteromastides* sp. | | | | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | | |
| *Notomastus latericeus* Sars, 1851 | | | | | | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | | | | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | | | |
| Terebellid sp. 1 | | | | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | | | | | | | | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | | | | | | | |
| Total: | 0 | 1 | 0 | 0 | 7 | 2 | 0 | 0 | 6 | 0 |

Table 2b. MHW benthos samples (see main text for codes for sites and stations).
Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | MZ | MZ | MZ | MZ | MZ | MZ | MB | MB | MB | MB | MB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | S2 | S2 | S2 | S2 | S2 | S2 | S2 | S2 | S2 | S2 | S2 |
| REPLICA | T1C1 | T1C2 | T1C3 | T2C1 | T2C2 | T2C3 | C1 | C2 | C3 | C4 | C5 |
| *Aphrogenia* sp. | | | | | | | | | | | |
| *Iphione* cf. *muricata* (Savigny, 1818) | | | | | | | | | | | |
| Harmothoinae sp. | | | | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | | | | | | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | | | | |
| *Phyllodoce* cf. *castanea* (Marenz., 1879) | | | | | | | | | | | |
| *Phyllodoce* sp. | | | | | | | | | | | |
| *Ancistrosyllis parva* Day, 1963 | | | | | | | | | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | | | | | | | | | | | |
| *Syllis* cf. *amica* Quatrefages, 1865 | | | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | | | | | | | | |
| *Syllis cornuta* Rathke, 1843 | | | | | | | | | | | |
| *Syllis* cf. *gracilis* Grube, 1840 | | | | | | | | | | | |
| *Syllis* cf. *prolifera* Krohn, 1852 | | | | | | | | | | | |
| *Ceratonereis erythraensis* Fauvel, 1918 | 1 | 6 | 2 | 22 | 12 | | 33 | 16 | | | |
| *Ceratonereis mirabilis* Kinberg, 1866 | | | | | | | | | | | |
| *Dendronereis arborifera* Peters, 1854 | 5 | 3 | | | 2 | | 13 | 10 | | 1 | 1 |
| *Namalycastis indica* (Southern, 1921) | | | | | | | | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | | | |
| *Nereis coutieri* Gravier, 1899 | | | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | | | |
| *Nereis unifasciata* Willey, 1905 | | | | | | | | | | | |
| *Perinereis nuntia vallata* (Grube, 1857) | | | | | | | | | | 4 | |
| *Platynereis isolita* Gravier, 1901 | 6 | 2 | | | | | | | | | |
| *Platynereis pulchella* Gravier, 1901 | | | | | | | | | | | |
| *Platynereis* sp. | | | | | | | | | | | |
| *Glycera lancadivae* Schmarda, 1861 | | | | | 1 | 2 | | | | | |
| *Eunice antennata* (Savigny, 1820) | | | | | | | | | | | |
| *Eunice indica* Kinberg, 1865 | | | | | | | | | | | |
| *Lysidice collaris* Grube, 1870 | | | | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | | | | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | 1 | | 2 | | 1 | |
| *Nematonereis unicornis* (Grube, 1840) | | | | | | | | | | | |
| *Arabella iricolor iricolor* (Montagu, 1804) | | | | | | | | | | | |
| *Notocirrus australis* Day, 1960 | | | | 1 | | | | | | | |
| *Oenone* sp. | | | | | | | 1 | | | 1 | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | | | | | | | | | | |
| *Diopatra cuprea cuprea* (Bosc, 1802) | | | | | | | | | | | |
| *Aonides oxycephala* (Sars, 1862) | | 1 | | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | | 1 | 3 |
| *Nerinides* sp. | | | | | | | | | | | |
| *Prionospio* cf. *convexa* Imajima, 1990 | | | | | | | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | 1 | | 2 | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | | | | | | | | |
| *Scolelepis squamata* (Müller, 1806) | | | | | | | | | | | |
| *Spio* sp. | | | | | | | | | | | |
| *Magelona* sp. | | | | | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | | | | | | |
| *Caulleriella* sp. | | | | | | | | | | | |
| *Cirratulus* sp. | | | | | | | | | | | |
| *Cirriformia* sp. | | | | | | | | | | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | | | | |
| *Scoloplos* cf. *uniramus* Day, 1961 | | 2 | 1 | | | | | | | | |
| Orbinidae sp. | | | | | | | | | | | |
| *Paraonis* sp. | | | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | | | | | | | 10 | | | 10 | |
| *Armandia leptocirrus* Grube, 1878 | | | | | | | | | | | |
| *Armandia melanura* Gravier, 1905 | | | | | | | | | | | 4 |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | | | | | | | | | |
| *Anatomastus* sp. | | | | | | | | | 15 | | |
| *Capitella* cf. *capitata* (Fabricius, 1780) | | | | | | | | | | | |
| Capitellid sp. 1 | | | 1 | | | | 1 | | | | |
| *Dasybranchus caducus* (Grube, 1846) | | | | | | | 1 | | | | |
| *Heteromastides* sp. | | | | | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | | | |
| *Notomastus latericeus* Sars, 1851 | | | | | | | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | | | | | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | | | | |
| Terebellid sp. 1 | | | | | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | | | | | | | | | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | 1 | | | | | | | |
| Total: | 13 | 14 | 6 | 24 | 15 | 3 | 59 | 28 | 15 | 18 | 8 |

Table 3. MHWN benthos samples (see main text for codes for sites and stations).

Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | NG | NG | NG | HB | HB | HB | BW | BW | BW | MZ | MZ | MZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | S1 | S1 | S1 | S2 | S2 | S2 | S1 | S1 | S1 | S2 | S2 | S2 |
| REPLICA | C1 | C2 | C3 | C1 | C2 | C3 | C1 | C2 | C3 | T3C1 | T3C2 | T3C3 |
| *Aphrogenia* sp. | | | | | | | | | | | | |
| *Iphione* cf. *muricata* (Savigny, 1818) | | | | | | | | | | | | |
| Harmothoinae sp. | | | | | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | | | | | | | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | | | | | |
| *Phyllodoce* cf. *castanea* (Marenz., 1879) | | | | | | | | | | | | |
| *Phyllodoce* sp. | | | | | | | | | | 1 | | 1 |
| *Ancistrosyllis parva* Day, 1963 | | | | | | | | | | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | | | | | | | | | | | | |
| *Syllis* cf. *amica* Quatrefages, 1865 | | | | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | | | | | | | | | |
| *Syllis cornuta* Rathke, 1843 | | | | | | | | | | | | |
| *Syllis* cf. *gracilis* Grube, 1840 | | | | | | | | | | | | |
| *Syllis* cf. *prolifera* Krohn, 1852 | | | | | | | | | | | | |
| *Ceratonereis erythraensis* Fauvel, 1918 | | | | | | | | | | 4 | | 8 |
| *Ceratonereis mirabilis* Kinberg, 1866 | | | | | | | | | | | | |
| *Dendronereis arborifera* Peters, 1854 | | | | | | | | | | 25 | | 6 |
| *Namalycastis indica* (Southern, 1921) | | | | | | | | | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | | | | |
| *Nereis coutieri* Gravier, 1899 | | | 1 | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | | | | |
| *Nereis unifasciata* Willey, 1905 | | | | | | | | | | | | |
| *Perinereis nuntia vallata* (Grube, 1857) | | | | | | | | | | | | |
| *Platynereis isolita* Gravier, 1901 | | | | | | | 1 | | | | | |
| *Platynereis pulchella* Gravier, 1901 | | | | | | | | | | | | |
| *Platynereis* sp. | | | | | | | | | | | | |
| *Glycera lancadivae* Schmarda, 1861 | 1 | | 2 | | | | | | 1 | | | 1 |
| *Eunice antennata* (Savigny, 1820) | | | | | | | | | | | | |
| *Eunice indica* Kinberg, 1865 | | | | | | | | | | | | |
| *Lysidice collaris* Grube, 1870 | | | | | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | | | | | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | | | | | | | |
| *Nematonereis unicornis* (Grube, 1840) | | | | | | | | | | | | |
| *Arabella iricolor iricolor* (Montagu, 1804) | | | | | | | | | | | | |
| *Notocirrus australis* Day, 1960 | | | | | | | | | | | | |
| *Oenone* sp. | | | | | | | | | | | | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | | | | | | | | | 1 | | |
| *Diopatra cuprea cuprea* (Bosc, 1802) | | | | | | | | | | | | |
| *Aonides oxycephala* (Sars, 1862) | | | | | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | | | | |
| *Nerinides* sp. | | | | | 41 | 2 | | | | | | |
| *Prionospio* cf. *convexa* Imajima, 1990 | | | | | | | | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | | | | | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | | | | | | | | | |
| *Scolelepis squamata* (Müller, 1806) | | | | 8 | 3 | 15 | | | | | | |
| *Spio* sp. | | | | | | | | | | | | |
| *Magelona* sp. | | | | | | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | | | | | | | |
| *Caulleriella* sp. | | | | | | | | | | | | |
| *Cirratulus* sp. | | | | | | | 1 | | | | | |
| *Cirriformia* sp. | | | | | | | 1 | | | | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | | | | | |
| *Scoloplos* cf. *uniramus* Day, 1961 | | | | | | | | | | | | |
| Orbinidae sp. | | | | | | | | | | | | |
| *Paraonis* sp. | | | | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | | | | | | | | | | 1 | | |
| *Armandia leptocirrus* Grube, 1878 | | | | | | | | | | | | |
| *Armandia melanura* Gravier, 1905 | | | | | | | | | | 3 | | |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | | | | | | | | | | |
| *Anatomastus* sp. | | | | | | | | | | | | |
| *Capitella* cf. *capitata* (Fabricius, 1780) | | | | | | | | | | | | |
| Capitellid sp. 1 | | | | | | | | | | | | |
| *Dasybranchus caducus* (Grube, 1846) | | | | | | | | | | | | |
| *Heteromastides* sp. | | | | | | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | | | | |
| *Notomastus latericeus* Sars, 1851 | | | | | | | | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | | | | | | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | | | | | |
| Terebellid sp. 1 | | | | | | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | | | | | | | | | | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | | | | | | | | | |
| Total: | 1 | 0 | 3 | 8 | 44 | 17 | 3 | 0 | 1 | 35 | 0 | 16 |

Table 4a. MTL benthos samples (see main text for codes for sites and stations).
Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | BW | BW | BW | MZ | MZ | MZ | NG | NG | NG | MZ | MZ | MZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | S2 | S2 | S2 | S3 | S3 | S3 | S2 | S2 | S2 | S3 | S3 | S3 |
| REPLICA | C1 | C2 | C3 | T1C1 | T1C2 | T1C3 | C1 | C2 | C3 | T2C1 | T2C2 | T2C3 |
| *Aphrogenia* sp. | | | | | | | | | | | | |
| *Iphione* cf. *muricata* (Savigny, 1818) | | | | | | | | | | | | |
| Harmothoinae sp. | | | | | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | | | | | | | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | 1 | | | | |
| *Phyllodoce* cf. *castanea* (Marenz., 1879) | | | | | | | | | | | | |
| *Phyllodoce* sp. | | | | | | | | | 3 | | | |
| *Ancistrosyllis parva* Day, 1963 | | | | | | | | | | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | 1 | | | | | | | | | | | |
| *Syllis* cf. *amica* Quatrefages, 1865 | | | | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | | | | | | | | | |
| *Syllis cornuta* Rathke, 1843 | | | | | | | | | | | | |
| *Syllis* cf. *gracilis* Grube, 1840 | | | | | | | | | | | | |
| *Syllis* cf. *prolifera* Krohn, 1852 | | 1 | | | | | | | | | | |
| *Ceratonereis erythraensis* Fauvel, 1918 | | | | | | | | | | | | |
| *Ceratonereis mirabilis* Kinberg, 1866 | | | | | 1 | | | | | | | |
| *Dendronereis arborifera* Peters, 1854 | | | | | | | | | | | | |
| *Namalycastis indica* (Southern, 1921) | | | | | | | | | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | | | | |
| *Nereis coutieri* Gravier, 1899 | 2 | | | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | | | | |
| *Nereis unifasciata* Willey, 1905 | | | | | | | | | | | | |
| *Perinereis nuntia vallata* (Grube, 1857) | | | | | | | | | | | | |
| *Platynereis isolita* Gravier, 1901 | | | | | | | | | | | | 1 |
| *Platynereis pulchella* Gravier, 1901 | | | | | 1 | | | | | | | |
| *Platynereis* sp. | | | | | | | | | | | | |
| *Glycera lancadivae* Schmarda, 1861 | | 1 | | 4 | 1 | 4 | | 4 | 2 | 2 | 2 | |
| *Eunice antennata* (Savigny, 1820) | | | | | | | | | | | | |
| *Eunice indica* Kinberg, 1865 | | | | | | | | | | | | |
| *Lysidice collaris* Grube, 1870 | | | | 1 | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | | | | | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | | | | | | | |
| *Nematoneries unicornis* (Grube, 1840) | | | | | | | | | | | | |
| *Arabella iricolor iricolor* (Montagu, 1804) | | | | | | | | | | | | |
| *Notocirrus australis* Day, 1960 | | | | | | | | | | | | |
| *Oenone* sp. | | | | | | | | | | | | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | | | | | | | | | | | 1 |
| *Diopatra cuprea cuprea* (Bosc, 1802) | | | | | | | | | | | | |
| *Aonides oxycephala* (Sars, 1862) | | | | 4 | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | | | | |
| *Nerinides* sp. | | | | 1 | | | | | | | | |
| *Prionospio* cf. *convexa* Imajima, 1990 | | | | | | | | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | | | | 1 | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | | | | | | | | | |
| *Scolelepis squamata* (Müller, 1806) | | | | | | | | | | | 1 | |
| *Spio* sp. | | | | | | | | | | | | |
| *Magelona* sp. | | | | | | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | | | | | | | |
| *Caulleriella* sp. | | | | | | | | | | | | |
| *Cirratulus* sp. | | | 11 | | | | | | | | | |
| *Cirriformia* sp. | | | | 1 | | | | | | | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | | | | | |
| *Scoloplos* cf. *uniramus* Day, 1961 | | | | | | | | | | | | |
| Orbinidae sp. | 4 | | | | | | | | | | | |
| *Paraonis* sp. | | | | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | | | 1 | | | | | | | | | |
| *Armandia leptocirrus* Grube, 1878 | | | | | | | 131 | 3 | 2 | | | |
| *Armandia melanura* Gravier, 1905 | | | | | | | | | | | | |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | 1 | | | | | | | | | |
| *Anatomastus* sp. | | | | | | | | | | | | |
| *Capitella* cf. *capitata* (Fabricius, 1780) | | | | | | | | | | | | |
| Capitellid sp. 1 | | | | 1 | | | | | | | | |
| *Dasybranchus caducus* (Grube, 1846) | | | | | | | | | | | | |
| *Heteromastides* sp. | | | | | | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | | | | |
| *Notomastus latericeus* Sars, 1851 | | | | | | | | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | | | | | | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | 7 | 7 | | | |
| Terebellid sp. 1 | | | | | | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | | | | | 2 | | | | | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | | | | | | 1 | | | |
| Total: | 7 | 2 | 13 | 13 | 5 | 4 | 131 | 15 | 15 | 2 | 3 | 2 |

Table A4b. MTL benthos samples (see main text for codes for sites and stations). Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | MZ | MZ | MZ | NG | NG | NG | BW | BW | BW | HB | HB | HB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | S3 | S3 | S3 | S3 | S3 | S3 | S3 | S3 | S3 | S3 | S3 | S3 |
| REPLICA | T3C1 | T3C2 | T3C3 | C1 | C2 | C3 | C1 | C2 | C3 | C1 | C2 | C3 |
| *Aphrogenia* sp. | | | | | | | | | | | | |
| *Iphione* cf. *muricata* (Savigny, 1818) | | | | | | | | | | | | |
| Harmothoinae sp. | | | | | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | | | | | | | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | | | | | |
| *Phyllodoce* cf. *castanea* (Marenz., 1879) | | | | | | | | | | | | |
| *Phyllodoce* sp. | | 1 | | | | | | | | | 1 | |
| *Ancistrosyllis parva* Day, 1963 | | | | | | | | | | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | | | | | | | | | | | | |
| *Syllis* cf. *amica* Quatrefages, 1865 | | | | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | | | | | | | | | |
| *Syllis cornuta* Rathke, 1843 | | | | | | | | | | | | |
| *Syllis* cf. *gracilis* Grube, 1840 | | | | | | | | | | | | |
| *Syllis* cf. *prolifera* Krohn, 1852 | | | | | | | | | | | | |
| *Ceratonereis erythraensis* Fauvel, 1918 | | 22 | 7 | | | | | | | 1 | | |
| *Ceratonereis mirabilis* Kinberg, 1866 | | | | | | | 1 | | | | | |
| *Dendronereis arborifera* Peters, 1854 | | | | | | | | | | | 4 | |
| *Namalycastis indica* (Southern, 1921) | | | | | | | | | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | | 25 | | |
| *Nereis coutieri* Gravier, 1899 | | | | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | | | | |
| *Nereis unifasciata* Willey, 1905 | | | | | | | | | | | | |
| *Perinereis nuntia vallata* (Grube, 1857) | | | | | | | | | | | | |
| *Platynereis isolita* Gravier, 1901 | | | | | | | | | | | | |
| *Platynereis pulchella* Gravier, 1901 | | | | | | | | | | | | |
| *Platynereis* sp. | | | | | 1 | | | | | | | |
| *Glycera lancedivae* Schmarda, 1861 | 1 | | 1 | 3 | 3 | | | | | | | |
| *Eunice antennata* (Savigny, 1820) | | | | | | | | | | | | |
| *Eunice indica* Kinberg, 1865 | | | | | | | | | | | | 1 |
| *Lysidice collaris* Grube, 1870 | | | | | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | | | | | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | | | | | 3 | 1 | 3 |
| *Nematoneries unicornis* (Grube, 1840) | | | | | | | | | | | | |
| *Arabella iricolor iricolor* (Montagu, 1804) | | | | | | | | | | | | |
| *Notocirrus australis* Day, 1960 | 1 | | 1 | | | | | | | | | |
| *Oenone* sp. | | | | | | | | | | | | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | | | | | | | | | | | |
| *Diopatra cuprea cuprea* (Bosc, 1802) | 1 | 1 | | | | | | | | 7 | 4 | 5 |
| *Aonides oxycephala* (Sars, 1862) | | 1 | | | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | | | | |
| *Nerinides* sp. | | | | | | | | | | | | |
| *Prionospio* cf. *convexa* Imajima, 1990 | | | | | | | | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | | | | | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | | | | | | | | | |
| *Scolelepis squamata* (Müller, 1806) | | | | | | | | | | | | |
| *Spio* sp. | | 1 | | | | | | | | | | |
| *Magelona* sp. | | | | | | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | 1 | | | | | | |
| *Caulleriella* sp. | | 1 | 3 | | | | | | | | | |
| *Cirratulus* sp. | | | | | | | | | | | | |
| *Cirriformia* sp. | | | | | | | | | | | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | | | | | |
| *Scoloplos* cf. *uniramus* Day, 1961 | | | | | | | | | | | | |
| Orbinidae sp. | | | | | | | | | | | | |
| *Paraonis* sp. | | | 1 | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | | | | | | | | | | | | |
| *Armandia leptocirrus* Grube, 1878 | | | | | | | | | | | | |
| *Armandia melanura* Gravier, 1905 | | | | | | | | | | | | |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | | | | | | | | | | |
| *Anatomastus* sp. | | | | | | | | | | | | |
| *Capitella* cf. *capitata* (Fabricius, 1780) | | | | | | | | | | | 1 | 4 |
| Capitellid sp. 1 | 2 | | 2 | | | | | | | 1 | 1 | |
| *Dasybranchus caducus* (Grube, 1846) | | | | | 1 | | | | | | | |
| *Heteromastides* sp. | | | | | 1 | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | | | | |
| *Notomastus latericeus* Sars, 1851 | | | | | | | | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | | | | | | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | | | | | |
| Terebellid sp. 1 | | | | | | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | | | | | | | | | | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | | | | | | | | | |
| Total: | 5 | 27 | 14 | 3 | 6 | 1 | 1 | 0 | 0 | 37 | 12 | 13 |

Table 5a. MLWN benthos samples (see main text for codes for sites and stations). Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | MZ | MZ | MZ | MZ | MZ | MZ | MZ | MZ | MZ | BW | BW | BW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | S4 | S4 | S4 | S4 | S4 | S4 | S4 | S4 | S4 | S4 | S4 | S4 |
| REPLICA | T1C1 | T1C2 | T1C3 | T2C1 | T2C2 | T2C3 | T3C1 | T3C2 | T3C3 | C1 | C2 | C3 |
| *Aphrogenia* sp. | | | | | 1 | | | | 1 | 1 | | |
| *Iphione* cf. *muricata* (Savigny, 1818) | | | | | | | | | | 1 | | |
| Harmothoinae sp. | | | | | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | | 1 | | | | | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | | | | | |
| *Phyllodoce* cf. *castanea* (Marenz., 1879) | | | | | | | | | | | | |
| *Phyllodoce* sp. | | | | | | | | | | | | |
| *Ancistrosyllis parva* Day, 1963 | | | | | 1 | | | | 1 | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | | | | | | | | | | | | |
| *Syllis* cf. *amica* Quatrefages, 1865 | 1 | | | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | 1 | | | | | | | | |
| *Syllis cornuta* Rathke, 1843 | | | | 1 | 1 | | | | | | | |
| *Syllis* cf. *gracilis* Grube, 1840 | 1 | | | | | | | | | | | |
| *Syllis* cf. *prolifera* Krohn, 1852 | | | | | | | | | | | 1 | |
| *Ceratonereis erythraensis* Fauvel, 1918 | | | | | | | | | | | 3 | |
| *Ceratonereis mirabilis* Kinberg, 1866 | | | | | | | | | | | 1 | |
| *Dendronereis arborifera* Peters, 1854 | | | | | 1 | | | | | | | |
| *Namalycastis indica* (Southern, 1921) | | | | | | | | | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | | | | |
| *Nereis coutieri* Gravier, 1899 | | | | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | | | | |
| *Nereis unifasciata* Willey, 1905 | | | | | | | | | | | | |
| *Perinereis nuntia vallata* (Grube, 1857) | | | | | | | | | | | | |
| *Platynereis isolita* Gravier, 1901 | | | | | | | | | | | 1 | |
| *Platynereis pulchella* Gravier, 1901 | | | | | | | | | | | | |
| *Platynereis* sp. | | | | | | | | | | | | |
| *Glycera lancadivae* Schmarda, 1861 | 1 | | | | | 1 | | | | | | 1 |
| *Eunice antennata* (Savigny, 1820) | | | | | | | | | | | 1 | 2 |
| *Eunice indica* Kinberg, 1865 | | | | | | | | | | | | |
| *Lysidice collaris* Grube, 1870 | | | | | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | | | | | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | | | | | | | |
| *Nematoneries unicornis* (Grube, 1840) | | | | | | | | | | | | |
| *Arabella iricolor iricolor* (Montagu, 1804) | | | | | | | | | | | | |
| *Notocirrus australis* Day, 1960 | | | | | | | | | | | | |
| *Oenone* sp. | | | | | | | | | | | | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | | | | | | | | | | | |
| *Diopatra cuprea cuprea* (Bosc, 1802) | | | | | | | | | | | | |
| *Aonides oxycephala* (Sars, 1862) | | | | | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | | | | |
| *Nerinides* sp. | | | | | | | | | 1 | | | |
| *Prionospio* cf. *convexa* Imajima, 1990 | | | | | 3 | | | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | | | | | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | | | | | | 1 | | | |
| *Scolelepis squamata* (Müller, 1806) | | | | | | | | | 2 | | | |
| *Spio* sp. | | | | | | | | | | | | |
| *Magelona* sp. | | | | | 1 | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | | | | | | | |
| *Caulleriella* sp. | | | | | | | | | | | | |
| *Cirratulus* sp. | | | | | | | | | | | | |
| *Cirriformia* sp. | | | | | | | | | | 1 | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | | | | | |
| *Scoloplos* cf. *uniramus* Day, 1961 | | | | | 1 | | | | | | | |
| Orbinidae sp. | | | | | | | | | | | | |
| *Paraonis* sp. | | | | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | | | | | | | | | | | | |
| *Armandia leptocirrus* Grube, 1878 | | | | | | | | | | | | |
| *Armandia melanura* Gravier, 1905 | | | | | | | | | | | | |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | | | | | | | | | | |
| *Anatomastus* sp. | | | | | | | | | | | | |
| *Capitella* cf. *capitata* (Fabricius, 1780) | | | | | | | | | | | | |
| Capitellid sp. 1 | | | | | | | | | | | | |
| *Dasybranchus caducus* (Grube, 1846) | | | | | | | | | | | | |
| *Heteromastides* sp. | | | | | | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | 7 | | | |
| *Notomastus latericeus* Sars, 1851 | | | | | | | | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | | | | | 1 | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | | | | | |
| Terebellid sp. 1 | | | | | 2 | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | | | | | | | | | | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | | | | | | | | | |
| Total: | 3 | 0 | 0 | 2 | 13 | 1 | 0 | 0 | 13 | 3 | 7 | 3 |

Table 5b. MLWN benthos samples (see main text for codes for sites and stations).
Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | BW | BW | BW | NG | NG | NG | NG | NG | NG |
|---|---|---|---|---|---|---|---|---|---|
| STATION | S5 | S5 | S5 | S4 | S4 | S4 | S5 | S5 | S5 |
| REPLICA | C1 | C2 | C3 | C1 | C2 | C3 | C1 | C2 | C3 |
| *Aphrogenia* sp. | | | | | | | | | |
| *Iphione* cf. *muricata* (Savigny, 1818) | | | | | | | | | |
| Harmothoinae sp. | | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | | | | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | | |
| *Phyllodoce* cf. *castanea* (Marenz., 1879) | | | 2 | | | | | | |
| *Phyllodoce* sp. | | | 1 | | | | | | |
| *Ancistrosyllis parva* Day, 1963 | | | | | | | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | | | | | | | | | |
| *Syllis* cf. *amica* Quatrefages, 1865 | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | | | | | | |
| *Syllis comuta* Rathke, 1843 | | | | | | | | | |
| *Syllis* cf. *gracilis* Grube, 1840 | | | | | | | | | |
| *Syllis* cf. *prolifera* Krohn, 1852 | | | | | | | | | |
| *Ceratonereis erythraensis* Fauvel, 1918 | | | | | | | | | |
| *Ceratonereis mirabilis* Kinberg, 1866 | | | | | | | | | |
| *Dendronereis arborifera* Peters, 1854 | | | | | | | | | |
| *Namalycastis indica* (Southern, 1921) | | | | | | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | |
| *Nereis coutieri* Gravier, 1899 | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | |
| *Nereis unifasciata* Willey, 1905 | | | | | | | | | |
| *Perinereis nuntia vallata* (Grube, 1857) | | | | | | | | | |
| *Platynereis isolita* Gravier, 1901 | | | | | | | | | |
| *Platynereis pulchella* Gravier, 1901 | | | | | | | | | |
| *Platynereis* sp. | | | | | | | | | 1 |
| *Glycera lancadivae* Schmarda, 1861 | | | | 2 | | | | | |
| *Eunice antennata* (Savigny, 1820) | | 1 | | | | | | | |
| *Eunice indica* Kinberg, 1865 | | | | | | | | | |
| *Lysidice collaris* Grube, 1870 | | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | | | | |
| *Nematonereis unicornis* (Grube, 1840) | | | | | | | | | |
| *Arabella iricolor iricolor* (Montagu, 1804) | | | | | | | | | |
| *Notocirrus australis* Day, 1960 | | | | | | | | | |
| *Oenone* sp. | | | | | | | | | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | | | | | | | | |
| *Diopatra cuprea cuprea* (Bosc, 1802) | | | | | | | | | |
| *Aonides oxycephala* (Sars, 1862) | | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | |
| *Nerinides* sp. | | | | | | | | | |
| *Prionospio* cf. *convexa* Imajima, 1990 | | | | | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | | | | | | |
| *Scolelepis squamata* (Müller, 1806) | | | | | | | | | |
| *Spio* sp. | | | | | | | | | |
| *Magelona* sp. | | | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | | | | |
| *Caulleriella* sp. | | | 1 | | | | | | |
| *Cirratulus* sp. | | | 2 | | | | | | |
| *Cirriformia* sp. | | | | | | | | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | | |
| *Scoloplos* cf. *uniramus* Day, 1961 | | | | | | | | | |
| Orbinidae sp. | | | | | | | | | |
| *Paraonis* sp. | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | | | | | | | | | |
| *Armandia leptocirrus* Grube, 1878 | | | | 2 | | | | | 3 |
| *Armandia melanura* Gravier, 1905 | | | | | | | | | |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | | | | | | | 1 |
| *Anatomastus* sp. | | | | | | | | | |
| *Capitella* cf. *capitata* (Fabricius, 1780) | | | | | | | | | |
| Capitellid sp. 1 | | | | | | | | | |
| *Dasybranchus caducus* (Grube, 1846) | | | | | | | | | |
| *Heteromastides* sp. | | | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | |
| *Notomastus latericeus* Sars, 1851 | | | | | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | | | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | | |
| Terebellid sp. 1 | | | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | | | | | | | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | | | | | | |
| | | | | | | | | | |
| Total: | 0 | 1 | 6 | 4 | 0 | 0 | 0 | 0 | 5 |

Table 6. MLWS benthos samples (see main text for codes for sites and stations).
Abbreviations associated with sampling sites: MZ: Mazizini Bay, T1-T4: transects, S1-S5: stations along transect; MK: Makoba; NG: Nungwi; HB: Zanzibar Harbour; MB: Mbweni; KS: Kisakasaka; BW: Bawe Island; C1-C5: replicate core samples.

| SITE | MZ | MZ | MZ | MZ | MZ | MZ | HB | HB | HB |
|---|---|---|---|---|---|---|---|---|---|
| STATION | S5 | S5 | S5 | S5 | S5 | S5 | S4 | S4 | S4 |
| REPLICA | T2C1 | T2C2 | T2C3 | T3C1 | T3C2 | T3C3 | C1 | C2 | C3 |
| *Aphrogenia* sp. | 2 | 2 | | | | | | | |
| *Iphione* cf. *muricata* (Savigny, 1818) | | | | | | | | | |
| Harmothoinae sp. | 1 | | | | | | | | |
| *Sthenelais boa* (Johnston, 1839) | | | | 1 | 1 | 1 | | | |
| *Phyllodoce capensis* Day, 1960 | | | | | | | | | |
| *Phyllodoce* cf. *castanea* (Marenz., 1879) | | | | | | | | | |
| *Phyllodoce* sp. | | | | | | | | | |
| *Ancistrosyllis parva* Day, 1963 | | | | | | | | | |
| *Pharyngeovalvata natalensis* Day, 1951 | | | | | | | | | |
| *Syllis* cf. *amica* Quatrefages, 1865 | | | | | | | | | |
| *Syllis bouvieri* Gravier, 1900 | | | | 4 | | | | | |
| *Syllis cornuta* Rathke, 1843 | 4 | 1 | | 1 | | | | | |
| *Syllis* cf. *gracilis* Grube, 1840 | | | | | | | | | |
| *Syllis* cf. *prolifera* Krohn, 1852 | | | | | | | | | |
| *Ceratonereis erythraensis* Fauvel, 1918 | | | | | | | | | |
| *Ceratonereis mirabilis* Kinberg, 1866 | 1 | | | | | | | | |
| *Dendronereis arborifera* Peters, 1854 | | | | | | | | | |
| *Namalycastis indica* (Southern, 1921) | | | | | | | | | |
| *Nereis caudata* Delle Chiaje, 1841 | | | | | | | | | |
| *Nereis coutieri* Gravier, 1899 | | | | | | | | | |
| *Nereis persica* Fauvel, 1911 | | | | | | | | | |
| *Nereis unifasciata* Willey, 1905 | | | | | | | | | |
| *Pennereis nuntia vallata* (Grube, 1857) | | | | | | | | | |
| *Platynereis isolita* Gravier, 1901 | 1 | | | | | | | | |
| *Platynereis pulchella* Gravier, 1901 | | 1 | 1 | | | | | | |
| *Platynereis* sp. | | 1 | | 1 | | | | | |
| *Glycera lancadivae* Schmarda, 1861 | 4 | | | | | 1 | | | |
| *Eunice antennata* (Savigny, 1820) | | | | | | | | | |
| *Eunice indica* Kinberg, 1865 | | | | | | 1 | | | |
| *Lysidice collaris* Grube, 1870 | | | | | | | | | |
| *Marphysa bifurcata* Kott, 1951 | | | 1 | | | | | | |
| *Marphysa mossambica* (Peters, 1854) | | | | | | | | | |
| *Nematonereis unicornis* (Grube, 1840) | 3 | | | | 1 | | | | |
| *Arabella incolor incolor* (Montagu, 1804) | 1 | | | 4 | 5 | 3 | | | |
| *Notocirrus australis* Day, 1960 | | | | | | | | | |
| *Oenone* sp. | | | | | | | | | |
| *Lumbrineris latreilli* Aud. & M. Ed., 1834 | | 2 | | 1 | 1 | 1 | | | |
| *Diopatra cuprea cuprea* (Bosc, 1802) | | | | | | | | 1 | 3 |
| *Aonides oxycephala* (Sars, 1862) | | | | | | | | | |
| *Malacoceros indicus* (Fauvel, 1928) | | | | | | | | | |
| *Nerinides* sp. | | | | | | | | | |
| *Prionospio* cf. *convexa* Imajima, 1990 | 1 | | | 1 | | | | | |
| *Prionospio malmgreni* Claparède, 1870 | | | | | | | | | |
| *Prionospio sexoculata* Augener, 1918 | | | | 1 | | | | | |
| *Scoletepis squamata* (Müller, 1806) | | | | | 1 | | | | |
| *Spio* sp. | | | | | | | | | |
| *Magelona* sp. | | | | | | | | | |
| *Poecilochaetus serpens* Allen, 1904 | | | | | | | | | |
| *Caulleriella* sp. | | | | | | | | | |
| *Cirratulus* sp. | | | | | | | | | |
| *Cirriformia* sp. | | | | | | | | | |
| *Scoloplos capensis* Day, 1961 | | | | | | | | 1 | |
| *Scoloplos* cf. *uniramus* Day, 1961 | | | | | | | | | |
| Orbinidae sp. | | | | | | | | | |
| *Paraonis* sp. | | | | | | | | | |
| *Armandia intermedia* Fauvel, 1902 | 1 | | | 4 | | 1 | | | 1 |
| *Armandia leptocirrus* Grube, 1878 | 1 | | | | 2 | | | | |
| *Armandia melanura* Gravier, 1905 | | | | | 1 | | | | |
| *Polyophthalmus pictus* (Dujardin, 1839) | | | | | | | | | |
| *Anatomastus* sp. | | | | | | | | | |
| *Capitella* cf. *capitata* (Fabricius, 1780) | | | | | | | | | |
| Capitellid sp. 1 | | 1 | | | | 3 | | | |
| *Dasybranchus caducus* (Grube, 1846) | 2 | | | | 1 | | | | |
| *Heteromastides* sp. | | | | | | | | | |
| *Mediomastus* sp. | | | | | | | | | |
| *Notomastus latericeus* Sars, 1851 | | | | 2 | | | | | |
| *Amphicteis gunneri* (Sars, 1835) | 1 | | | | | | | | |
| *Nicolea venustula africana* Aug., 1918 | | | | | | | | | |
| Terebellid sp. 1 | | | | | | | | | |
| *Terebellides stroemi* Sars, 1835 | 6 | 5 | | 5 | | 2 | | | |
| *Jasmineira elegans* Saint-Joseph, 1894 | | | | | | | | | |
| Total: | 29 | 13 | 2 | 25 | 13 | 13 | 0 | 2 | 4 |

# APPENDIX 2

Table 1. Sources for records of echinoderma fauna of the western Indian Ocean and its distribution. Numbers correspond to sources (see List of Sources to Appendix 2 Table 1 at the end of this section), with records marked '?' equivalent to doubtful records in Clark & Rowe (1971). Numbers in italics correspond to synonyms.

| Taxa | East Afruca | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | Trop. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Class CRINOIDEA** | | | | | | | | | | | | | | | |
| **COMASTERIDAE** | | | | | | | | | | | | | | | |
| *Capillaster multiradiatus* (L.) | 1 | 1 | .. | .. | 1 | ? | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Comanthus wahlbergi* (J.Müller) | 5 | *19* | 9 | 40 | 1 | .. | 34 | .. | .. | 9 | 9 | 9 | .. | .. | .. |
| *Comaster distinctus* (P.H. Carpenter) | 2 | .. | .. | .. | 48 | .. | .. | .. | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Comaster multifidus* (J. Muller) | .. | 19 | .. | .. | .. | .. | 34 | .. | 1 | 1 | 39 | 1 | .. | .. | .. |
| **HIMEROMETRIDAE** | | | | | | | | | | | | | | | |
| *Heterometra africana* (A.H. Clark) | 1 | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Heterometra delagoae* Gislen | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Heterometra gravieri* A.H. Clark | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Heterometra joubini* (A.H. Clark) | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Heterometra madagascarensis* (A.H. Clark) | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **MARIAMETRIDAE** | | | | | | | | | | | | | | | |
| *Dichrometra flagellata* (J. Muller) | 1 | .. | *16* | .. | .. | .. | .. | .. | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Lamprometra klunzingeri* (Hartlaub) | 1 | 7 | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Stephanometra indica* (Smith) | 1 | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| **COLOBOMETRIDAE** | | | | | | | | | | | | | | | |
| *Cenometra emendatrix* (Bell) | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Decametra modica* A.H. Clark | 1 | 1 | .. | .. | .. | .. | ? | ? | .. | .. | .. | .. | .. | .. | .. |
| *Oligometra serripinna* (P.H. Carpenter) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| **TROPIOMETRIDAE** | | | | | | | | | | | | | | | |
| *Tropiometra carinata* (Lamarck) | 1 | 1 | 16 | 1 | 1 | .. | .. | 34 | 34 | .. | .. | .. | .. | .. | .. |
| **ANTEDONIDAE** | | | | | | | | | | | | | | | |
| *Antedon arabica* A.H. Clark & A.M. Clark | 2 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Dorometra mauritiana* A.H. Clark | 1 | 1 | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. |
| *Iridometra malagasiensis* Marshall & Rowe | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **Class ASTEROIDEA** | | | | | | | | | | | | | | | |
| **LUIDIIDAE** | | | | | | | | | | | | | | | |
| *Luidia hardwicki* (Gray) | .. | 1 | .. | 1 | .. | .. | .. | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| *Luidia maculata* Muller & Troschel | 1 | 1 | 16 | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 37 | .. | .. | .. |
| *Luidia mauritiensis* Koehler | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Luidia savignyi* (Auduoin) | 1 | 1 | .. | .. | 1 | .. | .. | 1 | 1 | .. | .. | 1 | .. | .. | .. |
| **ASTROPECTINIDAE** | | | | | | | | | | | | | | | |
| *Astropecten antares* Doderlein | 1 | .. | 16 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Astropecten granulatus* Muller & Troschel | 1 | .. | 16 | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| *Astropecten hemprichi* Muller & Troschel | 1 | 1 | .. | 1 | 1 | .. | .. | ? | ? | .. | .. | .. | .. | .. | .. |
| *Astropecten mauritianus* Gray | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Astropecten monacanthus* Sladen | 1 | .. | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| *Astropecten polyacanthus* Muller & Troschel | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| **ARCHASTERIDAE** | | | | | | | | | | | | | | | |
| *Archaster angulatus* Muller & Troschel | 1 | .. | 16 | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Archaster lorioli* Sukarno & Jangoux | .. | 49 | .. | .. | .. | .. | 49 | .. | .. | .. | .. | .. | .. | .. | .. |
| **GONIASTERIDAE** | | | | | | | | | | | | | | | |
| *Stellaster childreni* Gray | *1* | .. | .. | *1* | *1* | .. | .. | *1* | *1* | *1* | *1* | .. | .. | .. | .. |
| *Stellasteropsis colubrinus* Macan | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **ASTERODISCIDIDAE** | | | | | | | | | | | | | | | |
| *Asterodiscides belli* Rowe | 51 | 51 | .. | .. | .. | 51 | .. | 51 | .. | .. | .. | .. | .. | .. | .. |
| *Asterodiscides tessellatus* Rowe | .. | 50 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **OREASTERIDAE** | | | | | | | | | | | | | | | |
| *Choriaster granulatus* Lutken | 6 | 11 | .. | .. | 1 | .. | 52 | .. | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Culcita schmideliana* (Retzius) | 1 | 1 | .. | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. |
| *Halityle regularis* Fisher | 17 | .. | .. | 17 | .. | .. | .. | .. | 1 | 17 | .. | 37 | .. | .. | .. |
| *Monachaster sanderi* Meissner | 1 | .. | .. | 40 | 40 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Pentaceraster horridus* (Gray) | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Pentaceraster mammillatus* (Auduoin) | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

Table 1 (continued)

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | Trop. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Pentaceraster tuberculatus* (M. & Troschel) | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Protoreaster lincki* (de Blainville) | 1 | 1 | .. | 1 | .. | .. | .. | 1 | 1 | 10 | .. | .. | .. | .. | .. |
| *Protoreaster nodosus* (L.) | 1 | 1 | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| **OPHIDIASTERIDAE** | | | | | | | | | | | | | | | |
| *Andora faouzii* (Macan) | .. | 19 | .. | 1 | .. | 6 | 52 | .. | .. | .. | .. | .. | .. | .. | .. |
| *Cistina columbiae* Gray | .. | 1 | .. | .. | .. | .. | 6 | .. | .. | 10 | .. | 6 | .. | .. | .. |
| *Dactylosaster cylindricus* (Lamarck) | 1 | 1 | .. | 1 | .. | .. | 1 | 1 | 1 | 10 | 39 | 1 | 1 | .. | .. |
| *Ferdina flavescens* Gray | .. | 1 | .. | .. | .. | .. | 52 | .. | .. | .. | .. | .. | .. | .. | .. |
| *Fromia milleporella* (Lamarck) | 1 | 1 | .. | 40 | ? | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Fromia monilis* Perrier | 12 | .. | .. | .. | 6 | .. | 53 | 1 | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Fromia nodosa* A.M. Clark | .. | 1 | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | 45 | .. | .. | .. |
| *Gomophia egyptiaca* Gray | 1 | 1 | .. | .. | 1 | .. | 52 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Leiaster coriaceus* Peters | 1 | 1 | .. | .. | 15 | .. | .. | .. | 1 | 10 | .. | 1 | .. | 6 | .. |
| *Leiaster glaber* Peters | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 1 | .. | .. |
| *Leiaster leachi* (Gray) | .. | 1 | .. | 48 | 1 | .. | 1 | .. | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Linckia guildingi* Gray | 1 | 1 | .. | 1 | ? | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 37 | 37 |
| *Linckia laevigata* (L.) | 1 | 1 | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Linckia multifora* (Lamarck) | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 10 | 1 | 1 | 1 | .. | .. |
| *Nardoa frianti* Koehler | .. | 19 | .. | .. | .. | .. | 52 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Nardoa variolata* (Retzius) | 1 | 1 | .. | 40 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Neoferdina offreti* Muller & Troschel | 11 | 7 | .. | .. | .. | .. | 52 | 1 | 46 | .. | 46 | 46 | .. | .. | .. |
| *Ophidiaster duncani* de Loriol | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. |
| *Ophidiaster hemprichi* Muller & Troschel | 1 | 1 | .. | .. | 1 | .. | 1 | .. | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophidiaster perrieri* de Loriol | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophidiaster cribrarius* Lutken | .. | / | .. | .. | .. | .. | .. | .. | .. | 10 | ? | 46 | .. | .. | .. |
| *Tamaria lithosora* H.L. Clark | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Tamaria marmorata* (Michelin) | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **ASTEROPSEIDAE** | | | | | | | | | | | | | | | |
| *Asteropsis carinifera* (Lamarck) | 1 | 1 | .. | 1 | 1 | .. | 52 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Valvaster striatus* (Lamarck) | .. | 1 | .. | .. | .. | .. | .. | 1 | 1 | 10 | .. | 1 | 1 | .. | .. |
| **ASTERINIDAE** | | | | | | | | | | | | | | | |
| *Asterina burtoni* Gray | 6 | 6 | .. | 6 | 6 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **ACANTHASTERIDAE** | | | | | | | | | | | | | | | |
| *Acanthaster planci* (L.) | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| **PTERASTERIDAE** | | | | | | | | | | | | | | | |
| *Euretaster cribrosus* (v. Martens) | 1 | 1 | .. | 48 | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. |
| **MITHRODIIDAE** | | | | | | | | | | | | | | | |
| *Mithrodia clavigera* (Lamarck) | 1 | 1 | .. | .. | 1 | .. | 1 | .. | 1 | 10 | 1 | 37 | .. | 13 | 13 |
| *Thromidia seychellesensis* Pope & Rowe | .. | 13 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **ECHINASTERIDAE** | | | | | | | | | | | | | | | |
| *Echinaster callosus* v. Marenzeller | 1 | 1 | .. | .. | 1 | .. | .. | 1 | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Echinaster purpureus* (Gray) | 1 | 1 | .. | 48 | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| **ASTERIIDAE** | | | | | | | | | | | | | | | |
| *Stolasterias calamaria* (Gray) | 1 | 1 | 16 | .. | .. | .. | .. | .. | .. | 10 | 1 | 1 | .. | .. | .. |
| **Class OPHIUROIDEA** | | | | | | | | | | | | | | | |
| **OPHIOMYXIDAE** | | | | | | | | | | | | | | | |
| *Ophiomyxa australis* Lutken | 1 | 1 | .. | 48 | 15 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| **EURYALIDAE** | | | | | | | | | | | | | | | |
| *Euryale aspera* Lamarck | 4 | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 37 | .. | .. | .. |
| **GORGONOCEPHALIDAE** | | | | | | | | | | | | | | | |
| *Astroboa clavata* (Lyman) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | .. | 1 | 4 | .. | .. | .. | .. |
| *Astroboa nuda* (Lyman) | 1 | .. | .. | 1 | 1 | .. | .. | .. | 1 | 10 | 1 | 37 | .. | .. | .. |
| *Astrocladus exiguus* (Lamarck) | 4 | .. | .. | .. | .. | .. | .. | 1 | 1 | 10 | 4 | .. | .. | .. | .. |
| *Astroboa granulatus* H.L. Clark | 4 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 37 | .. | .. | .. |
| *Astrocladus tonganus* Doderlein | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| *Astroglymma sculptum* (Doderlein) | .. | 37 | .. | .. | .. | .. | .. | .. | 10 | 10 | 39 | 37 | .. | .. | .. |
| **OPHIACANTHIDAE** | | | | | | | | | | | | | | | |
| *Ophiacantha gracilis* (Studer) | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. |
| **AMPHIURIDAE** | | | | | | | | | | | | | | | |
| *Amphilycus scripta* (Koehler) | 1 | .. | .. | 1 | 1 | .. | .. | 1 | .. | .. | 39 | .. | .. | .. | .. |

Table 1 (continued)

| Taxa | East Afruca | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | Trop. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Amphiodia (Amphiodia) dividua* (Mortensen) | 4 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiodia (Amphiodia) picardi* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiodia (Amphispina) microplax* Burfield | 4 | .. | .. | 48 | 1 | .. | .. | .. | .. | 10 | 39 | .. | .. | .. | .. |
| *Amphioplus (Amphichilus) impressus* (Ljung.) | 4 | 7 | .. | .. | .. | .. | .. | .. | 1 | 10 | 39 | .. | .. | .. | .. |
| *A. (Amphioplus) cyrtacanthus* H.L.Clark | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 39 | .. | .. | .. | .. |
| *A. (Amphioplus) heptagonus* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Amphioplus) longuscutum* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Amphioplus) lucidus* Koehler | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | 39 | .. | .. | .. | .. |
| *A. (Amphioplus) margueritae* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Amphioplus) parvitus* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Amphioplus) polymorphus* Chr. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Amphioplus) spinosus* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Amphioplus) thomassini* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Amphioplus) titubantius* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Lymanella) hastatus* (Ljungman) | 1 | 7 | .. | 1 | 1 | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. |
| *A. (Lymanella) integer* (Ljungman) | 1 | 7 | 16 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *A. (Lymanella) laevis* (Lyman) | 4 | .. | .. | 1 | 1 | .. | .. | .. | 1 | 10 | 1 | 1 | .. | .. | .. |
| *A. (Lymanella) furcatus* Mortensen | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphipholis littoralis* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphipholis loripes* Koehler | 4 | .. | .. | .. | .. | .. | .. | .. | 4 | .. | 39 | .. | .. | .. | .. |
| *Amphipholis serrataspina* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphipholis sigillata* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphipholis squamata* (D.Chiaje) | 1 | 1 | 16 | 1 | 1 | 1 | .. | .. | 1 | 1 | 39 | 1 | 1 | .. | 4 |
| *Amphiura acrisia* H.L. Clark | 4 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| *Amphiura capensis* Ljungman | 16 | .. | 16 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiura candida* Ljungman | 16 | 7 | .. | .. | .. | .. | .. | .. | .. | .. | 4 | .. | .. | .. | .. |
| *Amphiura clausadae* Cherbonnier & Guille | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiura corona* Cherbonnier & Guille | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiura crispa* Mortensen | 4 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiura dejectoides* H.L. Clark | 1 | 7 | .. | .. | 1 | .. | .. | .. | 24 | .. | .. | .. | .. | .. | .. |
| *Amphiura duncani* Lyman | 5 | .. | .. | .. | .. | .. | .. | 1 | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Amphiura leptotata* H.L. Clark | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | 10 | .. | 1 | .. | .. | .. |
| *Amphiura madecassae* Cherbonnier & Guille | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiura micra* H.L. Clark | 4 | .. | .. | .. | .. | .. | .. | .. | 24 | 1 | .. | .. | .. | .. | .. |
| *Amphiura plantei* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiura sexradiata* Koehler | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| *Amphiura (Fellaria) africana* (Balinsky) | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Amphiura (Fellaria) octacantha* (H.L. Clark) | 4 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. |
| *Amphiura (Ophiopeltis) tenuis* (H.L. Clark) | 4 | .. | .. | 48 | .. | 1 | .. | .. | .. | 1 | 39 | .. | .. | .. | .. |
| *Ophiocentrus asper* (Koehler) | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | 10 | .. | 37 | .. | .. | .. |
| *Ophiocentrus crassuspinosus* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiocentrus dilatatus* (Koehler) | 1 | .. | .. | .. | .. | .. | 1 | .. | 1 | 1 | .. | 37 | .. | .. | .. |
| *Ophiocentrus inequalis* (H.L. Clark) | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | 10 | 1 | .. | .. | .. | .. |
| *Ophiocentrus spinacutus* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Paracrocnida sacensis* (Balinsky) | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **OPHIACTIDAE** | | | | | | | | | | | | | | | |
| *Ophiactis carnea* Ljungman | 1 | .. | 16 | 1 | 15 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiactis crosnieri* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiactis delagoa* Balinsky | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiactis hemiteles* H.L. Clark | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| *Ophiactis lymani* Ljungman | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 4 |
| *Ophiactis modesta* Brock | 16 | .. | .. | .. | .. | 1 | .. | 24 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophiactis macrolepidota* Marktann.-Turneret. | *1* | .. | .. | *1* | *1* | .. | .. | .. | .. | 10 | 39 | .. | .. | .. | .. |
| *Ophiactis plana* Lyman | 16 | .. | .. | 48 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiactis picteti* (de Loriol) | 5 | 7 | .. | .. | .. | .. | .. | .. | 1 | .. | 39 | .. | .. | .. | .. |
| *Ophiactis savignyi* Muller & Troschel | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | 4 |
| *Ophiactis versicolor* H.L. Clark | 1 | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiosphaera insignis* Brock | 1 | 19 | .. | .. | .. | .. | .. | .. | 1 | 10 | .. | 37 | .. | .. | .. |

Table 1 (continued)

| Taxa | East Afruca | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | Trop. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OPHIOTRICHIDAE** | | | | | | | | | | | | | | | |
| *Macrophiothrix demessa* (Lyman) | 1 | 1 | .. | 1 | 1 | .. | 1 | .. | 1 | 1 | 43 | 1 | 1 | .. | .. |
| *M. hirsuta* (Muller & Troschel) | 1 | .. | .. | 1 | 1 | .. | .. | 22 | 1 | .. | .. | 1 | .. | .. | .. |
| *M. longipeda* (Lamarck) | 1 | 1 | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *M. robillardi* (de Loriol) | .. | 1 | .. | .. | .. | .. | .. | .. | 43 | 10 | 43 | 43 | .. | .. | .. |
| *M. (Keystonea) nereidina* (Lamarck) | 1 | 1 | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *M. (Keystonea) propinqua* Lyman | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophiocnemis marmorata* (Lamarck) | 1 | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| *Ophiomaza cacaotica* Lyman | 1 | .. | .. | 1 | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophiothela danae* Verrill | 16 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Ophiothela tigris* Lyman | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiothela venusta* (de Loriol) | 1 | .. | .. | 1 | .. | .. | .. | .. | 1 | 10 | .. | .. | .. | .. | .. |
| *Ophiothrix comata* Muller & Troschel | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| *Ophiothrix echinotecta* Balinsky | 1 | .. | .. | 40 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiothrix exigua* Lyman | 4 | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophiothrix foveolata* Mark.- Turneretscher | 1 | .. | .. | .. | .. | .. | 1 | 1 | 1 | 10 | .. | 23 | .. | .. | .. |
| *Ophiothrix picturata* de Loriol | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiothrix savignyi* (Muller & Troschel) | 1 | 4 | .. | 1 | 1 | 1 | 22 | .. | .. | .. | .. | 37 | .. | .. | .. |
| *Ophiothrix tricuspida* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiothrix trilineata* Lutken | 1 | 1 | .. | 40 | 4 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophiothrix tristis* de Loriol | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiothrix vitrea* Doderlein | .. | 1 | .. | .. | .. | .. | .. | 1 | 1 | .. | 1 | .. | .. | .. | .. |
| *Ophiothrix (Acanthophio.) proteus* Koehler | 4 | .. | .. | 1 | 1 | .. | .. | 1 | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Ophiothrix (Acanthophio.) purpurea* Martens | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 10 | 1 | 1 | .. | .. | .. |
| **OPHIOCOMIDAE** | | | | | | | | | | | | | | | |
| *Ophiarthrum elegans* Peters | 1 | 1 | .. | 4 | 4 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophiarthrum lymani* de Loriol | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiocoma brevipes* Peters | 1 | 1 | .. | 30 | 4 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophiocoma dentata* Muller & Troschel | 1 | 1 | .. | 30 | .. | .. | 1 | 20 | 24 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophiocoma doederleini* de Loriol | 5 | 7 | .. | .. | .. | .. | .. | .. | .. | 10 | .. | 10 | .. | .. | .. |
| *Ophiocoma erinaceus* Muller & Troschel | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophiocoma pica* Muller & Troschel | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophiocoma pusilla* (Brock) | 16 | 1 | .. | 48 | 1 | .. | .. | .. | 1 | 10 | 39 | 37 | .. | .. | .. |
| *Ophiocoma scolopendrina* (Lamarck) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophiocoma valenciae* Muller & Troschel | 1 | 1 | .. | 1 | 1 | .. | ? | ? | .. | .. | .. | .. | .. | .. | .. |
| *Ophiocomella sexradia* (Duncan) | 1 | 1 | .. | 48 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophiomastix caryophyllata* Lutken | 1 | 1 | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophiomastix koehleri* Devaney | 5 | 7 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiomastix palaoensis* Murakami | 4 | .. | .. | .. | .. | .. | .. | .. | .. | 10 | .. | 1 | .. | .. | .. |
| *Ophiomastix variablis* Koehler | 1 | 1 | .. | .. | 1 | .. | 1 | .. | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophiomastix venosa* Peters | 1 | 1 | .. | 40 | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. |
| *Ophiopsila paucispina* Koehler | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophiopsila timida* Koehler | 4 | .. | .. | .. | .. | .. | .. | .. | 4 | .. | .. | .. | .. | .. | .. |
| **OPHIONEREIDAE** | | | | | | | | | | | | | | | |
| *Ophionereis australis* (H.L. Clark) | 16 | .. | .. | .. | .. | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. |
| *Ophionereis degeneri* (A.H. Clark) | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. |
| *Ophionereis dubia* (Muller & Troschel) | 1 | 1 | 16 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 37 | .. | .. | .. |
| *Ophionereis hexactis* H.L. Clark | 4 | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| *Ophionereis porrecta* Lyman | 1 | 1 | 16 | .. | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophionereis thryptica* (Murakami) | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| *Ophionereis vivipara* Mortensen | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ophioneroides granum* Chr. & Glle. | 4 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **OPHIODERMATIDAE** | | | | | | | | | | | | | | | |
| *Cryptopelta granulifera* H.L. Clark | .. | 1 | .. | .. | .. | .. | 24 | .. | 24 | 1 | .. | .. | .. | .. | .. |
| *Ophiarachna affinis* Lutken | 1 | 1 | .. | .. | .. | .. | .. | .. | 1 | 10 | .. | 1 | .. | .. | .. |
| *Ophiarachna incrassata* (Lamarck) | 1 | 1 | .. | .. | 15 | .. | .. | 1 | 1 | 1 | 1 | 1 | 50 | .. | .. |
| *Ophiarachna robillardi* de Loriol | .. | 1 | .. | .. | .. | .. | .. | 24 | .. | .. | .. | .. | .. | .. | .. |
| *Ophiarachnella gorgonia* (M. & Troschel) | 1 | 1 | .. | 30 | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *O. macracantha* H.L. Clark | .. | 7 | .. | .. | .. | .. | .. | .. | .. | 10 | .. | 1 | .. | .. | .. |
| *O. septemspinosa* (Muller & Troschel) | 1 | 1 | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | 37 | .. | .. | .. |

Table 1 (continued)

| Taxa | East Afruca | WIO islands | S Africa | Arabian Sea | Rod Sea | W India | Laks-Chagos | Lanka-Bengal | Malay-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | Trop. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Ophiochaeta hirsuta* Lutken | 4 | 1 | .. | .. | .. | .. | 24 | .. | 24 | .. | .. | 1 | .. | .. | .. |
| *Ophioconis cincta* Brock | 1 | 7 | .. | 1 | 1 | .. | .. | .. | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Ophiopeza fallax* Peters | 1 | 1 | .. | 1 | 1 | 1 | .. | ? | 1 | .. | .. | .. | .. | .. | .. |
| *Ophiopeza spinosa* (Ljungman) | 4 | 1 | .. | 40 | 15 | .. | 1 | .. | 1 | 10 | 39 | 1 | 1 | .. | .. |
| **OPHIURIDAE** | | | | | | | | | | | | | | | |
| *Ophiolepis cincta* Muller & Troschel | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophiolepis irregularis* Brock | 4 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | 1 | .. | .. | .. |
| *Ophiolepis superba* H.L. Clark | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Ophioplocus imbricatus* Muller & Troschel | 1 | 1 | .. | 30 | .. | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Ophiura kinbergi* (Ljungman) | 16 | 19 | .. | 1 | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| **Class ECHINOIDEA** | | | | | | | | | | | | | | | |
| **CIDARIDAE** | | | | | | | | | | | | | | | |
| *Eucidaris metularia* (Lamarck) | 1 | 1 | .. | 40 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Phyllacanthus imperialis* (Lamarck) | 1 | 1 | .. | .. | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Prionocidaris baculosa* (Lamarck) | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 10 | 1 | 37 | .. | .. | .. |
| *Prionocidaris pistillaris* (Lamarck) | 1 | 1 | 16 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Prionocidaris verticillata* (Lamarck) | 1 | 1 | .. | 48 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| **ECHINOTHURIDAE** | | | | | | | | | | | | | | | |
| *Asthenosoma varium* Grube | 11 | .. | .. | 48 | 1 | .. | 1 | 1 | 1 | 10 | 1 | 37 | .. | .. | .. |
| **DIADEMATIDAE** | | | | | | | | | | | | | | | |
| *Astropyga radiata* (Leske) | 1 | 1 | .. | 1 | 31 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Diadema savignyi* Michelin | 1 | 1 | .. | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Diadema setosum* (Leske) | 1 | 1 | .. | 1 | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Echinothrix calamaris* (Pallas) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Echinothrix diadema* (L.) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| **STOMOPNEUSTIDAE** | | | | | | | | | | | | | | | |
| *Stomopneustes variolaris* (Lamarck) | 1 | 1 | .. | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| **TEMNOPLEURIDAE** | | | | | | | | | | | | | | | |
| *Microcyphus maculatus* L. Agassiz | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Microcyphus rousseaui* L. Agassiz | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. |
| *Salmaciella dussumieri* L. Agassiz | 1 | 1 | .. | 1 | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Salmacis bicolor* L. | 1 | 1 | .. | 30 | 1 | 1 | 1 | 1 | 1 | .. | 1 | .. | .. | .. | .. |
| *Temnopleurus reevesi* (Gray) | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. |
| *Temnopleurus toreumaticus* (Leske) | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Temnotrema siamense* (Mortensen) | 1 | 1 | .. | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| **TOXOPNEUSTIDAE** | | | | | | | | | | | | | | | |
| *Cyrtechinus verruculatus* (Lütken) | .. | 1 | .. | .. | .. | .. | .. | .. | 1 | 1 | 39 | 1 | 1 | .. | .. |
| *Gymnechinus robillardi* (de Loriol) | 1 | 1 | .. | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| *Pseudoboletia indiana* (Michelin) | 1 | 1 | .. | .. | .. | .. | .. | 1 | 1 | 1 | 39 | 37 | 1 | .. | .. |
| *Toxopneustes pileolus* (Lamarck) | 1 | 1 | .. | 1 | 31 | .. | .. | 1 | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Tripneustes gratilla* (L.) | 1 | 1 | 16 | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| **PARASALENIIDAE** | | | | | | | | | | | | | | | |
| *Parasalenia gratiosa* A. Agassiz | 1 | 7 | .. | .. | .. | .. | 1 | .. | 1 | 1 | 1 | 1 | .. | .. | .. |
| **ECHINOMETRIDAE** | | | | | | | | | | | | | | | |
| *Colobocentrotus atratus* (L.) | 1 | 1 | .. | 40 | .. | .. | .. | 1 | 1 | .. | .. | .. | 1 | .. | .. |
| *Echinometra mathaei* (de Blainville) | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Echinostrephus molaris* (de Blainville) | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Heterocentrotus mammillatus* (L.) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Heterocentrotus trigonarius* (Lamarck) | 1 | 1 | .. | 48 | 31 | .. | .. | .. | 1 | .. | 1 | 1 | .. | .. | .. |
| **ECHINONEIDAE** | | | | | | | | | | | | | | | |
| *Echinoneus abnormalis* de Loriol | .. | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | 39 | 1 | 1 | .. | .. |
| *Echinoneus cyclostomus* Leske | 1 | 1 | .. | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | 39 |
| **CLYPEASTERIDAE** | | | | | | | | | | | | | | | |
| *Clypeaster fervens* Koehler | 1 | 1 | .. | 1 | 1 | .. | .. | 1 | 1 | .. | 1 | .. | .. | .. | .. |
| *Clypeaster humilis* (Leske) | 1 | .. | .. | 1 | 1 | 1 | .. | 1 | 1 | 1 | .. | 1 | .. | .. | .. |
| *Clypeaster rarispinus* de Meijere | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. | .. | .. | .. |
| *Clypeaster reticulatus* (L.) | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |

Table 1 (continued)

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FIBULARIIDAE** | | | | | | | | | | | | | | | |
| *Echinocyamus crispus* Mazetti | 1 | 7 | .. | 1 | 1 | .. | 1 | 1 | 1 | 10 | 1 | .. | 1 | .. | .. |
| *Echinocyamus grandis* H.L. Clark | .. | 19 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Fibularia ovulum* Lamarck | 1 | 7 | .. | .. | 1 | .. | 1 | 1 | 1 | 10 | 1 | 1 | .. | .. | .. |
| *Fibularia volva* A. Agassiz | .. | 18 | .. | 1 | 1 | 39 | .. | ? | 1 | 10 | 1 | 23 | ? | .. | .. |
| **LAGANIDAE** | | | | | | | | | | | | | | | |
| *Laganum depressum* Lesson | 1 | 1 | .. | 48 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Laganum joubini* (Koehler) | 1 | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **ASTRICLYPEIDAE** | | | | | | | | | | | | | | | |
| *Echinodiscus auritus* Leske | 1 | 1 | .. | 1 | 1 | 1 | .. | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| *Echinodiscus bisperforatus* Leske | 1 | ? | .. | 1 | 1 | .. | .. | 1 | 1 | .. | .. | 37 | .. | .. | .. |
| **ECHINOLAMPADIDAE** | | | | | | | | | | | | | | | |
| *Echinolampas alexandri* de Loriol | .. | 1 | .. | 1 | 31 | .. | .. | 1 | 1 | .. | .. | 1 | .. | .. | .. |
| *Echinolampas ovata* (Leske) | .. | 1 | .. | .. | 1 | .. | .. | 1 | 1 | 1 | .. | .. | .. | .. | .. |
| **SPATANGIDAE** | | | | | | | | | | | | | | | |
| *Maretia planulata* (Lamarck) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Pseudomaretia alta* (A. Agassiz) | .. | 1 | .. | .. | .. | .. | 1 | 1 | 1 | .. | 1 | .. | .. | .. | .. |
| **LOVENIIDAE** | | | | | | | | | | | | | | | |
| *Lovenia elongata* (Gray) | 1 | .. | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 37 | .. | .. | .. |
| *Lovenia subcarinata* (Gray) | 1 | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | 1 | .. | .. | .. | .. |
| **SCHIZASTERIDAE** | | | | | | | | | | | | | | | |
| *Diploporaster barbatus* Mort. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Diploporaster savignyi* (Fourtau) | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Moira stygia* Lutken | 1 | .. | .. | .. | 1 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. |
| *Paraster gibberulus* (L. Agassiz) | 1 | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| *Prymnaster investigatoris* Koehler | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| *Schizaster lacunosus* (L.) | 1 | 7 | .. | .. | 48 | .. | 16 | .. | 1 | 1 | 1 | 37 | .. | .. | .. |
| **BRISSIDAE** | | | | | | | | | | | | | | | |
| *Brissopsis luzonicus* (Gray) | 1 | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Brissus latecarinatus* (Leske) | 1 | 1 | .. | .. | 31 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Metalia dicrana* H.L. Clark | .. | 7 | .. | .. | .. | .. | .. | .. | 1 | 10 | 39 | 1 | .. | .. | .. |
| *Metalia robillardi* (de Loriol) | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | 39 | .. | .. | .. | .. |
| *Metalia spatagus* (L.) | 1 | 1 | .. | 1 | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Metalia sternalis* (Lamarck) | 1 | 1 | .. | 1 | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| **Class HOLOTHURIOIDEA** | | | | | | | | | | | | | | | |
| **HOLOTHURIIDAE** | | | | | | | | | | | | | | | |
| *Actinopyga bacilla* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Actinopyga bannwarthi* Panning | 3 | 7? | .. | 1 | 1 | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. |
| *Actinopyga echinites* (Jaeger) | 1 | 1 | .. | 1 | 3 | .. | 22 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Actinopyga lecanora* (Jaeger) | 1 | 1 | .. | 1 | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Actinopyga mauritiana* (Quoy & Gaimard) | 1 | 1 | .. | 40 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Actinopyga miliaris* (Quoy & Gaimard) | 1 | 1 | .. | .. | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Actinopyga obesa* (Selenka) | 3 | .. | .. | .. | .. | .. | .. | .. | 1 | 10 | 1 | 36 | 1 | .. | .. |
| *Actinopyga serratidens* Pearson | 3 | 3 | .. | .. | 1 | .. | .. | 1 | 1 | 10 | .. | .. | .. | .. | .. |
| *Bohadschia argus* Jaeger | 3 | 1 | .. | .. | .. | .. | 22 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Bohadschia cousteaui* Cherbonnier | 3 | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Bohadschia koellikeri* (Semper) | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. |
| *Bohadschia marmorata* Jaeger | 1 | 1 | .. | .. | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Bohadschia mitsionensis* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Bohadschia similis* (Semper) | .. | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. |
| *Bohadschia subrubra* (Quoy & Gaimard) | 3 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Bohadschia tenuissima* (Semper) | 3 | .. | .. | .. | 1 | .. | 1 | 1 | 1 | .. | 1 | 1 | .. | .. | .. |
| *Bohadschia vitiensis* (Semper) | 3 | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | 37 | .. | .. |
| *Holothuria (Cystipus) mammosa* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Cystipus) rigida* (Selenka) | 1 | 1 | .. | 48 | 1 | .. | 1 | .. | 1 | 1 | 21 | 1 | .. | 51 | .. |
| *H. (Halodeima) atra* (Jaeger) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *H. (Halodeima) edulis* Lesson | 1 | .. | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 3 | .. | .. |
| *H. (Halodeima) pulla* Selenka | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | .. | .. |
| *H. (Lessonothuria) duoturricula* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Lessonothuria) hawaiiensis* Fisher | 3 | .. | .. | .. | .. | .. | .. | .. | .. | 44 | .. | 44 | 3 | .. | .. |

Table 1 (continued)

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *H. (Lessonothuria) pardalis* Selenka | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 51 | .. |
| *H. (Lessonothuria) verrucosa* Selenka | 1 | 1 | .. | .. | .. | .. | .. | .. | 1 | 1 | 39 | 37 | 1 | .. | .. |
| *H. (Mertensiothuria) albofusca* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Mertensiothuria) fuscorubra* Théel | .. | 8 | .. | 8 | .. | .. | .. | .. | .. | 10 | 10 | .. | 10 | | |
| *H. (Mertensiothuria) leucospilota* (Brandt) | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 21 | 1 | 1 | 51 | .. |
| *H. (Metriatyla) albiventer* Semper | 1 | .. | .. | .. | 1 | .. | 1 | .. | 1 | 1 | 39 | 1 | .. | .. | .. |
| *H. (Metriatyla) fuligina* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Metriatyla) martensi* Semper | 1 | .. | .. | 1 | 48 | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| *H. (Metriatyla) scabra* Jaeger | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *H. (Microthele) fuscopunctata* Jaeger | 3 | .. | .. | .. | .. | .. | .. | .. | 1 | 10 | 39 | 37 | .. | .. | .. |
| *H. (Microthele) nobilis* (Selenka) | 1 | 1 | .. | 40 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *H. (Microthele) whitmaei* Bell | 8 | .. | .. | .. | .. | .. | .. | .. | .. | 10 | 10 | 10 | / | .. | .. |
| *H. (Platyperona) crosnieri* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Platyperona) difficilis* Semper | 3 | 1 | .. | .. | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 44 | .. |
| *H. (Platyperona) excellens* (Ludwig) | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 3 | .. | .. | .. |
| *H. (Platyperona) insolita* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Platyperona) samoana* Ludwig | 3 | .. | .. | .. | .. | .. | .. | .. | .. | 10 | .. | 10 | .. | .. | .. |
| *H. (Selenkothuria) bacilla* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Selenkothuria) erinaceus* (Brandt) | 3 | .. | .. | 40 | .. | .. | .. | 1 | 1 | 1 | 3? | 1 | .. | .. | .. |
| *H. (Selenkothuria) moebii* Ludwig | .. | 1 | .. | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *H. (Selenkothuria) parva* Krauss in Lampert | 1 | 7 | .. | 1 | 1 | .. | .. | 3 | .. | .. | .. | .. | .. | .. | .. |
| *H. (Selenkothuria) spinea* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Selenkothuria) vittalonga* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Semperothuria) cinerascens* (Brandt) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *H. (Semperothuria) flavomaculata* Semper | 3 | .. | .. | .. | 1 | .. | .. | 37 | 1 | 10 | 21 | 1 | .. | .. | .. |
| *H. (Semperothuria) granosa* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *H. (Stauropora) dofleini* Augustin | 8 | .. | .. | .. | .. | .. | .. | .. | 10 | 10 | 10 | 10 | 8 | .. | .. |
| *H. (Stauropora) fuscocinerea* Jaeger | 1 | 1 | .. | .. | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | 51 | .. |
| *H. (Stauropora) pervicax* Selenka | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 21 | 1 | 1 | .. | .. |
| *H. (Stauropora) olivaceus* Ludwig | 3 | .. | .. | .. | 3 | .. | .. | .. | 1 | 10 | 21 | 10 | 10 | .. | .. |
| *H. (Theelothuria) maculosa* Pearson | 3 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 37 | .. | .. | .. |
| *H. (Thymiosycia) arenicola* Semper | 1 | 1 | .. | 48 | 1 | 32 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 51 | 51 |
| *H. (Thymiosycia) conusalba* Cherb. & Féral | 11 | .. | .. | .. | .. | .. | .. | .. | 37 | 10 | .. | 37 | .. | .. | .. |
| *H. (Thymiosycia) gracilis* Semper | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | 10 | 21 | 1 | .. | .. | .. |
| *H. (Thymiosycia) hilla* Lesson | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 51 | .. |
| *H. (Thymiosycia) impatiens* (Forskål) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 51 | 3 |
| *H. (Thymiosycia) remollescens* Lampert | .. | 7 | .. | .. | 1 | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. |
| *H. (Thymiosycia) strigosa* Selenka | 1 | .. | .. | 40 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Labidodemas pertinax* (Ludwig) | 3 | .. | .. | .. | .. | .. | 3 | .. | 3 | 10 | 25 | 3 | .. | .. | .. |
| *Labidodemas rugosum* (Ludwig) | 3 | 7 | .. | 40 | .. | .. | 1 | 1 | 1 | 1 | .. | 1 | .. | .. | .. |
| *Labidodemas semperianum* (Selenka) | 5 | .. | .. | 48 | 42 | .. | .. | 1 | 1 | 1 | 39 | 1 | 1 | .. | .. |
| *Pearsonothuria graeffei* (Semper) | 3 | .. | .. | .. | 1 | .. | 1 | .. | 1 | 10 | 25 | 1 | .. | .. | .. |
| **STICHOPODIDAE** | | | | | | | | | | | | | | | |
| *Neostichopus grammatus* (H.L. Clark) | 3 | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Stichopus chloronotus* Brandt | 1 | 1 | .. | 3 | 15 | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Stichopus hermanni* Semper | 1 | ? | .. | ? | ? | . | 38? | ? | 10 | 10 | .. | 10 | .. | .. | .. |
| *Stichopus horrens* Selenka | 14 | 7 | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. |
| *Stichopus monotuberculatus* (Quoy & Gaimard) | 1 | 1 | .. | 1 | 1 | .. | .. | .. | 44 | 10 | 44 | 44 | .. | .. | .. |
| *Thelenota ananas* (Jaeger) | 3 | 1 | .. | .. | .. | .. | 1 | .. | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Thelenota anax* H.L. Clark | 3 | .. | .. | .. | .. | .. | .. | .. | 3 | 1 | 39 | 47 | .. | .. | .. |
| **PSOLIDAE** | | | | | | | | | | | | | | | |
| *Psolus appendiculatus* de Blainville | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **CUCUMARIIDAE** | | | | | | | | | | | | | | | |
| *Colochirus quadrangularis* (Lesson) | 10 | .. | .. | .. | .. | .. | .. | 1 | 10 | 10 | 1 | .. | .. | .. | .. |
| *Cucumella decaryi* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Koehleria unica* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Plesiocolochirus cylindricus* (Semper) | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Plesiocolochirus dispar* (Lampert) | 3 | .. | .. | 1 | 3 | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. |
| *Plesiocolochirus tantulus* (Cherbonnier) | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Plesiocolochirus tesselera* (Cherbonnier) | 29 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

Table 1 (continued)

| Taxa | East Africa | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | Trop. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Plesiocolochirus verrucula* (Cherbonnier) | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Pseudocnella sinorbis* (Cherbonnier) | 29 | .. | 29 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Pseudocnella sykion* (Lampert) | 29 | .. | 29 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Pseudocolochirus violaceus* (Theel) | 3 | .. | .. | .. | 3 | .. | .. | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| *Psolidium ornatum* (Ed. Perrier) | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Roweia frauenfeldi* (Ludwig) | 29 | .. | 29 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Trachythyone crucifera* (Semper) | 1 | 1 | 29 | 1 | 1 | .. | .. | 29 | .. | .. | .. | .. | .. | .. | .. |
| **SCLERODACTYLIDAE** | | | | | | | | | | | | | | | |
| *Afrococumis africana* (Semper) | 1 | 1 | .. | 40 | .. | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Cladolabes acicula* (Semper) | .. | 1 | .. | .. | .. | 1 | .. | 1 | 1 | 1 | 39 | 1 | 37 | .. | .. |
| *Cladolabes bifurcatus* (Deichmann) | 3 | .. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Cladolabes pichoni* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Globosita murrea* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Ohshimella ehrenbergi* (Selenka) | 1 | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | 39 | .. | .. | .. | .. |
| *Ohshimella mauritiensis* Heding & Panning | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **PHYLLOPHORIDAE** | | | | | | | | | | | | | | | |
| *Athyone exila* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Athyone maculispara* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Parathyone incurva* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Havelockia ferali* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Havelockia turripinea* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Havelockia versicolor* (Semper) | 27 | .. | .. | .. | .. | .. | .. | 33 | 1 | 1 | 39 | .. | .. | .. | .. |
| *Hemithyone semperi* (Bell) | 1 | .. | .. | .. | .. | 1 | .. | 1 | 1 | 1 | .. | .. | .. | .. | .. |
| *Lipotrapeza ambigua* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Lipotrapeza incurva* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Lipotrapeza ventripes* (Joshua & Creed) | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Neothyonidium dissimilis* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Phyllophorus (Phyllonovus) anomalia* Cherb. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *P. (Phyllophorella) contractura* Cherb. | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *P. (Urodemella) brocki* Ludwig | 3 | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 | .. | .. | .. | .. | .. |
| *P. (Urodemella) oculus* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *P. (Urodemella) tenuis* Haacke | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Selenkiella paradoxa* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Stolus buccalis* (Stimpson) | 1 | .. | .. | 1 | 3 | 1 | .. | 1 | 1 | 1 | 1 | .. | .. | .. | .. |
| *Thyone avenusta* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone carens* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone comata* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone crebrapodia* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone curvata* Lampert | 1 | .. | .. | .. | 15 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone guillei* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone longicornis* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone sineturra* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone vadosa* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyone venusta* Selenka | 28 | .. | .. | .. | 28 | .. | .. | .. | .. | 1 | .. | 47 | .. | .. | .. |
| *Thyonidiella exigua* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Thyonidiella oceana* Heding & Panning | 3 | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 23 | .. | .. | .. |
| **SYNAPTIDAE** | | | | | | | | | | | | | | | |
| *Anapta gracilis* Semper | 1 | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | 39 | 1 | .. | .. | .. |
| *Euapta godeffroyi* (Semper) | 1 | 1 | .. | .. | 1 | .. | 1 | .. | 1 | 1 | 39 | 1 | 1 | .. | .. |
| *Leptosynapta geyserensis* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Leptosynapta oblonga* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Leptosynapta tantula* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Opheodesoma grisea* (Semper) | 1 | 3 | .. | 1 | 1 | .. | .. | 1 | 1 | 1 | 39 | 35 | 1 | .. | .. |
| *Opheodesoma serpentina* (J. Müller) | 1 | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. |
| *Opheodesoma sinevirga* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Patinapta crosslandi* Heding | 1 | .. | 26 | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Patinapta ooplax* von Marenzeller | 1 | .. | .. | .. | .. | .. | 1 | .. | 1 | .. | 1 | 1 | .. | .. | .. |
| *Patinapta vaughani* Cherbonnier | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Polyplectona kefersteini* (Selenka) | .. | 7 | .. | .. | 1 | .. | .. | .. | 1 | 1 | 39 | 1 | 1 | 44 | .. |
| *Protankyra picardi* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

Table 1 (continued)

| Taxa | East Afruca | WIO islands | S Africa | Arabian Sea | Red Sea | W India | Laks-Chagos | Lanka-Bengal | Malay-Indon. | N Australia | China-Japan | W Pacific Is. | Hawaii | E Pacific | Trop. Atlantic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Synapta maculata* (Chamisso & Eysenhardt) | 1 | 1 | .. | 1 | 1 | .. | 1 | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Synaptula mortenseni* Heding | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Synaptula reciprocans* (Forskal) | 3 | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| **CHIRODOTIDAE** | | | | | | | | | | | | | | | |
| *Chiridota eximia* Haacke | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Chiridota rigida* Semper | 41 | .. | 41 ? | . | .. | .. | .. | .. | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Chiridota stuhlmanni* Lampert | 1 | 7 | .. | .. | 42 | .. | 3 | .. | 38 | .. | 39 | 1 | .. | .. | .. |
| *Chiridota violacea* J. Müller | 1 | 7 | .. | .. | .. | .. | 1 | .. | 3 | .. | .. | .. | .. | .. | .. |
| *Polycheira rufescens* (Brandt) | 1 | 1 | 26 | .. | .. | .. | .. | 1 | 1 | 1 | 1 | 1 | .. | .. | .. |
| *Trochodota mira* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| *Trochodota vivipara* Cherbonnier | 3 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

## LIST OF SOURCES TO APPENDIX 2 TABLE 1.

1. Clark & Rowe (1971)
2. Marshall & Rowe (1981)
3. Cherbonnier (1988)
4. Cherbonnier & Guille (1978)
5. Humphreys (1981)
6. Clark (1993)
7. Sloan *et al.* (1979)
8. Rowe *pers. com.*
9. Rowe *et al.* (1986)
10. Rowe & Gates (1995)
11. Spm. obs./photogr. by MDR
12. Spm. identified by Rowe
13. Pope & Rowe (1977)
14. Spm. identified by Pawson
15. Vine (1986)
16. Clark & Courtman-Stock (1967)
17. Baker & Marsh (1976)
18. Hughes & Gamble (1977)
19. Clark (1984)
20. James (1987)
21. Liao (1979)
22. Clark & Taylor (1971)
23. Pawson (1995)
24. Price & Rowe (1996)
25. Liao (1997)
26. Thandar (1989a)
27. Thandar (1989b)
28. Thandar (1990)
29. Thandar (1991)
30. Campbell & Morrison (1988)
31. Roman (1979)
32. Tahera & Tirmizi (1995)
33. James (1979)
34. Crossland & Price (*in press*)
35. Kerr (1994)
36. Kerr *et al.* (1993)
37. Guille *et al.* (1986)
38. Price & Reid (1985)
39. Liao & Clark (1995)
40. Tortonese (1980)
41. Thandar & Rowe (1989)
42. Tortonese (1977)
43. Hogget (1991)
44. Massin (1996)
45. Oguro & Sasayama (1984)
46. Marsh (1977)
47. Rowe & Doty (1977)
48. Price (1982)
49. Sukarno & Jangoux (1977)
50. Rowe (1977)
51. Rowe (1985b)
52. Moosleitner (1997)
53. Marsh & Price (1991)

## SYNONYMS ADOPTED IN THE PRESENT STUDY

Synonyms in square brackets, where possible with defining authority.

**Crinoidea**
*Comanthus wahbergi* [*Commisia hatmeyeri*; *Commisia ignota*]
*Dichrometra flagellata* [*D. afra* A.H. Clark : Marshall & Rowe (1981)]

**Asteroidea**
*Neoferdina offreti* Muller & Troschel [*N. mahei* Jangoux: Clark (1993)]
*Ophidiaster cribrarius* Lutken [*Ophidiaster robillardi* Loriol]
*Asterina burtoni* Gray [*Asterina wega* Perrier]

**Ophiuroidea**
*Amphilycus scripta* Koehler [*Ophidaphne scripta* Koehler]
*Amphiura candida* Ljungman [*Amphiura kalki*]
*Amphiura dejectoides* H.L. Clark [*A. inhacensis*]
*Amphiura duncani* Lyman [*A. luetkeni* Duncan]
*Amphiura (Fellaria) octacantha* (H.L. Clark) [*Amphiura (Ophiopeltis) iranica* (Mortensen)]
*Ophiactis macrolepidota* Marktanner-Turneretscher [*Ophiactis parva* Mortensen]
*Ophiothela danae* Verrill [*Ophiothela hadra* H.L. Clark]
*Ophiothela venusta* (de Loriol) [*Ophiothela beauforti* Engel]
*Ophiomastix koehleri* Devaney[*Ophiomastix wendti* sensu Koehler]
*Ophiomastix variablis* Koehler [*Ophiomastix bispinosa*]
*Ophiarachna affinis* Lutken [*Ophiarachna mauritiensis*]
*Ophiochaeta hirsuta* Lutken [*Ophiochaeta boschmae*; *Ophiochaeta crinita*]
*Ophioconis cincta* Brock [*Ophioconis permixta*; *Ophioconis cupida*]
*Ophiopeza spinosa* (Ljungman) [*Ophiopeza dubiosa*]
*Ophiolepis irregularis* Brock [*Ophiolepis cardioplax* Murakami]

**Holothuroidea**
*Actinopyga echinites* (Jaeger) [*Actinopyga crassa, A. plebeja*: Rowe (1995)]
*Holothuria (Lessonothuria) pardalis* Selenka [*H. insignis* Ludwig]
*Holothuria (Microthele) nobilis* (Selenka) [*Holothuria fuscogilva*]
*Holothuria (Platyperona) samoana* Ludwig [*Holothuria altimensis* H.L. Clark]
*Havelockia versicolor* (Semper) [*Havelockia mirabilis* (Ludwig)]
*Thyone venusta* Selenka [*Thyone okeni*]
*Opheodesoma grisea* (Semper) [*Opheodesoma mauritiae* Heding]
*Polycheira rufescens* (Brandt) [*Polycheira fusca* (Q. & G.): Cherbonnier (1952).