

GOMBRT Publication No. 23



COMMON MOLLUSCS OF GULF OF MANNAR



GULF OF MANNAR BIOSPHERE RESERVE TRUST

RAMANATHAPURAM - 623 504

Tamil Nadu

GOMBRT Publication No. 23



COMMON MOLLUSCS OF GULF OF MANNAR

November 2012



Gulf of Mannar Biosphere Reserve Trust
Ramanathapuram - 623 504, Tamil Nadu, India

Citation : Anbalagan, T. and V. Deepak Samuel 2012. Common Molluscs of Gulf of Mannar, Publication No.23, 66 p.

This Publication has no commercial value
It is for circulation among various stakeholders and researchers

November 2012

Compiled by

Dr. T. Anbalagan
Biodiversity Programme Officer

Dr. V. Deepak Samuel
Programme Specialist
Energy & Environment Unit
United Nations Development Programme

Gulf of Mannar Biosphere Reserve Trust
Ramanathapuram - 623 504, Tamil Nadu, India

Published by

Gulf of Mannar Biosphere Reserve Trust
Ramanathapuram - 623 504, Tamil Nadu, India

Typeset and Printed by

Rehana Offset Printers, Srivilliputtur - 626 125
Phone : 04563-260383, E-mail : rehanaoffset@yahoo.co.in



GULF OF MANNAR BIOSPHERE RESERVE TRUST (GoMBRT)



(A Statutory Trust of the Government of Tamil Nadu)

S. Balaji, I.F.S.

Chief Conservator of Forests and
Trust Director

Gulf of Mannar Biosphere Reserve Trust
102/26, Jawan Bhavan First Floor
Kenikarai
Ramanathapuram - 623 503

FOREWORD

Gulf of Mannar Biosphere Reserve Trust, a State Government owned "Special purpose Vehicle" Agency, spearheads a movement of conservation of coastal and marine biodiversity in Gulf of Mannar Biosphere Reserve Region, located in south eastern India. This Reserve has the richest faunal and floral repository in the entire South east Asia, in terms of both diversity and density, numbering about 4223 species. Owing to its uniqueness. Government of India declared Gulf of Mannar as the country's first Biosphere Reserve during 1989.

Global Environment Facility (GEF), in association with UNDP, concerned over the necessity to preserve this rich heritage, commissioned a project "Conservation and sustainable Management of coastal and Marine bio-diversity in Gulf of Mannar" during 2002. This project, co-funded by Government of Tamil Nadu, envisages multi-stakeholder participation in the learning and management process pertaining to resources use in the Reserve. During 10 years of Implementation of this project, Government of Tamil Nadu, Government of India, NGO's, various Government departments, Research agencies and project village

Marine conservation and Eco-development committies have accomplished awareness creation and capacity building among the resource users and managers to a significant extent, resulting in abatement of over exploitation and unsustainable use of the coastal and marine resources, toward building capacity among stakeholders. The Trust has been commissioning research works in areas of marine biodiversity conservation and management and circulating key findings among the academia and other stakeholders, which has created a positive impact among all on the need for conserving marine resources of the region for posterity and prosperity. The Trust has so far, published 22 number of science series publication in the last decade, which has been reported to having immense knowledge value and use.

This publication is intended to serve as a pictorial field guide on Common Molluscs found in the Gulf of Mannar. I am sure this guide will greatly help marine biology students, scientists, resource managers and all other stakeholders in identification of molluscs in this region, whose conservation the project envisions.

20-11-2012
Ramanathapuram



(S. BALAJI)
Chief Conservator of Forests &
Trust Director

CONTENTS

Useful Technical Terms (From FAO)	1
Introduction	7
BIVALVES	10
<i>Trisidos tortuosa</i> (Linnaeus, 1758)	13
<i>Circe scripta</i> (Linnaeus, 1758)	14
<i>Donax faba</i> Gmelin, 1791	15
<i>Isognomon isognomon</i> (Linnaeus, 1758)	16
<i>Atrina pectinata</i> (Linnaeus, 1767)	17
<i>Placuna placenta</i> (Linnaeus, 1758)	18
<i>Pholas orientalis</i> Gmelin, 1791	19
<i>Paphia malabarica</i> (Chemnitz, 1782)	20
<i>Paphia textile</i> (Gmelin, 1791)	21
<i>Crassostrea madrasensis</i> (Preston)	22
<i>Pinctada fucata</i> (Gould, 1850)	23
<i>Malleus malleus</i> (Linnaeus, 1758)	24
<i>Cucullaea labiata</i> (Lightfoot, 1786)	25
<i>Pteria avicular</i> (Holten, 1802)	26
<i>Solen roseomaculatus</i> Pilsbry, 1901	27
GASTROPODS	28
<i>Architectonica perspectiva</i> (Linnaeus, 1758)	31
<i>Lophiotoma indica</i> (Roding 1798)	32
<i>Bulla ampulla</i> Linnaeus, 1758	33
<i>Harpulina lapponica</i> (Linnaeus, 1767)	34
<i>Conus amadis</i> Gmelin, 1791	35
<i>Conus tessulatus</i> Born, 1778	36
<i>Conus betulinus</i> Linnaeus, 1758	37
<i>Conus monile</i> Hwass in Bruguiere, 1792	38

Common Molluscs of Gulf of Mannar

<i>Laevistrombus canarium</i> Linnaeus, 1758	39
<i>Tibia curta</i> Sowerby, 1842	40
<i>Lambis lambis</i> (Linnaeus, 1758)	41
<i>Lambis truncata</i> Humphrey 1786	42
<i>Monetaria (Cypraea) moneta</i> (Linnaeus, 1758)	43
<i>Monetaria (Cypraea) caputserpentis</i> (Linnaeus, 1758)	44
<i>Haustellum haustellum</i> (Linnaeus, 1758)	45
<i>Chicoreus ramosus</i> Linnaeus, 1758	46
<i>Agaronia nebulosa</i> (Lamarck, 1811)	47
<i>Ancilla cinnamomema</i> (Lamarck, 1801)	48
<i>Phalium glaucum</i> (Linnaeus, 1758)	49
<i>Phalium bisulcatum</i> (Schubert and Wagener, 1829)	50
<i>Pugilina cochlidium</i> Linnaeus, 1758	51
<i>Natica tigrina</i> (Roding, 1798)	52
<i>Ficus ficus</i> (Linnaeus, 1758)	53
<i>Harpa major</i> (Roding, 1798)	54
<i>Turritella attenuata</i> Reeve, 1849	55
<i>Duplicaria duplicata</i> (Linnaeus, 1758)	56
<i>Bufonaria rana</i> (Linnaeus, 1758)	57
<i>Babylonia zeylanica</i> (Bruguiere 1799)	58
<i>Cymatium perryi</i> Emerson & Old, 1963	59
<i>Turbinella pyrum</i> (Linnaeus, 1767)	60
<i>Murex carbonnieri</i> Jousseaume, 1881	61
References	62
Quick Reference Index	65

USEFUL TECHNICAL TERMS (From FAO)

Accessory plate - calcareous and periostracal structure covering the soft parts in the Pholadidae, in addition to the shell valves.

Adductor muscle - muscle connecting the 2 valves of a shell, tending to draw them together.

Aperture : the opening in the last whorl, providing an outlet for the head and foot.

Apophysis - finger-like shelly structure to which the foot muscles are attached in the Pholadidae and Teredinidae.

Axial sculpture : ribs or growth lines that run parallel to the outer lip.

Branchial - pertaining to the gills.

Branchial lamella - (see gill).

Byssus - clump of horny threads spun by the foot, by which a bivalve can anchor to a hard substrate.

Cardinal area - surface of the shell extending between umbo and hinge margin.

Cardinal tooth - (see tooth).

Chomata - marginal crenulations in Ostreidae and Gryphaeidae, occurring all around the inner side of valves or only near the hinge, composed of small tubercles or ridgelets on the right valve, and corresponding pits on the left valve.

Commissure - line of junction of the valves.

Concentric - parallel to lines of growth.

Cruciform muscles - crossed muscles connecting valves and serving to retract the siphons, leaving 2 small scars near the posteroventral end of pallial line in some bivalves (e.g., Tellinidae).

Ctenidial axis - (see gill).

Ctenolium - a row of small teeth on lower side of byssal notch in some Pectinidae.

Demibranch - (see gill).

Denticle - a small tooth.

Ear - lateral expansion of the dorsal part of a shell.

Equilateral - the condition of a valve when growth on either side of umbo is symmetrical.

Equivalve - the condition of a shell when valves are of the same shape and size.

Escutcheon - differentiated area extending along dorsal margin of valves, behind the umbones.

Eulamellibranchiate type - gill demibranchs composed of 2 lamellae. Branchial filaments and lamellae always connected by tissular junctions (e.g., Veneridae).

Filibranchiate type - gill demibranchs composed of 2 lamellae. In addition to the ciliary junctions between branchial filaments, anastomosed tissular junctions may unite lamellae of each demibranch (e.g., Mytilidae, Pectinidae).

Foot - mobile and extensible muscular organ, used for locomotion or for attachment to substrate by means of byssal threads.

Gape - opening or gap remaining between margins of valves, when shell is closed.

Gill - respiratory organ generally composed of 2 thin leaf-like structures (demibranchs) suspended to a dorsal axis (ctenidial axis); each demibranch may be either simple or bent back upon itself and then formed of 2 sheets (branchial lamellae). A lamella is constituted of many ciliated filaments parallel to each other and interconnected by more or less complex junctions. Four main

types of gill structures are currently recognized among bivalves: the protobranchiate, filibranchiate, eulamellibranchiate, and septibranchiate types (see these terms).

Growth marks - (see sculpture).

Hinge - structures in the dorsal region of the shell, along which the valves meet, and that function in the opening and closing of the shell.

Hinge line - shell margin adjacent to the hinge.

Hinge plate - infolding of dorsal shell margin bearing hinge teeth and sockets, and lying in each valve in a plane parallel to that of junction of valves.

Imbricate - overlapping like tiles or shingles on a roof.

Inequilateral - the condition of a valve when growth on either side of umbo is asymmetrical.

Inequivalve - the condition of a shell when valves are not alike in shape or size.

Keel - a prominent, angular ridge.

Lamellate - with thin, flattened plates.

Lateral tooth - (see tooth).

Lenticular - shaped like a biconvex lens.

Ligament - horny, elastic structure joining the 2 valves dorsally.

Ligamental area - part of cardinal area occupied by the ligament.

Lunule - differentiated area extending along dorsal margin of valves, just in front of umbones.

Mantle - fleshy sheet surrounding vital organs and composed of 2 lobes, one lining and secreting each valve.

Muscle scar - impression marking the place of attachment of a muscle inside the shell.

Common Molluscs of Gulf of Mannar

Nacreous - pearly, often with multi-coloured hues, as in mother-of-pearl.

Nymph - narrow plateform extending behind umbo along dorsal margin, to which the external ligament is attached.

Operculum : a “trapdoor” grown on the posterior upper part of the foot of a snail. It may be hard and shelly or pliable and made of chitinous, or horny, material.

Opisthogyrate - the condition of a shell when umbones are directed posteriorly.

Orbicular - disk-shaped, nearly circular.

126 Bivalves

Orthogyrate - the condition of a shell when umbones are perpendicular to the hinge line (directed neither anteriorly nor posteriorly).

Pallet - small paddle-shaped or feather-like calcareous and periostracal structure, a pair of which closes the burrow opening when siphons are retracted in the Teredinidae.

Pallial - pertaining to the mantle.

Pallial line - a line near internal margin of valve, marking the site of attachment of the mantle edge.

Pallial sinus - posterior indentation of pallial line, marking the site of attachment of muscles allowing siphons to retract within the shell.

Pedal - pertaining to the foot.

Periostracum - layer of horny material covering the shell.

Periostracum : an outer layer of thin or thick chitinous material covering the outer shell. Sometimes with bristles or hairs.

Plicate - folded or ridged.

Porcelaneous - with translucent, porcelain-like appearance.

Prosogyrate - the condition of a shell when umbones are directed anteriorly.

Protobranchiate type - gill demibranchs simple, formed of leaf-like filaments loosely connected by sparse ciliary junctions.

Radial - diverging from umbo, like the spokes of a wheel.

Radula (plural - radulae) : microscopic hard teeth on a moveable ribbon in the mouth of molluscs, other than bivalves.

Rostrate - with a beak-like projection (rostrum).

Sculpture - relief pattern developed on the outer surface of the shell; sculpture is overlain by concentric growth marks corresponding to various positions of shell margins during growth.

Scabrous - rough, file-like.

Scale - localized projection on the outer surface of shell, commonly situated on a rib.

Septibranchiate type - gills absent, replaced by a muscular horizontal partition (the "septum") pierced by small pores. This structure enables a carnivorous nutrition and is encountered in a group of predominantly deep-sea bivalves (e.g., Cuspidariidae).

Siphons - extensible, tube-like projections of the posterior marginal region of mantle, forming 2 openings for water inflow (inhalant siphon) and outflow (exhalant siphon).

Socket - recess of the hinge plate, for reception of a tooth of opposite valve.

Spiral sculpture : cords or threads that encircle the whorls parallel to the sutures.

Spire : the whorls at the top, narrow end, where growth began.

Common Molluscs of Gulf of Mannar

Suture : continuous line on shell surface where the whorls join.

Tooth - shelly projection from the hinge, received in socket of opposite valve; cardinal teeth are close to umbo, whereas lateral teeth are set apart from these, anteriorly or posteriorly.

Umbo (pl. umbones) - the first formed part of a valve, usually above the hinge.

Umbilicus : a central cavity at the base or bottom of the shell.

Umbonal reflection - expansion of the internal dorsal margin which is folded over the umbones in Pholadidae and Teredinidae.

Valve - one of the main shelly halves of a bivalve.

Whorl : a turn or coil of a snail shell. The body whorl is the last and largest.

INTRODUCTION

Gulf of Mannar is one of the biologically richest coastal area situated in the south eastern coast of Tamil Nadu. The Gulf falls within the Indo- Malayan realm is known to harbor marine biodiversity of global significance. The Gulf of Mannar is a large shallow bay in the Indian ocean extending from Rameswaram Island to Tuticorin in the Southwest-Southeast direction, between 78° 5' and 79° 30' E longitudes and 8° 47' and 9° 15' N Latitudes, to a length of about 140 km. Gulf of Mannar Biosphere Reserve covers approximately an area of 10,500 sq.km of which the Marine National Park is 560 sq.km. There are 21 Islands situated at an average distance of about 8 km from the coast and running almost parallel to the coast line, covering an area of 623 ha. The islands are categories into Mandapam, Keelakarai, Vembar and Tuticorin group, of which 2 islands namely Vilanguchalli and Poovarasnappatti are submerged. The region is enriched with a combined dynamic ecosystem such as coral reefs, sea grass and mangroves. This environment enhances a wide variety of flora and fauna. More than 4000 species of flora and fauna have been known to occur in this area. Above 800 sp of mollusc have been recorded by researchers from this region.

All mollusc have a soft body (their name is driven from the Latin word mollusc, meaning "soft", which is generally protected by a hard, calcium containing shell. A characteristic foot, head, and internal organs, has evolved into a myriad of shapes and forms that inhabit virtually every imaginable ecological niche on earth: in the ocean, on land, and in the freshwaters of lakes, rivers and wetlands. The "snails" of land and sea are gastropods, meaning "stomach footed," because

Common Molluscs of Gulf of Mannar

there is usually a coiled shell containing the viscera which is carried above a slug-like foot. Some gastropods, the “slugs,” have either reduced shells or no shells. Clams, mussels and pearl oysters are termed the Bivalvia for the two shells which enclose the body. Bivalves lack a head as we know it in other animals and they feed as water containing food particles flows over their gills. They are found in both freshwater and the ocean. Five groups of molluscs are found only in the sea: the tusk shells or Scaphopoda burrow in soft sediments; the coat-of-mail shells or chitons (Polyplacophora) have a covering of eight interlocking shell plates, reminiscent of medieval armor, and the Cephalopoda include the shelled pearly nautilus as well as squid and octopus which have no visible shell. The name, meaning “head foot,” derives from the fact that they move by tentacles which form part of their heads. Two lesser known groups include fairly small animals (5 - 10 mm) which live at depths of more than 50m, the Monoplacophora and the Aplacophora.

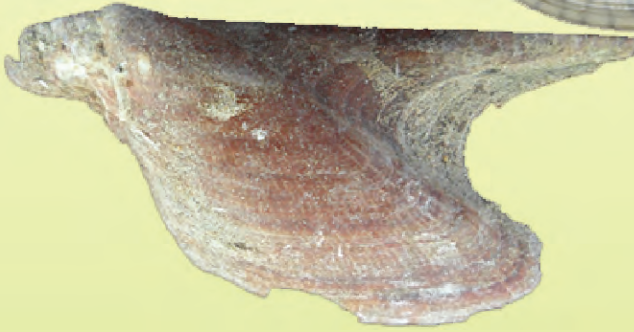
Molluscs are among the most ancient of animals on earth today. They appear in the oldest Cambrian deposits, more than 500 million years BP. Molluscs are also among the most successful of all animals, and are second only to insects in numbers of species (IUCN, 1995). The Mollusc comprises a huge taxonomic group, second only to the Arthropoda in terms of number of extant species. They are successful in marine, freshwater, and terrestrial habitats. There are probably close to 100,000 species of living molluscs, including such diverse forms as snails, clams, slugs, and squids.

First account on marine gastropods of Gulf of Mannar was reported by Melvill and Stander (1878). Successively

works on mollusks of the Gulf of Mannar include Thurston (1895); Iyengar and Parthasarathy (1927); Thomas (1972); Satyamurti (1952); Nayar (1955); Alagaraswami (1966); Appukuttan (1972); Nair and Rao (1974) and Nair and Dharmaraj (1980). Investigation on the mollusk recently (after 1990s) was carried out, Jeyabaskaran *et al.*,1996; Shaul Hameed and Somasundaram, (1998); Fernando and Fernando, 2002; Hylleberg and Nateewathana, 2002; Subba Rao, 2003; Samuel *et al* 2005; Melkani *et al.*, 2007; Kannaiyan and Venkatraman, (2008) and GoMBRT,(2012).

Editorial Board.

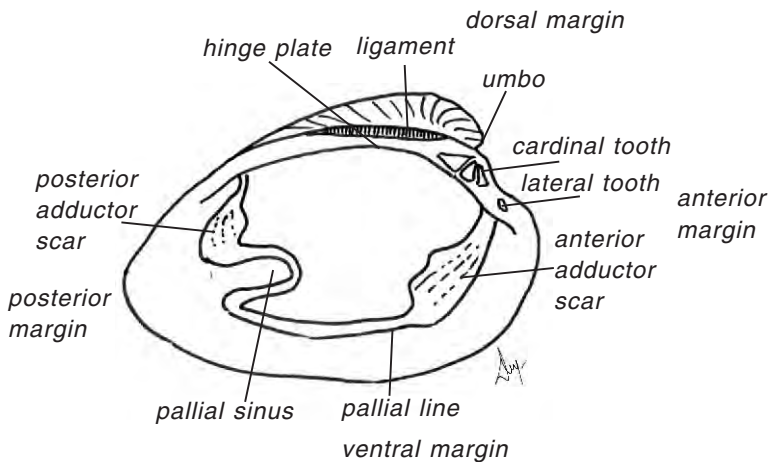
BIVALVES



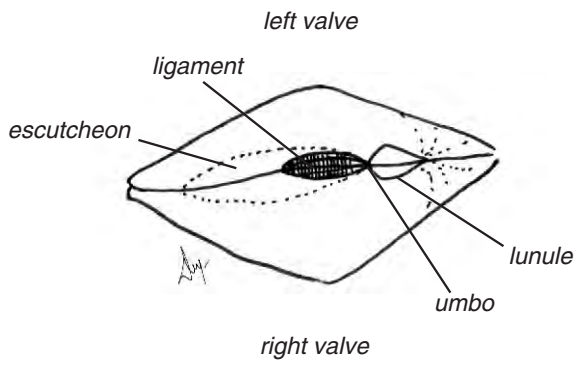
Bivalves

Class Pelecypoda (hatchet-foot) also called as Bivalvia contains a laterally compressed body, a shell consisting of two valves hinged by an elastic ligament. This class contains oysters, clams, cockles, scallops, mussels and an array of shells exhibiting various shapes. The connecting hinge possesses tiny teeth for proper closure of both valves. Teeth number, position of ligament and the pallial sinus are some of the key identification characters. In addition bivalves have one or two strong adductor muscles, which are responsible for the closing of the valves. They attach to the inside of both valves and leave more or less distinct "scars". Externally the shell usually has a thin organic layer, the periostracum, which is often pigmented. Presence of an inner nacreous layer is popularly referred as "mother-of-pearl".

Left valve - Interior



Entire shell - Dorsal



Trisidos tortuosa (Linnaeus, 1758)



Family: Arcidae

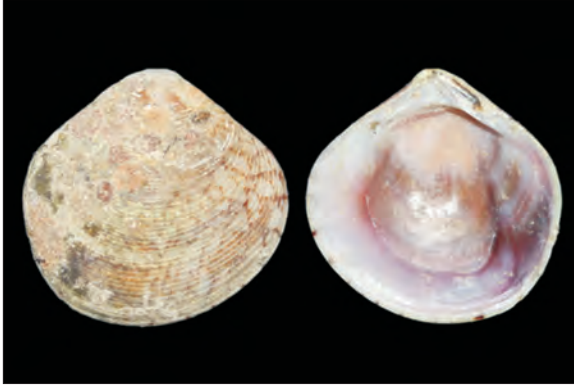
Common name : Propellor Ark

The valves are strongly twisted, producing a fold at an acute angle to the hinge line (seen as a gully internal). The long hinge is almost straight, but the lower edge of each valve is curved. The shell has thin, radiating ribs and coarse, concentric growth ridges. Yellowish white in colour; brown periostracum. Maximum shell length 8.5 cm, commonly to 7.5 cm. Half-buried in muddy fine to medium sand bottoms, with abundant fragmental shell material, and subject to the effects of currents and wave action.

Habitat: shallow water, Littoral and sublittoral to a depth of 50 m.

Distribution: Indo-Pacific

Circe scripta (Linnaeus, 1758)



Family: Veneridae

Common name: Script Venus

A solid, very compressed shell, it has a poorly developed ridge from umbo to rear edge. Strong, concentric ribs cover the shell. There are three large cardinal teeth. Yellowish with brown rays, bands, and zigzags; inside white.

Habitat: Shallow water in sand

Distribution: Tropical Indo-Pacific

Donax faba Gmelin, 1791



Family: Donacidae

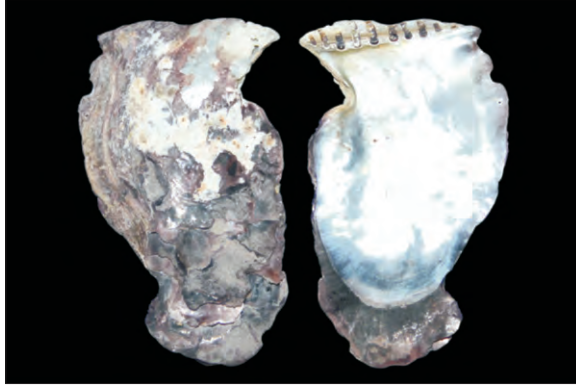
Common Name: Bean Clams/ Butterfly Clams

The shell is moderately small, smaller in average size, and bears a more or less evenly rounded outline, absence of sharp angles in two outlines 'the shell is ovate and transversely elongate young specimen being proportionately more so. The surface of the shell is finely concentrically striated through the radial keel extending from the umbo near the posterior margin is entirely absent in this species. The shell is inequilateral the anterior side being much corner. The ventral margin bears a very slight, but distinct indentation towards the posterior end, and this species appears to be very constant character in this species. The lunule is very narrow, elongated and not very well defined. The pallial sinus is broad, moderately deep, slightly inclined upwards and shaped like the tip of the thumb. The inner surface is smooth glossy and tinged with various shades of purple. The colour and colour pattern of the shell is subject to considerable variation.

Habitat: Surface beaches

Distribution: Indian Ocean

Isognomon isognomon (Linnaeus, 1758)



Family: Isognomonidae.

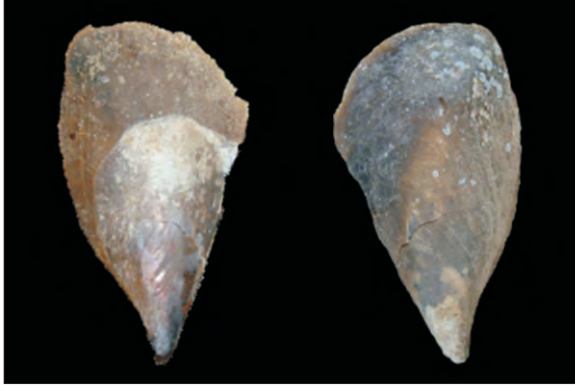
Common Name: Toothed Oyster

Both valves very flat shape very variable. Blue-grey, usually heavily encrusted; interior pearly white strongly anchored by a byssus to mangrove roots, coral are other hard substratum.

Habitat: Mangroves, corals and hard substratum

Distribution: Indo-Pacific and northern Australia

Atrina pectinata (Linnaeus, 1767)



Family: Pinnidae

Common Name: Pen Shell

Shell fragile and thin. Equivalve; inequilateral, outline roughly triangular. Dorsal margin is straight, ligament thin, inconspicuous, lying along the anterior half of margin; ventral margin is straight anteriorly, becoming concave or irregular posteriorly, grading into rounded posterior margin. Valves are gaping posteriorly and along antero-ventral margin. Sculpture of fine concentric lines and variable number of smooth, wavy ridges radiating from umbones, raised dorsally and posteriorly into delicate, flat spines. Interior of shell is glossy, anterior adductor scar is small, hidden beneath umbone, posterior large and distinct, in the middle of valve. A number of vertical ridges, or septa, closely packed, may be seen beneath umbones at anterior end of shell. Yellow-horn to darker brown, occasionally with few darker patches. Periostracum is thin.

Habitat: Seagrass beds and muddy bottom

Distribution: Indo-Pacific

Placuna placenta (Linnaeus, 1758)



Family: Anomiidae

Common name: Window Pane Oyster

The shell is made in two-parts and is lustrous. The shell valves are slightly unequal – one valve is slightly convex and rougher. The circular shell has white or beige coloration while dead shells often take black colouration. The shell size varies from 6-20 cm depending on the geographical location. Umbo is small in size and 2 thin ridge-like teeth emerge from the umbo making a characteristic “V” shape on the upper half of the shell. This species is protected under the Wildlife Protection Act of India.

Habitat : Among seagrass meadows, lying loose on the ground, abundant in quiet lagoons protected bays and mangrovelagoons.

Distribution : Indo-Pacific

Pholas orientalis Gmelin, 1791



Family: Pholadidae

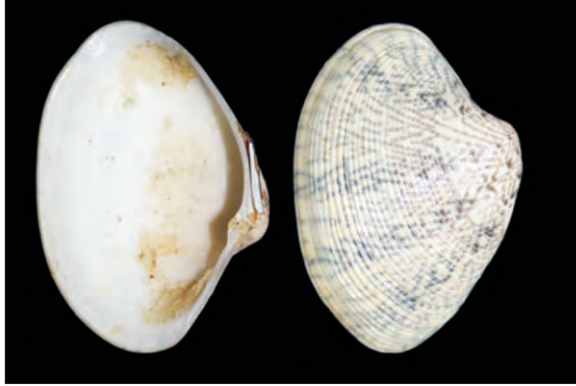
Common name: Angel Wings

Fragile thin shells elongated at the posterior ends and smooth in nature. Shell elongate-ovate in outline, more than 3 times longer than high, rounded at both anterior and posterior ends. The shell can grow up to 12 cm in length. Three accessory calcareous plates along dorsal margins of the valves are characteristic referred as "*Apophysis*". Outside of shell dirty white while the interior is milky white and porcelaneous. The anterior part of the shell is used for drilling into soft mud and hard peat.

Habitat: Shallow water muddy bottoms

Distribution: Indo-Pacific

Paphia malabarica (Chemnitz)



Family: Veneridae

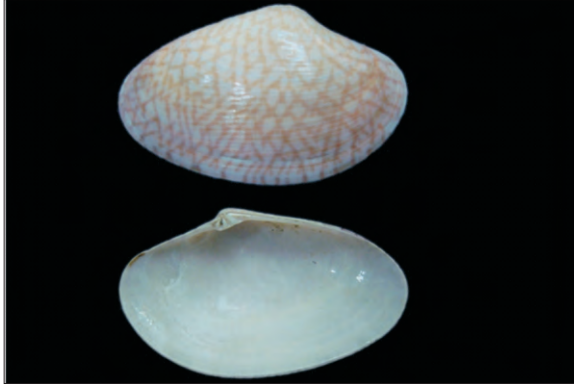
Common name: Malabar Venus

Shell is ovate, moderately inflated and comparatively thin. Concentric grooves run throughout the shell surface. Smooth inner surface with glossy appearance. Colour is yellowish brown with 4-5 lines of darker vertical irregular zig-zag lines. Pallial sinus is "U" shaped and very deep. Three thick and short cardinal teeth are present. Anterior and posterior margins are narrowly rounded.

Habitat: Shallow water muddy bottoms

Distribution: Indian waters

Paphia textile (Gmelin, 1791)



Family: Veneridae

Common name: Textile Venus

Shell moderately inflated, triangular, elliptical ovate, equal valves and compressed laterally. The maximum shell length is up to 8 cm. Shell is smooth and glossy with anterior umbo. Ventral margin broadly rounded. Fine concentric grooves are present all over the shell surface. The zig-zag markings are "V" shaped in nature. Shell colour is creasish brown and the the V shaped markings are darker tan to grayish brown. The region near the umbo has a slight orange colouration and the inner is whitish. Pallial sinus is deep, marked ascending and broadly "U" shaped.

Habitat: Shallow water muddy bottoms

Distribution: Indo-Pacific

Crassostrea madrasensis (Preston)



Family: Ostreidae

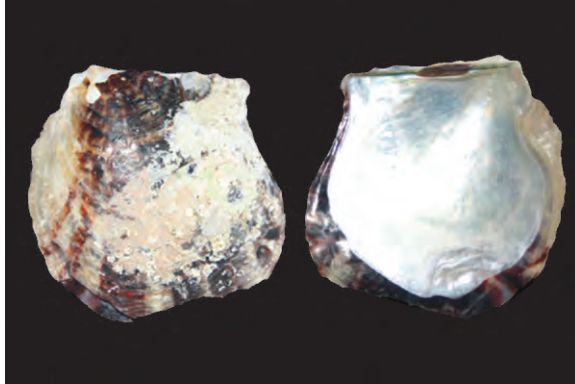
Common name: Indian Backwater Oyster/ Edible Oyster

Shell is easily identifiable by the irregular shape with the absence of marginal denticles. Single kidney-shaped adductor muscle scar is present that has dark purple colouration. Shell surface is covered with numerous foliaceous laminae. The left valve is deeper than the right and darker in colouration. Inner surface is milky white and smooth. Shell surface also bears laminated overlapping valves. Attachment by cementing to hard substrata is by the lower half of the cup shaped left valve that is flat or slightly concave. The hinge is elongated, toothless and narrow.

Habitat: Brackish and coastal waters, found exposed during low tides in estuaries and shallow lagoons.

Distribution: All along the east coast of India with sporadic distribution in the west.

Pinctada fucata (Gould,1850)



Family: Pteridae

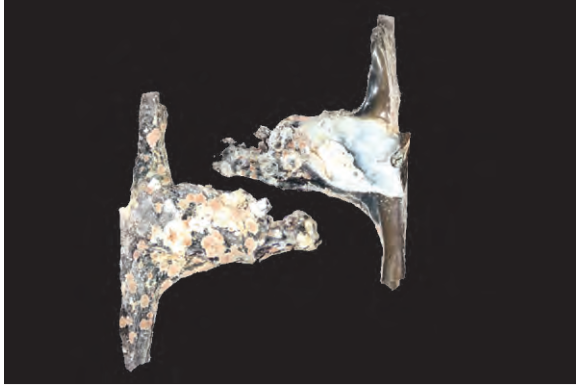
Common Name: Indian Pearl Oyster

Shell generally rounded with scaly periostracum and wing like extension. Shell surface reddish brown. Externally 6 to 8 radial bands of reddish brown colour emerge from the umbo and runs downwards up to the free margin of the shell. Hinge is long and straight; the long axis of the shell is at right angles to the hinge. Left valve is deeper and more concave than the right. The shell is about one and a half time thicker over the greater part. It is composed of three layers, the outer periostracum, middle prismatic layer and the inner most nacreous layer (the mother of pearl layer). The border of the inner most layer of the valves non-nacreous and have brownish or reddish patches which coincide with the external radial markings. The remaining portion of the inner surface is very lustrous which is formed of nacre. Adductor muscle impression is large and sub-centrally placed.

Habitat: Sandy and muddy bottoms of shallow waters

Distribution: Indo-Pacific

Malleus malleus (Linnaeus, 1758)



Family: Malleidae

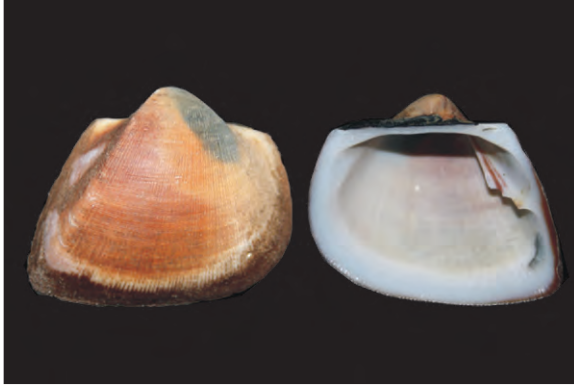
Common Name: Black Hammer Oyster

Maximum shell height 25 cm, commonly to 18 cm. Byssally attached to hard objects, on reef flats, coarse coral sand or eelgrass areas. The shell is vertically disposed and partly buried in sediment, with the long dorsal ears acting as an anchor and the ventral quarter of valves exposed. Sublittoral, from depths of 1 to 15 m. Often occurring in large colonies. Locally collected in Indonesia and the Philippines. The shell is used to make lime and for shellcraft.

Habitat: Coral reef and Seagrass beds

Distribution: Indo-Pacific

Cucullaea labiata (Lightfoot, 1786)



Family: Cucullaeidae

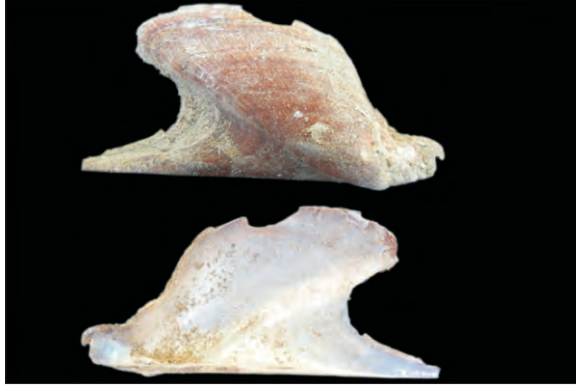
Common name: Hooded Ark

Characteristic box-like shaped shell thin but strong. The shelf on the inner side of the shell valve is prominent and raised. The inner margin is lined by a purple line. Posterior muscle scar has a prominent raised shelf on both valves with a dark violet longitudinal streak. Shell surface colouration is light yellowish to orange and sometimes with a red blotch of reddish brown. The shell has fine radiating ribs with minute bead like arrangement.

Habitat: Off shore waters in muddy and sandy bottoms

Distribution: Indo-Pacific

***Pteria avicular* (Holten, 1802)**



Family: Pteriidae

Common Name: Swift Wing Oyster

Shell somewhat compressed, obliquely ovate to suborbicular in outline, with a straight dorsal margin often produced at each end into a wing-like ear, trigonal in front and sometimes very long behind. Shell slightly inequivalve, with left valve a little more inflated than right valve which is provided with a strong byssal notch anteriorly. Shell colour dark brown, with a few yellowish radial rays; outline obliquely oval and rather narrow; non-nacreous internal margin reduced

Habitat: Epizoitic on seafans

Distribution: Indo-Pacific

Solen roseomaculatus Pilsbry, 1901



Family: Solenidae

Common Name: Pink-Spotted Razor Shell

Shell equivalve, laterally compressed to subcylindrical in cross-section, with a narrowly elongate, often sword-like or razor-like shape, very inequilateral and gaping at both ends. Umbones not prominent, frequently near the anterior end of dorsal margin. Outside of shell essentially with concentric growth marks, often changing abruptly in direction along a diagonal line running from the umbones to the posteroventral end of valves. Periostracum prominent, frequently glossy. Maximum shell length 5 cm, commonly to 4 cm.

Habitat : sandy to muddy bottoms. Littoral, sublittoral and shelf zones to a depth of about 100 m

Distribution : Widespread in the Indo-West Pacific, from East Africa, including Madagascar, the Red Sea and the Persian Gulf to Melanesia; north to East China Sea and Japan, and south to Queensland and New Caledonia

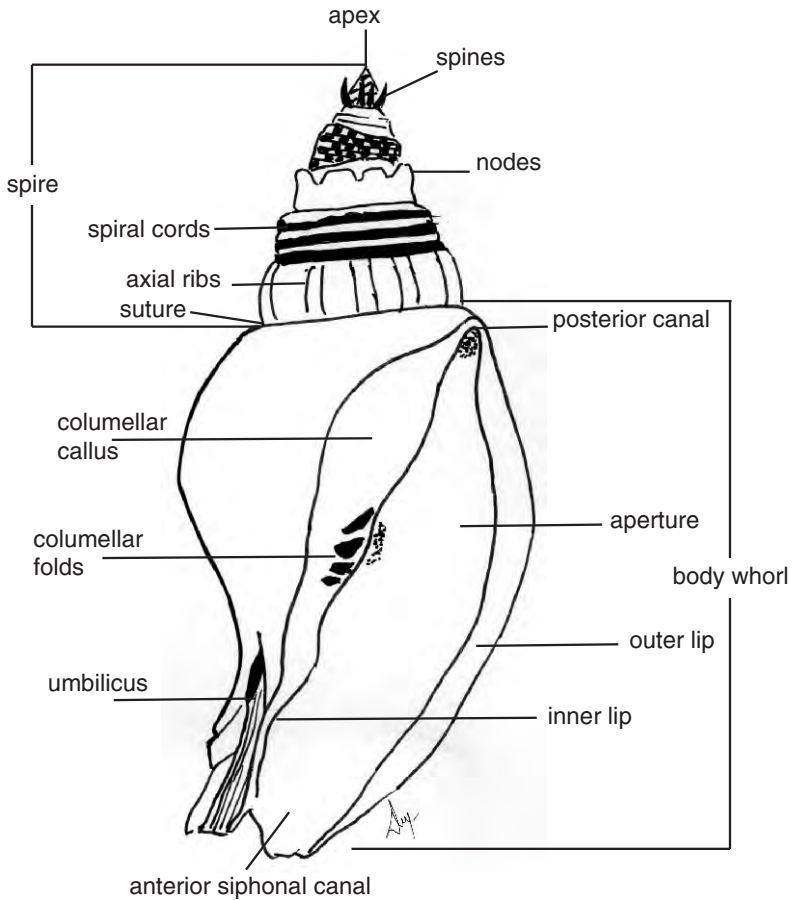
GASTROPODS



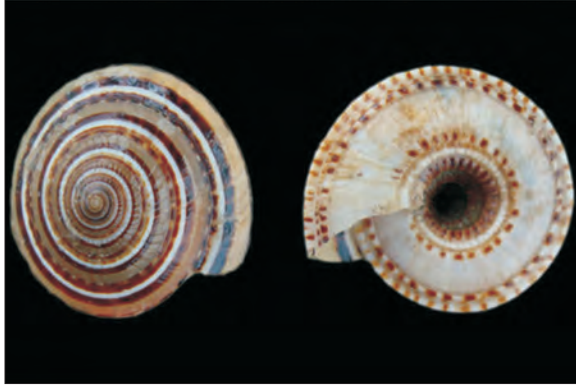
Gastropods

The most diverse and largest class among of Phylum Mollusca is Gastropoda (gastro = stomach, poda = foot). This class is estimated to contain more than 75,000 living species occupying almost all habitats like terrestrial, freshwater and marine environments. Gastropods have single shells, plate-like shells, shell-less slugs and nudibranchs. They have adapted to all kinds of environs for example like gills in the case of aquatic gastropods and pulmonary sacs in the case of terrestrial counterparts. Presence of a single foot with or without opacula is another characteristic feature of these elegant animals. They exhibit high diversity in morphology and colour. Presence of a chemosensory system aids in locomotion and feeding purposes. Head is well defined with the presence or absence of rudimentary eyes. They exhibit a variety of feeding habits like herbivorous (feeding on algae etc. with the help of radula) or carnivorous (hunting prey with specialized radula eg. *Conus* sp.). Presence of a small notch or canal at the upper end of the aperture and a siphonal canal at the lower end is found in most gastropods. Columella may contain folds or teeth on the outer lip of the shell.

Ventral view of a typical Gastropod



Architectonica perspectiva (Linnaeus, 1758)



Family : Architectonicidae

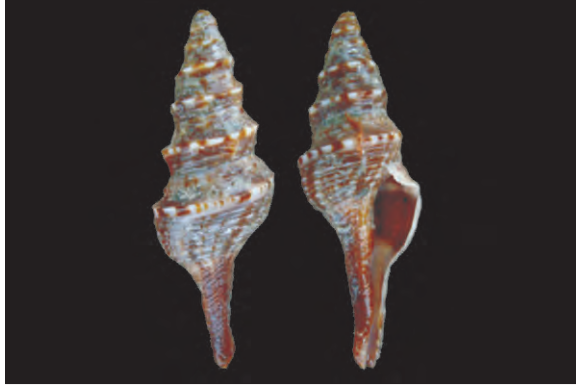
Common name : Clear / Painted / Oriental / Perspective Sundial / Spiral Staircase

A solid shell with evenly expanding whorls and a deep suture. The spiral and vertical grooves on the whorls produce a lattice pattern. The ridge above and below the suture resembles a string of flattened beads. The outer edge of the base is encircled by two flat - topped ribs. Grey to yellowish brown, with alternating spiral bands of white and dark brown; edge of umbilicus spotted dark brown. Shell size 28-83 mm.

Habitat: Sandy areas

Distribution: Indo-Pacific, E. Africa - Hawaii

Lophiotoma indica (Roding 1798)



Family: Turridae

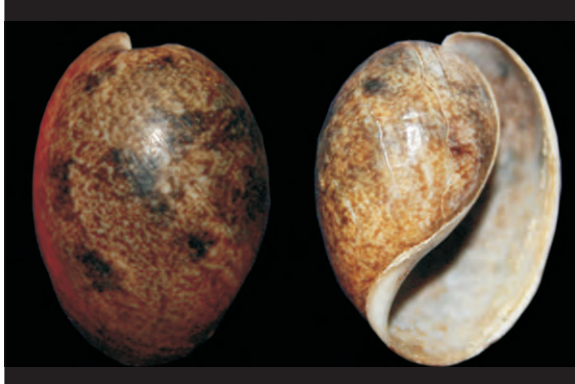
Common name: Indian Turrid

The spiral ridges bear brown and white dashes and the axial streaks are brown and prominent in the body whorl. The spire is slightly longer than the siphonal canal. Conspicuous anal notch (turril slit) is present at the upper margin of the outer wall of the aperture. The radula is harpoon-like in nature with the presence of venom gland. The Columella is straight ending as a long slightly sinuous canal. Shell size 35-90 mm.

Habitat: Muddysand bottom

Distribution : Indo-Pacific, Indian Ocean, E. Africa - Australia, Fiji

Bulla ampulla Linnaeus, 1758



Family: Bullidae

Common name : Flask Bubble / Bubble Shell / Large True Bubble

All *Bulla* species have large, thin, opaque, ovate, smooth external shells, which are large enough to accommodate the whole snail when retracted. The shells have a deep, narrow umbilicus at the apex. There is no operculum. The umbo is sunken (involute tip) and looks like narrow and deep umbilicus. Colour varies from gray or brownish with purple blotches, streaks or white spots. Aperture is white in colour and the outer lip is thick. Shell size 20-67 mm.

Habitat: Intertidal on sand

Distribution: Indo-W. Pacific, E. Africa

Harpulina lapponica (Linnaeus, 1767)



Family: Volutidae

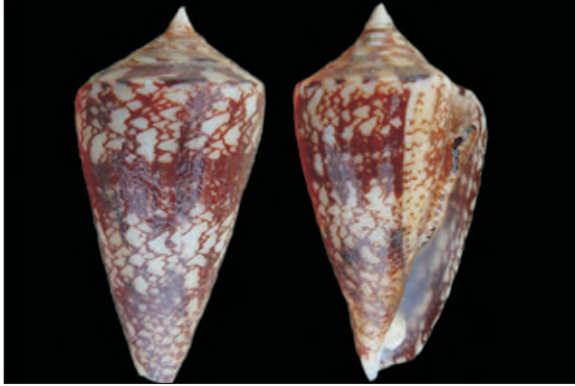
Common name: Brown-Lined Volute

A heavy shell with a short spire and inflated body whorl. The apex is bulbous; the succeeding two or three whorls have low vertical ribs; the remaining whorls are smooth. The suture is shallow; the columella has seven or eight folds. Cream, with brown blotches (arranged in three bands on body whorl) and many spiral rows of dashes. Shell size 60-103 mm.

Habitat: offshore

Distribution: South India, Sri Lanka

Conus amadis Gmelin, 1791



Family: Conidae

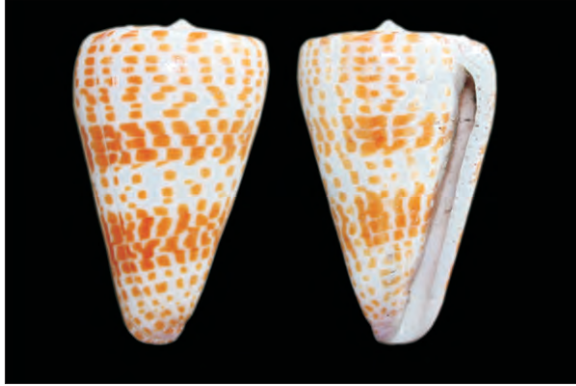
Common name: Amadis Cone

A thin glossy shell with a strongly keeled shoulder and a short spire. Early whorls are prominently elevated, later ones are concave and sometimes stepped. Outer lip is curved. White, heavily or lightly overlaid with pale or dark brown and variegated with angular white blotches; aperture and columella white. Shell size 40-110 mm.

Habitat: Offshore

Distribution: Indian Ocean

Conus tessulatus Born, 1778



Family: Conidae

Common name: Tessellate Cone

On this thick, glossy shell, early whorls and blunt apex are raised; spiral ridges on tops of whorls. Sides of body whorl are straight or slightly concave; shoulder broad and rounded or gently angled. White orange or red rectangles. Shell size 22-82 mm.

Habitat: Shallow water

Distribution : SE Africa - Pacific, Mexico and Costa Rica; Galapagos

Conus betulinus Linnaeus, 1758



Family : Conidae

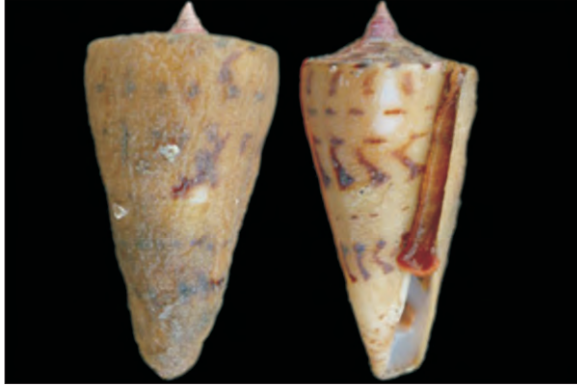
Common Name: Beech Cone

The largest of the subgenus. It's brown - yellow background colour is overlaid with lines of sparse purple - brown dots. Shell size 40-170 mm.

Habitat : Intertidal and shallow, subtidal sand flats and muddy sand.

Distribution: SE Africa - Polynesia

***Strategoconus (Conus) monile* Hwass in Bruguiere, 1792**



Family: Conidae

Common name: Necklace Cone

The shell is moderately heavy and measure between 45 mm and 95 mm. The spire is nearly plane, concave, and low to moderate height with a raised apex. There are about 5-7 body whorls, body whorl is closely striate below, and generally chestnut-stained at the base. The color of the shell is white, with oblique flames, spots and short lines of chestnut, arranged in revolving series. Shell size 45-95 mm.

Habitat: Shallow subtidal sandy and muddy bottoms

Distribution: NE Indian Ocean

***Laevistrombus canarium* Linnaeus, 1758**



Family: Strombidae

Common name: Dog Conch/Yellow Conch

This shell, heavy for its size, has pear shaped body whorl and Flared outer lip. The short spire has sharply pointed apex, The rounded spire whorls are smooth or ornamented with spiral grooves and ridges; smooth body whorl is grooved at the base. The outer lip has a thickened edge and a shallow stromboid notch. The straight columella is thickly callused. White, cream, or brown, with darker streaks. Shell size 30-105 mm.

Habitat: Sandy inshore

Habitat: South India, Sri Lanka - West Pacific

Tibia curta Sowerby, 1842



Family: Strombidae

Common name: Indian Tibia

A beautiful smooth shell that is elongated and solid in structure. The siphonal canal is long, straight and fragile. The strong flattened outer lip bears 4 to 5 elevated teeth-like projections. The aperture is narrow at the anterior and the posterior regions. Adult shells reach 120-185 mm in size. Colour varies from light to dark brown with white aperture and columella. Shell size 120-185 mm.

Habitat: Intertidal to moderate depth

Distribution: Arabian Gulf and Bay of Bengal

Lambis lambis (Linnaeus,1758)



Family: Strombidae

Common name: Common / Spider Conch

A large, solid shell with a spire almost as long as its body whorl. The widely flared aperture has six long, hollow spines, open throughout their length, which mostly curve upwards. The siphonal canal is almost a mirror image of the uppermost spines; the stromboid notch is deep. Blunt knobs decorate the body whorl, the knob nearest the lip being the largest. The rest of the shell has poorly developed spiral ribs. Each spire whorl is concave. A parietal callus covers the shell's aperture side. Creamy white, mottled and streaked with brown. Shell size 90-275 mm.

Habitat: Sandy inshore, Seagrass beds and reef area

Distribution: Indo-West Pacific

Lambis truncata Humphrey 1786



Family: Strombidae

Common Name: Truncate Spider Conch

All spire except for last three whorls is very depressed, almost flat, giving a truncated effect; spirally corded and fine, axial cords. whorls with angular, coarse, large knobs on shoulder; body whorl has especially large hump on high point of dorsum and other smaller humps and knobs, lip has six, rather open spines; deep, wide stromboid notch has crenulated edge. Siphonal canal is as long average spine, a little reflected backward and toward aperture. Heavily callous, smooth columella; parietal area spreads over part of body whorl but is indented at shoulder of whorl cream; brown maculations; aperture, inside of lip, columella and canals pink; darker on parietal area. Shell size 230-420 mm.

Habitat: Coral reef and seagrass beds

Distribution : Indo-Pacific, East Africa, Bay of Bangal and Philippines

***Monetaria (Cypraea) moneta* (Linnaeus, 1758)**



Family: Cypraeidae

Common name: Money Cowry

This familiar cowrie is one of the most variable of all seashells, and therefore hard to describe comprehensively. It is thick, somewhat flattened, and angular. Margins may be heavily callused, particularly at top, but may be lightly callused and less angular. Aperture is narrow; few strong, short teeth. Ground colour yellowish; three grayish blue bands show through; margins, base, and teeth white, often tinged yellow. Shell size 10-45 mm.

Habitat: Coral reefs

Distribution: E. Africa - WC Americas; Galapagos

Monetaria (Cypraea) caputserpentis (Linnaeus,1758)



Family: Cypraeidae

Common Name: Serpent's Head / Snake Head Cowry

The basic color of the shell is reddish-brown, with many whitish dots on the top of the dorsum, that sometimes shows a clear longitudinal line. The underside is light beige. Frequently these shells can be encountered on the market with a 'Purple Top', as they have been artificially colored dipping their tops in an acid-based formula. Shell size 15-45 mm.

Habitat : Intertidal and shallow subtidal, under rocks and in crevices, or sometimes exposed.

Distribution: Indo-West Pacific

***Haustellum haustellum* (Linnaeus,1758)**



Family: Muricidae

Common name: Snipe's Bill / Woodcock Murex

A solid, low-spired shell with a large body whorl and an extremely long, straight siphonal canal. Vertical ribs are prominent on the later whorls, where some develop into varices, three per whorl. The suture may be slightly channeled. Flared aperture, with its outer lip lightly toothed. Smooth varices have points which are crossed by strong spiral riblets. The siphonal canal is almost spineless. Creamy or pinkish, with brown blotches and dashes, barred on varices; apertural lips orange or pink. Shell size 65-185 mm.

Habitat: Intertidal and sand flats

Distribution: Indo-W. Pacific, Red Sea

Chicoreus ramosus (Linnaeus, 1758)



Family: Muricidae

Common name : Branched Murex/Ramose murex/Ram's murex

A very large, heavy shell with a low spire and inflated body whorl, angled at the shoulder. Each whorl has three varices, between which there may be one or two, knobby vertical ribs. Both varices and siphonal canal have short, frilled spines. Fine spiral ridges cover all whorls. The outer lip has a saw toothed edge and, towards its lower end, a prominent tooth. The columella is smooth. White, with brown ridges and blotches; the columella is pink. Shell size 45-342 mm.

Habitat: Coral reefs

Distribution: Indo-W. Pacific and Red Sea

Agaronia nebulosa (Lamarck,1811)



Family: Olividae

Common name: Blotchy Ancilla

Slender shell with gently convex body whorl and concave spire whorls. Deep suture; broad spiral callus on body whorl. The columella is mostly straight; short folds on the upper half, long folds on the lower half. Creamy yellow in colour, with brown blotches and Zigzags. Shell size 30-60 mm.

Habitat: Intertidal sand

Distribution: Bay of Bengal and Java sea

Ancilla cinnamomema (Lamarck, 1801)



Family: Olividae

Common Name: Ancillas

Shell oblong, fulvous; base of the spire with a white band; base of the pillar short, very oblique; outer lip one-toothed. Shell scarcely an inch long, of an oval oblong shape, and bright brown, having a white band on the body whorl, or at the base of the spire; the columella is also white, and the base is short, much thickened, and takes a more oblique direction; the belts are double, each margined by two parallel impressed lines, the upper of which terminates in a projecting obtuse tooth at the base of the outer lip. Shell size 19-40 mm.

Habitat: Sandy shore

Distribution: South India, Sri Lanka, Red Sea

Phalium glaucum (Linnaeus, 1758)



Family: Cassidae

Common Name: Grey / Glaucus Bonnet

Early whorls roundly shouldered with fine spiral and axial cords; last three angular and crenulate; usually one or more varices. Expanded, rotund, smooth or malleate body whorl. Narrow ridge below suture shoulder crenulations becoming weak nodules. Thickened lip backed by deep channel, with three or four, strong sharp spikes anteriorly, inside lip are up to twenty five teeth. Columella has wide shield at anterior end and is weak spirally wrinkled. Narrow, deep umbilicus; siphonal canal turned up vertically. Grey; lip orange; columella shield creamy pink to white; interior rich dark purple- brown; umbilical area white. Shell size 60-147 mm.

Habitat: Sandy mud of shallow waters

Distribution: E. Africa - S. Japan and Melanisia

***Phalium bisulcatum* (Schubert and Wagner, 1829)**



Family: Cassidae

Common Name: Japanese Bonnet

Very variable with many named forms heavy or light ; spire moderate but variable globose or narrow ; spirally striate; smooth or striate below suture and at base lip with strong or weak; small teeth; columellar shield somewhat roques white or cream. May have blue - gray tinge; may have five rows of more or less prominent, squarish, light brown spots; lip with or without five groups of dark or light brown marks; columella and shield white; interior white or purple brown.

Habitat: Sandy mud bottom of Shallow waters

Distribution: Indo-Pacific

Pugilina cochlidium Linnaeus, 1758



Family: Melongenidae

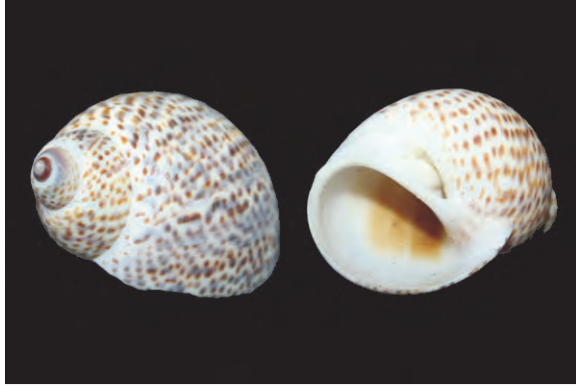
Common name: Spiral Melongena/ Melon Conch

Diagnostic characters: Shell relatively large (up to 15 cm long), solid and heavy, broadly fusiform in outline and markedly longer than wide. Spire conical and moderately tall, with angulate shoulders and deeply incised sutures. Spire whorls sculptured with many fine and rough spiral cords, and with broad axial folds bearing bluntly spinose nodules at shoulder of later whorls. Periostracum thick and finely wrinkled, becoming somewhat hairy on shoulder slope. Aperture elongate-ovate but rather wide, anterior siphonal canal broad and moderately long. Outside of shell beige to fawn or purplish brown under a dull, olive brown periostracum, occasionally with obscure darker brown spiral banding. Aperture polished orange cream, sometimes dark brown marginally. Shell size 60-150 mm.

Habitat: In muddy areas, often in brackish waters, near estuaries and mangroves. Sometimes very common near bivalve beds on which they prey. Intertidal and shallow subtidal zones.

Distribution: Indian Ocean - N. Australia and Philippines

Natica tigrina (Roding, 1798)



Family: Naticidae

Common name: Tiger Moon Snail

Shell of medium size, up to 31 mm in length, globose with an inflated body whorl and conically exerted spire. Columella with a thick callus at its base, funicle obliquely enters the umbilical depression at its anterior end leaving it open posteriorly. Colour pale brown ornamented all over with small, close-set, rounded, purplish brown spots arranged in regular spiral lines, which may often coalesce with each other; interior of aperture and umbilical area white. Synonym is *N. maculosa*.

Habitat: Sandy bottom

Distribution : East Africa - Southeast Asia and Southeast Australia

Ficus ficus (Linnaeus,1758)



Family: Ficidae

Common name: Paper fig shell

The thin, pear-shaped shell may reach a height of 4-5 inches. It has approximately four body whorls, which are enlarged on the "fat part" of the "pear." There is almost no spire, but rather a little "nipple." The shell has a long, straight canal and a large, smooth aperture. The lip of the aperture is thin. The surface of the shell has flattened cord-like ribs which alternate with weaker ribs. These are crossed by fine vertical striae. The fresh paper fig shell is pinkish, perhaps with pale brown dots. The interior is shiny orange-brown. Shell size 60 mm.

Habitat: Sandy bottom

Distribuiton: Southeast Africa, Indo-Pacific

Harpa major (Roding, 1798)



Family: Harpidae

Common name: Major Harp

Shell of medium to large in size, up to 80 mm in height, broadly oval, solid, body whorl large, spire conical. Aperture large, ovate, outer lip simple and gently arcuate, columella bordered by a strong rounded fasciole, ribs continue as ridges on the columella, anterior canal broad and posterior a shallow sinus. Protoconch consists of 3½ smooth whorls. Colour of the shell pinkish flesh colour, spaces between the ribs ornamented with axial festooned pattern of white, ribs with or without dark brown spiral lines, columella and parietal area with a large deep chestnut blotch, more or less divide in the middle of the parietal wall, the lower part continues down to the base of the columella. Shell size 60-130 mm.

Habitat: Offshore

Distribution: Indian Ocean, E. Africa - Hawaii

Turritella attenuata Reeve, 1849



Family : Turritellidae

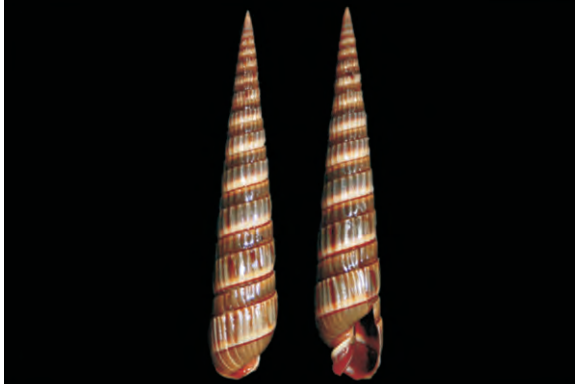
Common name : Turret / Screw Shell

Medium or large (1 to 6 inches) usually light and fairly strong, very high conical spire (turreted). The whorls vary from flat to very convex, the suture from barely incised to impressed, a flat or shortly convex base, always lacking an umbilicus, with a thin and sharp aperture lip, often sinuous in outline, circular or roughly square in shape. The sculpture is mainly spiral from thin, not very prominent ridges to thick bands, often grooved longitudinally. The coloration is also variable, but is always based on whitish or brown hues, often with reddish-brown flammings. The operculum is horny, round with a central nucleus and fringed margins. The foot is moderately developed the distinct head has two tentacles, and the eyes are at their bases, set on two swelling. The mantle cavity contains one gill with very long lamella and one osphradium. Males do not have a penis. Shell size 110-138 mm.

Habitat : Sandy muddy and fairly coarse detrital bottoms in the intralittoral and also in the circalittoral zone.

Distribution : India, Thailand

Duplicaria duplicata (Linnaeus, 1758)



Family: Terebridae

Common Name: Duplicate Auger

Moderately narrow with many whorls; axial plicae on early whorls become flattish ribs on later whorls which may also be slightly inflated. Sharply defined subsutural groove, giving a broad subsutural band. Wide aperture with a deep narrow notch; slightly recurved columella; fasciole with a strong ridge. Variable in colour may be as blue grey, rusty brown clouding and faint short, axial streak of darker grey or unicoloured, dark brown, orange-pink, cream or white or varieties of these with other markings but usually with a rather opaque shine. Shell size 20-93 mm.

Habitat: Sandy bottoms near coral reefs

Distribution: Indian Ocean, Red Sea - South Africa, Japan and Solomon Islands

***Bufonaria rana* (Linnaeus,1758)**



Family : Bursidae

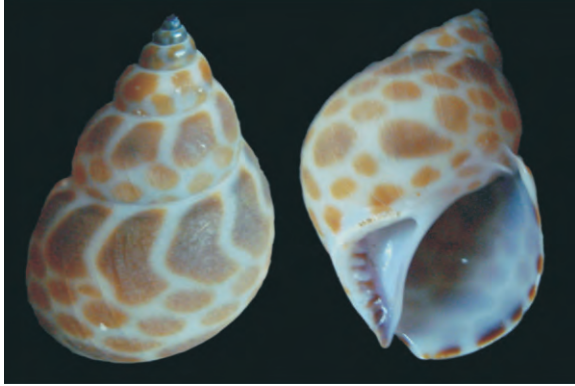
Common Name : Common Frog Shell

A typical specimen is nearly smooth except for a row of tubercles at the shoulder of the whorl. The color is purplish to reddish brown with a white band below the periphery and with white on the inner outer lips of the aperture, the brown banding showing within. Shell size 45-90 mm.

Habitat : Offshore muddy bottom

Distribution : Indo-Pacific, Bay of Bengal, Japan, East and West Australia

Babylonia zeylanica (Bruguiere, 1789)



Family: Buccinidae

Common Name: Indian / Sri Lankan / Perforated Babylon

Rather like *B.japonica* in shape but less robust with less inflated whorls. White with large brown blotches and spots generally smaller in centre of the last whorl and above the suture. Inside edge of fasciole ridge and apex purple. Shell size 50-85 mm.

Habitat: Muddy bottoms of deep waters.

Distribution: India, Sri Lanka, Taiwan, Indonesia

***Cymatium perryi* Emerson & Old, 1963**



Family: Ranellidae

Common name: Perry's Triton

Shell is solid, large, and glossy with a medium spire. Outer lip is thick with brown bands running along outer lip forming seven orange brown teeth. The callus on the columella has orange edge. Shell size measures 70-125 mm.

Habitat: Bottom of shallow waters, sandy and coral

Distribution: South India and Sri Lanka

Turbinella pyrum Linnaeus, 1758



Family: Turbinellidae

Common name: Sacred Chank

Shell is massive and the aperture is wide prolonged anteriorly into a long elevated apex. The columella bears 3 or sometimes 4 strong ridges. The shell is covered by a dark brownish horny periostracum which covers the porcellaneous (milky white) shell beneath. The whorls have slightly angular shoulders; the one on the body whorl is distinct. The shoulder ridges bear a series of small compressed tubercles. Sizes vary from 98-220 mm.

Habitat: Sandy bottoms of coastal waters

Distribution: SE India and Sri Lanka

Murex carbonnieri Jousseaume, 1881



Family: Muricidae

Common Name: Carbonnier's Murex

Club shaped shell with rounded whorls, smooth, deep suture and an ovate aperture. Elevated spire consisting of 7 to 9 whorls. Simple suture crossed by growth lamellae. Tubular siphonal canal. Large body whorl and preceding two whorls bear three prominent varices provided with long spines. Reddish-brown spots between lighter elevated nodes is a characteristic identification character. Colour of the shell is creamy white to light brown. Operculum is reddish brown in colour.

Habitat : Muddy bottoms

Distribution: Indo-Pacific

References

- Alagarswami, K. 1966. Studies on some aspects of biology of the wedge clam *Donax faba* Gmelin from Mandapam coast in Gulf of Mannar. *J. mar. biol. Ass. India*, 8: 56-75.
- Alison Kay, E. 1995. Occasional Paper of the IUCN Species Survival Commission No. 9. *The Conservation Biology of Molluscs*. 81 pp.
- Antony S. Fernando and Olivia J. Fernando 2002. A field guide to the common invertebrates of the east coast of India. pp.258.
- Appukuttan, K. K. 1972. Coral-boring bivalves of Gulf of Mannar and Palk Bay. *Proc. Symp. Corals and Coral Reefs*, Marine Biological Association of India, Mandapam. pp.379-398.
- Deepak Apte 1998. The book of Indian Shells. Bombay Natural History Society.
- GoMBRT, 2012. Compendium of Research Findings on Biodiversity Conservation and Sustainable use in Gulf of Mannar Biosphere Reserve, 2(21): 386.
- Hornell, J. 1922. The Indian pearl fisheries of the Gulf of Mannar and Palk Bay. *Proc. Symp. Madras Fish. Bull.*, 16:1-188.
- Hornell, J. 1924. Report on the inspection of pearl banks in the Gulf of Mannar and Palk Bay in March and April 1923, *Madras Fish. Bull.*, 17:199-214.
- Hylleberg, J. and Anuwat Nateewathana 2002. Editors. Zoogeography and Inventory of marine molluscs encountered in southern India. Phuket Marine Biological Centre Special Publication. No. 26. ISSN 0858 - 3633. pp. 80.

- Iyengar, M. and O. Parthasarathy 1927. Krusadai Island flora. *Bull. Madras Govt. Mus. N.S.*, 1: 185-188.
- Jeyabaskaran. R., D. Asir Ramesh and A. L. Paul Pandian 1996. Distribution and Abundance of Molluscan Cryptofauna from Karaichalli Island (Gulf of Mannar), Southeastern coast of India. *Phuket Marine Biological Center Special Publication*, 16: 215-219.
- Kannaiyan, S. and K. Venketraman 2008. Biodiversity conservation in Gulf of Mannar Biosphere Reserve, National Biodiversity Authority Publ., Chennai. pp. 484.
- Melkani, V.K., J.K.P. Edward, A. Murugan and A. Naganathan 2009. Capacity building in identification of Marine Scheduled Animals: Training cum information manual. Gulf of Mannar Biosphere Reserve Trust Publ. No. 8, pp. 82.
- Melville, J.C. and R. Stander 1878. The marine mollusks of Madras and the immediate neighbourhood. *J. Conch London*, 9: 30-48.
- Nair, N.B. and K. Dharmaraj 1980. Wood boring molluscs of the Palk Bay and the Gulf of Mannar. *Mahasagar*, 13 :249-260.
- Nair, R.V. and K.S. Rao 1974. The Commercial molluscs of india. *Bull. Cent. Mar. Fish. Inst*, No. 25, 168 pp.
- Nayar, K.N. 1955. Studies on the growth of Wedge clam *Donax cuneatus* Linnaeus. *Indian J. Fish.*, 2: 325-348.
- Peter Dance. S., 1992. Shell-The visual guide to over 500 species of sea shells from around the world. Dorling Kinderly limited London. 256 pp.
- Ramesh, D. S., R. Jeyabaskaran and A. L. P. Pandian 1996.

Common Molluscs of Gulf of Mannar

- Gastropods and bivalves associated with reef Building corals, Palk Bay, Southeast coast of India. A Phuket Marine Biological Center Special Publi., 16 : 257-260.
- Samuel V.D., D. Chacko and J.K. Patterson 2005. Preliminary study on the molluscan diversity of “the lost world”- Dhanushkodi, East coast of India. In: Proc. National Seminar on Reef Ecosystem Remediation. SDMRI Res. Publication. 9 : 54-58.
- Satyamurti, S. T. 1952. The Mollusca of Krusadai Island, Gulf of Mannar. *Bull. Madras Govt. Mus. (Nat. Hist.)*, 1 (2) (Part 7), 201 pp.
- Shaul Hameed, P. and S.N. Somasundaram 1998. A survey of bivalve molluscs in Gulf of Mannar, India. *Indian J. Fish.*, 45(2):177-181.
- Subba Rao N.V. 2003. Indian seashells (part I): Polyplacophora and Gastropoda. *Zoological Survey of India*. 426 pp.
- Thomas, P.A. 1972. Boring sponges of the reefs of Gulf of Mannar. *Proc. Symp. Corals and Coral Reefs*, Marine Biological Association of India, Mandapam, pp. 333-362.
- Thurston, E. 1895. Rameswaram Island and the fauna of Gulf of Mannar. *Bull. Madras Govt. Mus.*, 2: 108-112.

QUICK REFERENCE INDEX

<i>Agaronia nebulosa</i>	47	<i>Cucullaea labiata</i>	25
Amadis Cone	35	<i>Cymatium perryi</i>	59
<i>Ancilla cinnamomema</i>	48	Dog Conch/Yellow Conch	39
Ancillas	48	<i>Donax faba</i>	15
Angel Wings	19	<i>Duplicaria duplicata</i>	56
<i>Architectonica perspectiva</i>	31	Duplicate Auger	56
<i>Atrina pectinata</i>	17	<i>Ficus ficus</i>	53
<i>Babylonia zeylanica</i>	58	Flask Bubble	33
Beech Cone	37	Gray Bonnet/Glaucus	
Bean Clams/Butterfly Clams	15	Bonnet	49
Black Hammer Oyster	24	<i>Harpa major</i>	54
Blotchy Ancilla	47	<i>Harpulina lapponica</i>	34
Branched Murex/Ramose		<i>Haustellum haustellum</i>	45
Murex/Ram's Murex	46	Hooked Ark	25
Brown Lined Volute	34	Indian Babylon / Sri Lankan	
<i>Bufo naria rana</i>	57	Babylon	58
<i>Bulla ampulla</i>	33	Indian Backwater Oyster/	
Carbonnier's Murex	61	Edible Oyster	22
<i>Chicoreus ramosus</i>	46	Indian Pearl Oyster	23
<i>Circe scripta</i>	14	Indian Tibia	40
Clear-Painted Sundial	31	Indian Turrid	32
Common Frog Shell	57	<i>Isognomon Isognomon</i>	16
Common Spider Conch	41	Japanese Bonnet	50
<i>Conus amadis</i>	35	<i>Laevistrombus canarium</i>	39
<i>Conus betulinus</i>	37	<i>Lambis lambis</i>	41
<i>Conus tessulatus</i>	36	<i>Lambis truncata</i>	42
<i>Crassostrea madrasensis</i>	22	<i>Lophiotoma indica</i>	32

Common Molluscs of Gulf of Mannar

Major Harp	54	<i>Pteria avicular</i>	26
Malabar Venus	20	<i>Pugilina cochlidium</i>	51
<i>Malleus malleus</i>	24	Sacred Chank	60
<i>Monetaria (Cypraea)</i> <i>caputserpentis</i>	44	Script Venus	14
<i>Monetaria (Cypraea) moneta</i>	43	Serpent's Head Cowry	44
Money Cowry	43	Snipe's pill Murex	45
<i>Murex carbonnieri</i>	61	<i>Solen roseomaculatus</i>	27
<i>Natica tigrina</i>	52	Spiral Melongena/Melon Conch	51
Necklace Cone	38	<i>Strategoconus (Conus) monile</i>	38
Paper Fig Shell	53	Swift Wing Oyster	26
<i>Paphia malabarica</i>	20	Tessellate Cone	36
<i>Paphia textile</i>	21	Textile Venus	21
Pen Shell	17	<i>Tibia curta</i>	40
Perry's Triton	59	Tiger Moon Snail	52
<i>Phalium bisulcatum</i>	50	Toothed Oyster	16
<i>Phalium glaucum</i>	49	<i>Trisidos tortuosa</i>	13
<i>Pholas orientalis</i>	19	Truncate Spider Conch	42
<i>Pinctada fucata</i>	23	<i>Turbinella pyrum</i>	60
Pink-Spotted Razor Shell	27	Turret Shells / Screw Shells	55
<i>Placuna placenta</i>	18	<i>Turritella attenuata</i>	55
Propellor Ark	13	Window Pane Oyster	18

For further details contact :
Chief Conservator of Forests & Trust Director
Gulf of Mannar Biosphere Reserve Trust
Jawan Bhavan Building (1st Floor)
102/26, Devipattinam Road, Kenikarai
Ramanathapuram - 623 504, Tamilnadu, India

Ph. : 04567 - 226335
Fax : 04567 - 229228
E-mail : gombrt_rnd@yahoo.co.in
Web. : www.gombrt.org

