

Marine mollusc diversity and conservation in India

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The global ecosystem encompasses over 1.75 million distinct species, among which there are 46,000 recognised species of marine molluscs (Bouchet et al. 2016). The phylum Mollusca accounts for around 60% of the total global biodiversity, as stated by Gosliner et al. in 1996. India possesses a diverse range of marine environments, including tidal flats, lagoons, coral reefs, deep sea areas, and islands. The exploration of marine biodiversity in India did not occur till the seventeenth century. India has a coastline that spans 8,129 kilometres and a continental shelf that covers 0.5 million square kilometres. Within its waters, there are 3,370 different species of marine molluscs belonging to 220 families and 591 genera (Ramakrishna and Dey 2010). Among these the bivalves are the most diverse (1100 species), followed by cephalopods (210 species), gastropods (190 species), polyplacophores (41 species) and scaphopods (20 species). There is no consensus among various authors on the total number of marine molluscs from India. Nevertheless, the current knowledge regarding the status of different mollusc species in maritime environments in India is lacking, and their threat status remains unidentified. India is home to five out of the seven classes of molluscs found worldwide, as stated by

Classes in Phylum Mollusca

This phylum can be segregated into seven classes: Aplacophora, Monoplacophora, Polyplacophora, Bivalvia, Gastropoda, Cephalopoda, and Scaphopoda.

Class Aplacophora

Aplacophora, which means "bearing no plates," comprises worm-like organisms that are predominantly found in benthic marine environments. These organisms do not have a shell made of calcium carbonate, but they do have aragonite spicules on their outer layer. Their mantle cavity is basic and they do not possess eyes, tentacles, or nephridia (excretory organs).

Class Monoplacophora

Monoplacophora organisms possess a solitary, helmet-shaped shell that envelops the body. The shell's form and the underlying animal's structure can range from circular to ovate. These animals possess a coiled digestive system, numerous sets of excretory organs, abundant gills, and a pair of gonads. Monoplacophorans were considered to be extinct and were only known from fossil evidence until the identification of *Neopilinagalathaea* in 1952. Presently, scientists have recognised approximately twenty living species.

Class Polyplacophora

Animals belonging to the family Polyplacophora, which means "bearing many plates," are popularly referred to as "chitons." They have a dorsal shell made up of eight armor-like plates. These animals possess a wide, lower foot that is specialised for adhering to rocks and other surfaces, and a mantle that extends beyond the shell in the shape of a belt. The girdle may possess calcareous spines as a means of providing protection against predators. Chitons inhabit several regions across the globe, including cold water, warm water, and tropical environments. The majority of chiton species reside in intertidal or subtidal areas and do not go beyond the photic zone. Certain organisms inhabit the upper regions of the intertidal zone, enduring prolonged exposure to air and light.

Class Bivalvia

Bivalvia is a taxonomic class consisting of aquatic molluscs that have flattened bodies and are protected by a shell composed of two hinged pieces. Bivalves encompass clams, oysters, mussels, scallops, and various other shell-bearing families. Most of them are organisms that extract food particles from the water and lack a distinct head or radula. The majority of bivalves engage in sediment burial on the seabed, while others may rest on the sea floor or affix themselves to rocks or other solid substrates. The bivalve's shell is made up of calcium carbonate and is

comprised of two valves, typically of comparable shape and size. The valves are connected along one edge by a pliable ligament which, in combination with interlocking "teeth" on each valve, creates the hinge.

Class Gastropoda

The class Gastropoda, also known as "stomach foot," comprises various well-known mollusks such as snails, slugs, conchs, sea hares, and sea butterflies. Gastropoda encompasses both species that possess shells and species with diminished shells. These animals exhibit asymmetry and typically possess a spiral-shaped shell. Shells can exhibit planospiral morphology, resembling a coiled garden hose, as observed in garden snails, or conispiral morphology, resembling a spiral staircase, as observed in marine conches.

Class Cephalopoda

The class Cephalopoda include octopuses, squids, cuttlefish, and nautilus, which are all referred to as "head foot" animals. Cephalopods are a group of mollusks that have a shell, although it is smaller than usual. These organisms have vibrant colours, commonly observed in squids and octopuses, which serves the purpose of camouflage. All members of this class are carnivorous predators and possess beak-like jaws at the front end. Cephalopods exhibit a highly developed neural system and possess eyes, as well as a closed circulatory system. The foot is characterised by lobes and is specialised into tentacles and a funnel, which serve as the means of mobility. Cephalopods achieve locomotion by expelling a jet of water for propulsion. Cephalopods, such as squids and octopuses, secrete sepia or a dark ink, which is expelled towards a predator to facilitate a rapid escape. Octopuses and squid possess suckers on their tentacles. The ctenidia are contained within a spacious mantle cavity that is supplied by blood veins, each of which has its own corresponding heart. The mantle contains siphonophores that enable the exchange of water.

Class Scaphopoda

Scaphopoda, also known as "boat feet," are commonly referred to as "tusk shells" or "tooth shells." This is particularly noticeable when studying Dentalium, which is one of the few extant genera of scaphopods. Scaphopods typically reside underground in sand, with the front entrance exposed to water. These animals possess a solitary conical shell that is open at both ends. The head is underdeveloped and extends from the back end of the shell. These animals lack eyes but contain a radula, as well as

a foot that has been converted into tentacles with a bulbous end, referred to as captaculae. Captaculae function as mechanisms to ensnare and manipulate prey. These animals lack ctenidia.

Scheduled marine molluscs of India

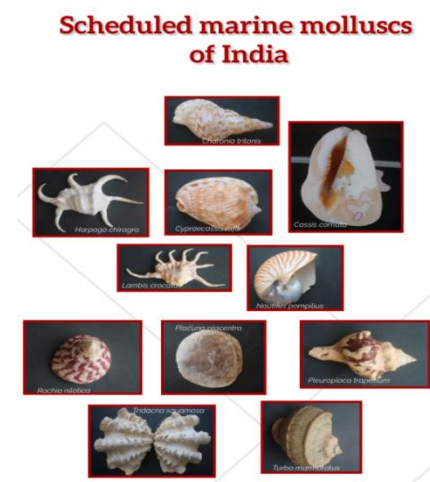
1. *Cassis cornuta* (Linnaeus, 1758)
2. *Charoniatritonis* (Linnaeus, 1758)
3. *Conus milneedwardsi* (Jousseaume, 1894)
4. *Cypraeacassisrufa* (Linnaeus, 1758)
5. *Ophioglossolambis digitata* (Perry, 1811)
6. *Lambismillepeda* (Linnaeus, 1758)
7. *Lambisscorpius* (Linnaeus, 1758)
8. *Harpagochiragra* (Linnaeus, 1758)
9. *Harpagoarthriticus* (Roding 1798)
10. *Turbo marmoratus* Linnaeus, 1758
11. *Tudiclaspirillus* (Linnaeus, 1767)
12. *Staphylaealimacina* (Lamarck, 1810)
13. *Leporicypraeamappa* (Linnaeus, 1758)
14. *Talpariatarpa* (Linnaeus, 1758)
15. *Pleuroploca trapezium* (Linnaeus, 1758)
16. *Harpulinaarausiaca* (Lightfoot, 1786)
17. *Dolomenaplicatasibbaldi* (G.B. Sowerby II, 1842)
18. *Lambistruncata* ([Lightfoot], 1786)
19. *Rochianilotica* (Linnaeus, 1767)

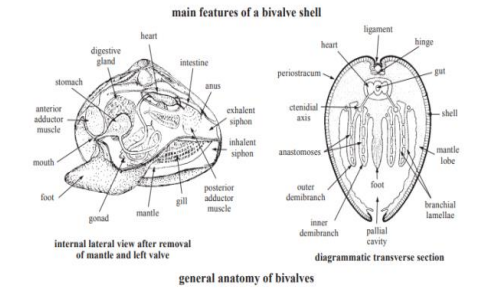
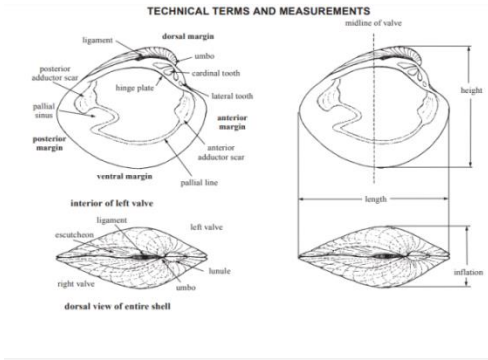
Bivalves

1. *Hippopus hippopus* (Linnaeus, 1758)
2. *Tridacna maxima* (Roding, 1798)
3. *Tridacna squamosa* (Lamarck, 1819)
4. *Placuna placenta* (Linnaeus, 1758)

Cephalopods

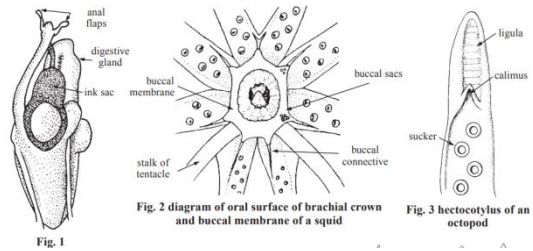
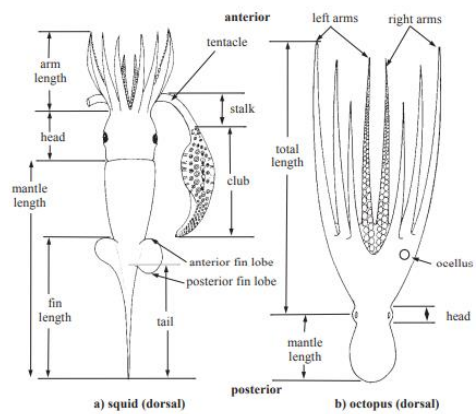
1. *Nautilus pompilius* (Linnaeus, 1758)



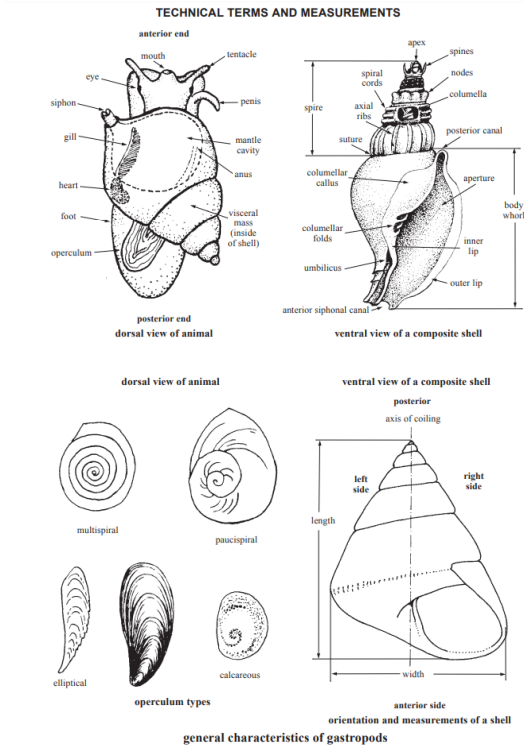


Courtesy:FAO identification guide for fishery purpose

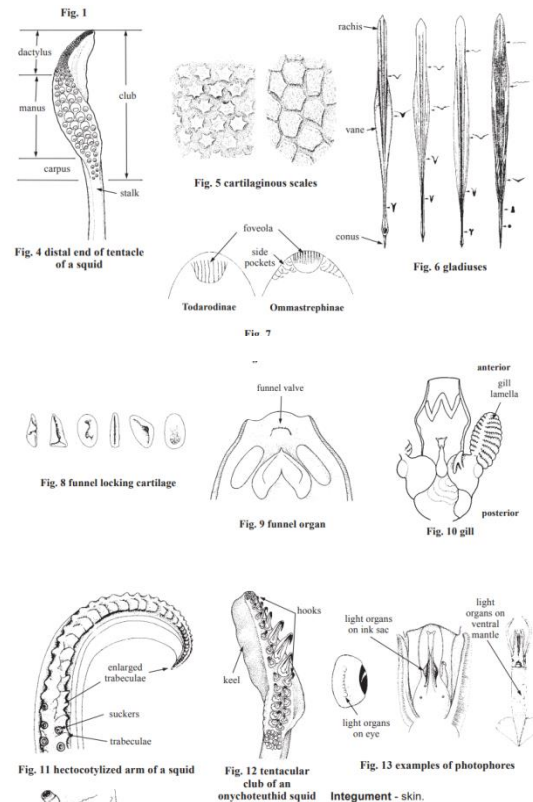
TECHNICAL TERMS AND MEASUREMENTS

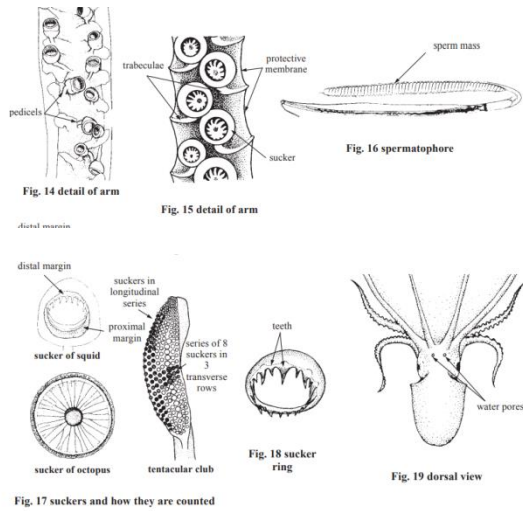


Courtesy:FAO identification guide for fishery purpose



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References

- Bouchet, P., Bary, S., Héros, V. and Marani, G., 2016. How many species of molluscs are there in the world's oceans, and who is going to describe them? *Tropical deep-sea benthos*, 208(29), pp.9-24.
- Leal J H. 2002. Gastropods. In: K. E. Carpenter (ed.) *The Living Marine Resources of the Western Central Atlantic. Volume 1. Introduction, mollusks, crustaceans, hagfishes, sharks, batoid fishes and chimaeras. FAO Identification Guide for Fishery Purposes*
- Ramakrishna, R., Mitra, S.C. and Dey, A., 2010. *Annotated checklist of Indian land molluscs. Occasional paper No. 306. Zoological Survey of India. Kolkatta, India.*

Further reading

- Huber M., 2010. *Compendium of Bivalves: A Full-Color Guide to 3'300 of the World's Marine Bivalves: A Status on Bivalvia After 250 Years of Research. IKAN Unterwasser-Archiv; Illustrated edition (11 November 2010), 901 pp.*