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DIVERSITY OF CONE SNAILS (MOLLUSCA: CONIDAE) ALONG KERALA COAST

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Abstract: Cone shells are neogastropod molluscs belonging to the super family Conoidea and family Conidae. These highly sophisticated predatory snails are among the most successful marine animals and are represented by about 500 species in the marine ecosystem. They are highly sought after by the conchologists because of their exquisite colouration and by the marine pharmacological industry due to the potential bioactivity of the neurotoxic venom. Majority of cone snails live in the intertidal zone between the reef and the shore; in the rock and coral crevices and in sandy habitats in the reef. A total number of 81 species of cone shells have been reported from Indian coast. A systematic survey was conducted to document the diversity of cone snails along Kerala coast. The specimens were collected from different landing centres and rocky shore habitats. The collected specimens were cleaned, photographed and the shells were preserved dry. Ten species of cone snails were recorded, which included *Conus betulinus* (Linnaeus), *C. coronatus* (Gmelin), *C. ebraeus* (Linnaeus), C.*inscriptus* (Reeve),*C. buxeus loroisii* (Kiener), *C.miles* (Linnaeus), *C. milneedwardsi* (Jousseaume), *C. monile*, (Hwass in Bruguiere), *C. rattus* (Hwass in Bruguiere), and *C. textile* (Linnaeus). Of these *C. rattus* and *C. miles* were reported for the first time from the west coast of India and *C.buxeus loroisii* and *C. coronatus* were the first time report from the Kerala coast. *C. milneedwardsi* included in the scheduled list I of Wildlife (Protection) Act of India has been recorded during the study from the trawl by-catch. *C. textile* is another commercially important species recorded during the study from Kerala coast. The cone shells landed in the fishing harbours were collected by the local people for supplying them to the shell handicraft industry.

Key words: Gastropoda, Conus, Scheduled list, Shell trade, By-catch

INTRODUCTION

Conus is the large genus of small to large venomous predatory marine gastropod belonging to the subfamily Coninae with in the family Conidae. These shells are mostly tropoical in distribution. These shells are varied in size. They are many whorled shells; in the form of an inverted cone as the name indicates. These shells are characterised by a long aperture with a short siphonal canal with a low spire. The shell characters of the family are very distinctive. Most of them are reef dwellers, inhabiting on muddy-sand bottoms under corals or in silt crevices. They are also present in the deep continental shelf area and slope to a depth of about 600m. They are partially or completely buried in the sediment and they come out for the search of food or at low tide. Most of them are feeding on marine worms, molluscs or even small fishes. Sexes are separate and fertilization is internal. Planktonic larval stage of variable duration absent.

Cones are well known poisonous molluscs. Live cones must be handled with proper care because their bites may be painful or occasionally fatal to human. These cone venoms are temperature sensitive so they can be used as food after cooking. In the Indo-Pacific area they are widely used as food. These organisms use the venom for immobilizing the prey. These venom contains highly structured small peptides and they target a wide variety of membrane bound iron channels and receptors. Due to the structural stability, small size and target specificity they are widely used as pharmacological agents. Several conus peptides are widely used as research tools in neuroscience such as w-conotoxin and potential therapeutic agents such as Ziconotide. Altogether approximately 150 conotoxins were reported. The compounds in the toxins are widely used in the treatment of Alzhimer's disease, Parkinson's disease, depression and epilepsy.

Conidae is a very popular family among gastropods due to it's rarity and beautiful colour. Many fishermen families among coastal villages are actively engaged in the collection of these shells and also in the shell handicraft industry. They are widely used for making dolls, fantecy flower sculptures of gods etc. According to Franklin *et al* (2009) a total number of 81 species of cone shells were reported from Indian waters. Studies regarding the diversity of cone shells along Kerala coast are scarce. The purpose of the study is to prepare a database on the diversity of cone snails along Kerala coast.

MATERIALS AND METHOD

The specimens were collected from the different landing centres and rocky shore areas of Kerala coast; including Vizhinjam (Thiruvananthapuram), Sakthikulangara, Neendakara (Kollam), Ponnani (Malappuram), Beypoore, Chombala, Puthiyappa, Chalium (Kozhikkode), Thalasserry, Azhikkal, Dharmadam, Muzhappilangad (Kannur), Madakkara-Cheruvathur, and Thaikadappuram - Neeleswaram (Kasargod). The period of collection from September 2012-June 2013. The collected specimens were cleaned and photographed. After taking the necessary measurements the specimens were sundried and preserved for further study. The collected specimens were identified with the help of FAO sheets and identification keys; Robin (2008) and Rao (2003). Abundance of the species was noted. Biodiversity index of the species were calculated by using PAST software.

RESUTS

Taxonomic Account

Phylum : Mollusca
Class : Gastropoda
Order : Neogastropoda
Super Family : Conoidea
Family : Conidae
Genus : Conus

Ten species of cone snails were recorded during the study period. They includes *Conus betulinus* (Linnaeus), *C. coronatus* (Gmelin), *C. ebraeus* (Linnaeus), C.*inscriptus* (Reeve),*C. buxeus loroisii* (Kiener), *C.miles* (Linnaeus), *C. milneedwardsi* (Jousseaume), *C. monile*, (Hwass in Bruguiere), *C. rattus* (Hwass in Bruguiere), and *C. textile* (Linnaeus).

Table 1. Diversity indices of Cone shells of Kerala coast.

Taxa S	10
Individual	594
Shannon Weiner index- H	0.8821
Dominance D	0.5714
Simpson 1-D	0.4286
Evenness- e^H/S	0.2416
Margalef	1.409

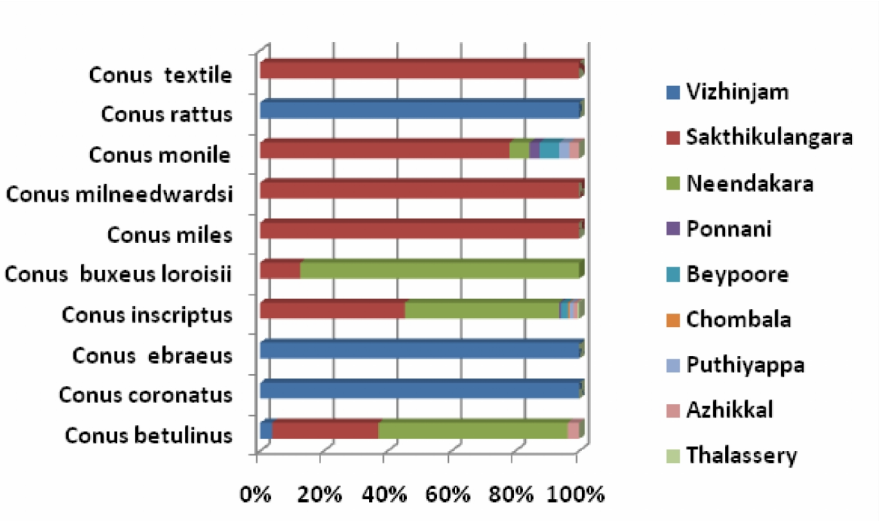

Fig. 1. Bar Diagram showing the Abundance of species from different locations

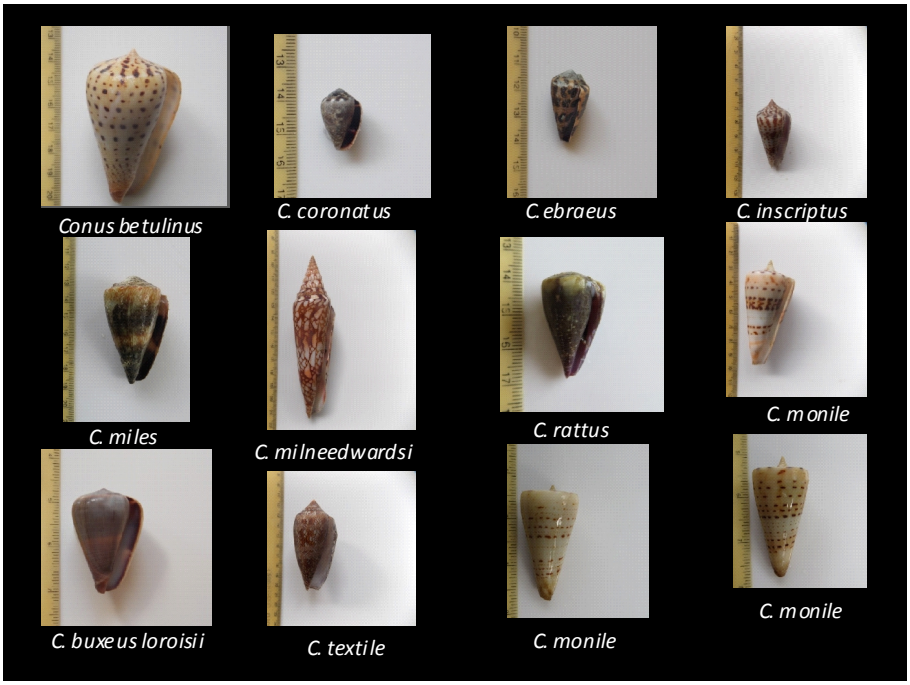

Fig. 2. Cone shells from Kerala coast

DISCUSSION

Among the cone shells collected, the most important one is *Conus milneedwardsi*. The price of the shell varies from Rs. 250-2000 depending on the size of the shell. This is the most demanding species among cones. *C. textile* is another important species having a maximum price of Rs. 50/-. These two species are the two economically important cone species of Kerala coast. The remainig species having a price of Rs. 20-30/ kg. Specimens of *C. monile* shows variations of banding patterns in the last body whorl. During the study period the maximum number of species abundance observed from Sakthikulangara-Neendakara coast. From the biodiversity indices calculated, Shannon diversity index of cone shells recorded a higher value of 0.8821 in Kerala coast and the Margalef species richness index was 1.409. The distribution of cone shells showed dominance of some species (Dominance index = 0.5714) and the Eveness index was less (0.2416). According to Franklin *et al.* (2009) the distribution of *C. rattus* is probably limited to Gulf of Mannar and this is considered to be the first report from the west coast of India. The earlier reports of *C. miles* is from the east coast by Franklin *et al.* 2009 and this is also the first report from the west coast. The occurrence of the two species, *C.buxeus loroisii* and *C. coronatus* were reported from the east coast, Gujarat, Mumbai (Franklin *et al*. 2009) and this appears to be the first report from the Kerala coast. Cone shells are the highly priced marine ornamental gastropods contributing major share in the trawl catches of Kerala coast. As a raw material for the shell craft industry these shells were over exploited. Due to the extensive exploitation some of them were included in the Scheduled list under Wild Life Protection Act 1972. *C. milneedwardsi* included in the scheduled list I and it is the most demanding species of Sakthikulangara-Neendakara coast.

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