"TAXONOMIC IDENTIFICATION OF MOLLUSCAN SPECIES"

Project Work By

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Affiliated to Mahatma Gandhi University, Kottayam in partial

Fulfillment of requirement for the degree of Bachelor of Science

In Zoology

2022-2023

CERTIFICATE

This is to certify that the project report entitled **"TAXONOMIC IDENTIFICATION OF MOLLUSCAN SPECIES"** submitted by Ms. VANDANA M H, Reg. No. AB20ZOO024, partial fulfilment of the requirements of Bachelor of Science degree of Mahatma Gandhi University, Kottayam, is a bonafide work done under the guidance and supervision of Dr.Soja Louis and this is her original effort.

Dr.Soja Louis

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EXAMINERS

1)

2)

DECLARATION

I, hereby declare that this project work entitled **"TAXONOMIC IDENTIFICATIONOF MOLLUSCANSPECIES"** is submitted to St.Teresa's College (Autonomous). Ernakulam affiliated to Mahatma Gandhi University, Kottayam in partial fulfilment of the requirements of Bachelor of Science degree in Zoology. This work has been undertaken or submitted elsewhere in connection with any other academic course and the opinions furnished in the report is entirely my own

Signature:

Name: VANDANA M H

Reg.No: AB20ZOO024

ACKNOWLEDGEMENT

Every small or big project is successful only because of the efforts that have been put by many dedicated people. I sincerely appreciate the inspiration, support and guidance of all those who have been instrumental in making this project a success.

I owe my deep gratitude to my project guide Dr.Soja Louis, who took keen interest on my project work and guided me all along, till the completion of my project work by providing all necessary information for developing a good system.

Also, I would like to extend my sincere esteems to all staff in laboratory for their timely support.

Above everything I would like to extend my gratitude to the almighty and my parents who had helped directly or indirectly towards the completion of this project.

CONTENTS

SYNOPSIS

Taxonomic identification is the recognition of identity or essential character of an organism. The project entitled “TAXONOMIC IDENTIFICATION OF MOLLUSCAN SPECIES”was done in order to classify all the specimens kept in museum to species level.They are organized as written descriptions of characteristics of similar species with their pictures to identify unknown organisms. Since, most of the conserved areas prevent the entry of the public,though with limitations, the only way to study the variety of animals is by examining available specimens in the museum.Hence this project was undertaken to have a in-depth knowledge on one of the most abundant group of animals the Mollusca for this study. In this project work on taxonomic identification of 29 species coming under phylum Mollusca (Bivalvia , Scaphopoda), along with their cataloguing was done. In total there are 29species of molluscans in museum among which, many species are there and rest are repetitions. According to Wildlife Protection) Act, there is restriction in the direct collection of molluscan specimens, so observing the molluscans available at the museum and their classification provides detailed information of the specimens that may be useful for future reference.

INTRODUCTION

Mollusca is the second-largest phylum of invertebrate animals after the Arthropods, the members of which are known as molluscs or mollusks. There are around 85,000 extant species of molluscs. The number of fossil species is estimated between 60,000 and 100,000 additional species.The proportion of undescribed species is very high. Many taxa remain poorly studied. Most of the species are marine, a few freshwater and some terrestrial. It is the largest,marine phylum, comprising about 23% of all identified marine organisms. Molluscs are highly diverse, not only in size and in anatomical structure, but also behavior and habitat.A part of almost every ecosystem in the world, molluscs are extremely important members of many ecological communities. They range in distribution from terrestrial mountain tops to the hydrothermal vents and cold seeps of the deep sea, and range in size from 20-meter-long giant squid to microscopic aplacophorans, a millimeter or less in length, that live between sand grains.

The phylum Mollusca is typically divided into six taxonomic classes. The gastropods (snails and slugs) include by far the most classified species, accounting for 80% of the total. Cephalopod molluscs such as squid, cuttle fish and octopus are among the most advanced invertebrates. Either the giant squid or the colossal squid is the largest known species of animal without a backbone. Many of the species are economically very important.

The body is divided into a head, a ventral muscular foot and a visceral mass. Soft and unsegmented body without appendages and with bilateral symmetry or asymmetry (Gastropoda).Glandular mantle is present in all forms which secretes a calcareous protective shell. In forms like clams, the shell is external, whereas in Octopus, Sepia etc. the shell is an internal supporting structure. Digestive system is well developed with digestive glands and liver. In most forms a rasping organ, the radula is usually present in the buccal cavity. Circulatory system is open type except in cephalopods and is with heart, pericardial space and blood vessels. Blood is mostly colourless. Coelom is reduced and represented mainly by the pericardium. Respiration is by gills (ctenidia), by lungs or directly through the body surface. Excretion is by one or two pairs of nephridia. Nervous system has paired cerebral, pleural, pedal and visceral ganglia. Fertilization is external or internal. No asexual reproduction. Presence of a trochophore or veliger larval stage in development.

Molluscs are important in variety of ways; they are usd as food, for decoration, in jewelry, and in Scientificstudies. They are even used as roadbed material and in vitamin supplements. Edible species of molluscs include numerous species of clams, mussels, oysters, scallops, marine and land snails, squid, and octopuses. Two natural products of molluscs used for decorations and jewelry are pearls and nacre. Several molluscs are ideal for scientific investigation of nervous system.

Phylum Mollusca can be generally classified into

CLASS 1. Aplacophora
Subclass: Chaetodermorpha
eg: *Chaetoderma*
Subclass: Neomeniomorpha eg:
Neomenia, Proneomenia

CLASS 2. Polyplacophora
Order: palaeoloricata Order:
Neoloricata eg:
Lepidopleurus, Cryptoplax

CLASS 3. Monoplacophora eg:
Neoplina

CLASS 4. Gastropoda
Subclass: Amphigastropoda Order:
Bellerophontida
eg extinct family of specialized globose bellerophontids, paleozoic etc
Subclass: Archaeobranchia
Order: pelagiellida eg:
Cambrian molluscs (extinct)
Order : Helcionellida
Subclass: Patellogastropoda
Order: Patellida eg: *Patella*
vulgata

Subclass : Neomphaliones

eg: *Helicrenion reticularium*

Order : Neomphalida eg:

Chrysomallon squaiferum

Order : Cocculinida eg:

Coccipigya hispida Subclass

: Vetigastropoda Order :

Pleurotomariida eg:

Perotrochus atlanticus Order

: Seguenziida Order :

lepetellida eg: *Scissurella*

costata Order : Trochida

eg: *Trochus radiatus, Trochus histrio, Trochus dentatus*

Subclass: Neritimorpha

Order : Cyrtoneritida

Eg: Clade of fossil sea snails, Marine gastropod etc

Subclass: Caenogastropoda Order:

Neogastropoda

eg: *Conus araneous, Babylonia spirata, Conus amadis etc*

Subclass: Heterobranchia

Order: Ringipleura

Order: Nudipleura

Order: Pleurobranchida

Order: Nudibranchia

Order: Umbraculida

Order: Cephalaspidea

Order: Runcunida

Order: Anaspidea

Order: pteropoda

CLASS 5.Bivalvia

Subclass: protoranchia

Order: Nuculoida

eg: *Nucula* Order:
Solemyoida eg:
Solemya Subclass:
pteriomorphia Order:
Arcoida eg: *Anadara,*
Arca Order: Mytiloida
eg*: Mytilus, Modiolus*
Order:Pterioida
e.g: *Pteria. Pinna*
Order: Ostreoida
e.g: *Ostrea, Pecten. Chlamys* Order:Limoid
eg: *Lima.* Subclass: Palaeoheterodonta
Order: Unionoida eg.*: Unio, Anodonta*
Order: Trigonioida e.g: *Trigonium* Subclass:
Heterodonta Order: Veneroida eg.*:*
Cardium, Mactrea, Tellina, Solen, Ensis.
Order: Myoida eg: *Mya, Pholas, Teredo*
Order: Hippuritoida eg: *Chama.* Subclass:
Anomalodesmata eg.:*Pandora, Poromya*

CLASS 6: Scaphopoda e.g:
Dentalium.

CLASS 7: Cephalopoda
Subclass: Nautiloidea
e.g: *Nautilus.*
Subclass: Ammonoidea
e.g: *Ammonites.*
Subclass: Coleoidea
Order: Belemnoidea
e.g: *Belemnites*. Order:
Sepioidea
e.g: *Sepia, Sepiola, Spirula, Rossia.*
Order: Teuthoidea

e.g: *Loligo,*
Sepiolenthis,Architeuthis Order:
Vampyromorpha e.g:
Vampyroteuthis.
Order: Octopoda
e.g: *Opisthoteuthis, Octopus*

In this work 2 classes namely bivalvia and Scaphopoda are focused.27 species of bivalvia and 2 species of scaphopoda are studied and identified from the museum.

Class bivalvia comprises more than 15000 species and are characterized by a shell that is divided from front to back into left and right valves. The valves are connected to one another at a hinge. Primitive bivalves ingest sediment. The shell of bivalvia is composed of calcium carbonate. The shell is typically bilaterally symmetrical. In most species the respiratory gills have become modified into organs of filtration called ctenidia.In keeping with largely sedentary and deposit feeding or suspension – feeding lifestyle, bivalves have lost the head and radular rasping organ typical of most molluscs. The shell morphology and hinge structure are used in classification. About 71 families (of the total 110 families globally) comprising 260 genere and more than 760 species are reported in India.

The scaphopod molluscs combines gastropod - like shell morphology with bivalve like development with cephalopod like anatomy. Schaphopods are shelled marine mollusk with worldwide distribution. Shells of species within this class ranges from about 0.5 to 18 cm.Members of the class first appear in the early Paleozoic and the taxon has maintained a slow and steady rate of increase in morphological diversification since then. Our knowledge of biology of recent species comes primarily from members of a single genus, *Dentalium*. Scaphopods are infaunal organisms and feed on foraminiferans and other interstitial prey.

Approximately 350 species occur from the intertidal zone to depths in excess of 7000 mand are present in all major oceans.

As per the Wildlife (Protection) Act, there is ban on collecting molluscan specimens directly from conserved areas,so a further study on mollusc cannot be done directly. So by identifying, classifying the specimens available at our museum helps to study more about their unique characteristics whenever possible. Thus studying more about their classification helps to know and understand more about the diversity of molluscs and their importance to nature.

REVIEW OF LITERATURE

Bogatov and Prozorova(2015) worked on Taxonamy and diversity of fresh water bivalve mollusks (bivalvia) of China based on analysis of catalog by He and Zhuang (2013).The diversity of freshwater Bivalvia in China was assessed on the basis of critical analysis of original and published data on the fauna, morphology, taxonomy, and molecular genetics of this group. This work was motivated by analysis of the catalog of freshwater Bivalvia of China

and the adjacent territories, including the territories of the Russian Federation within the limits of the Amur River basin and Primorskii krai, which was published by Conch Books Publishers in 2013 (He and Zhuang, 2013). Both the generic and specific compositions of the Chinese Unioniformes and Luciniformes have been significantly extended and updated.

Tan and Clements (2008) conducted studies on Taxonomy and distribution of the Neritidae (Mollusca Gastropoda) in Singapore. Molluscs from the gastropod family Neritidae are primarily found in marine habitats, but they are also known from brackish and freshwater systems. In Singapore, there is a paucity of information on the diversity of Neritids in all 3 aquatic environments. The paper provides taxonomic descriptions and distributional data for locally occurring Neritids. Surveys of 31 sites over a period of 10 years yielded a total of 19 species, of which 6 species are considered new records for Singapore.

Deusana et al.,(2021) studied on Devonian bivalvia (mollusca) from Brazil.Taxonamy and stratiography.The work discusses the taxonomic problems about the Devonian Bivalvia group in Brazil, emphasizing biodiversity, stratigraphic positioning, and geographic distribution in four intracratonic sedimentary basins - Amazonas, Paraná, Parnaíba, and Jatobá. 77 taxa were identified - 66 distributed in 2 subclasses, 3 infraclasses, 18 families, and 30 genera, plus 11 species in supraspecific taxonomic discussion. Of the bivalves studied, 10 stilldonothave aspecific epithet, demonstratingthe need for more accurate studies for the taxon. The greatest diversity is found in the Amazon Basin, with 39 species, followed by the Paraná Basin (24 species); the Parnaíba Basin (11 species), and the Jatobá Basin (8 species). There are shares of taxa between at least two to three basins, as well as the diversity of a certain genus for a given basin.

Vinarski et.al(2020) worked on freshwater Mollusca of the Circumpolar Arctic: a review on their taxonomy, diversity and biogeography.Review of the freshwater molluscs of the Arctic based on an analysis of published data, own results and examination of museum collections is presented. 104 species of Mollusca have been registered, which constitutes less than 2% of the global diversity. The actual diversity of the circumpolar freshwater molluscs may lie between 100 and 120 species. No endemic taxa are found in the Arctic. The most species-rich Arctic subregion is Siberia, whereas the North America maintains the poorest fauna. The aquatic malacofauna of Beringia is similar to that of North America, and Beringia as a biogeographic region constitutes a part of the Nearctic. The ways of formation of the Circumpolar

malacofauna are discussed, with evaluation of dispersal, adaptation, and environmental filtering as the faunogenesis factors. The number of non-alien species in the Circumpolar freshwater malacofauna remains very low, and only one reliable occurrence of an alien species is known. Among the Arctic molluscs only three have a conservation status other than „least concern" or „data deficient", whereas most resident species are widespread and abundant.

In 1978 Maxwellstudied on Taxonomic and nomenclatural notes on some New Zealand Cenozoic Mollusca, with descriptions of new taxa.This paper includes descriptions of new taxa of Cenozoic molluscs that might otherwise remain undescribed for some time, since they are members of Faunas that are unlikely to be worked on in the near Future or belong to groups with a relatively poor Fossil record in New Zealand. Several species belong to genusgroup taxa (Clavagella, Regozara, Proxicodone, Liotina, and Ancillina) that have not previously been reported from New Zealand. In addition, New names are proposed for two preoccupied species; The affinities of Cardi/ona Marwick, 1943, Longimactra Finlay, 1928, Galeodea wylliei Marwick, 1931, Eudolium aoteanum Beu, 1970, and Claraxis Iredale, 1936 are discussed; and the classification of certain cardiis is commented on.The material discussed is in the collections of the New Zealand Geological Survey, Lower Hutt.

Shayanna et al., (2020)investigated on the spatial variation of molluscan assemblages with different habitat-forming species and bare rock habitat in a rocky intertidal zone in northeastern Brazil.A total of 3,861 molluscs were recorded, belonging to the classes Gastropoda (9 species; 3,800 individuals), Bivalvia (3 spp.; 54 ind.), and Polyplacophora (1 sp.; 7 ind.). Functional diversity was accessed through the trophic structure, in which were identified as food guilds: suspension feeders, grazers, herbivores, and carnivores. The analysis revealed significant differences in mollusc abundance, species richness, diversity indices, and trophic diversity among barnacle belts, mussel beds, algae habitat, and bare rock habitats. The highest species richness and trophic diversity were detected in algae habitat and mussel beds, which showed low abundance. In contrast, barnacle belts registered low species richness and trophic diversity and a high number of individuals. Bare rock recorded low values in all surveyed indices. This result points to the effect of environmental modification caused by habitat-forming species in this system. These species increase environmental complexity and enable the establishment of organisms through facilitation processes. The various food guilds found in this study reaffirm the role of habitat-forming species in providing niches that support different occupation patterns.

In 2020 Páll-Gergely et.al studied on Taxonomic vandalism in malacology: comments on molluscan taxa recently described by N. N. Thach and colleagues (2014–2019). This paper listed all land snails described by Thach and colleagues, and commented on approximately half of his taxa based on examination of the literature and type specimens. As a result, 102 of their taxa are moved to the synonymies of previously described taxa. Three additional taxa, described by other authors, are also considered synonyms of known species.

In 2020 Vinarsky et al., studied onTaxonomic assessment of genetically-delineated species of radicine snails(Mollusca, Gastropoda, LLymnaeidae, an overview of 29 biological species of the radicine snail recovered during our previous molecular taxonomic study (Aksenova et al. 2018a; Scientific Reports, 8: 11199). For each species, the following information is provided: scientific name, a (non-exhaustive) list of synonyms, type locality, type materials, shell and copulative apparatus morphology, distribution, and nomenclatural and taxonomic remarks. The colour images of shell(s) of each species are also given as well as illustrations of the copulatory apparatuses. It revealed a great conchological variation in the radicines, both intra- and interspecific, alongside with striking uniformity in the structure of their copulatory apparatuses.

Biswas et al.,(2015) worked on Taxonomy, Distribution and Conservation of Molluscs in Kangra District of Himachal Pradesh: Three New Records from the State. The freshwater and land molluscs inventory survey was conducted in connection with our approved annual programme of research entitled "Species diversity and richness of molluscan fauna of Himachal Pradesh" From April 2012 to March 2015. 633 samples of (both Land and

Freshwater) were collected. Total 25 species are recorded from different district of Himachal Pradesh. Among 25 species eight species of molluscs have been recorded from the Kangra district. , and have been recorded for the f first time from Himachal Pradesh. A systematic taxonomic account, distribution and conservation status is discussed in this paper.

Sandhya et al.,(2022) researched on Molluscan diversity of coastal Karnataka, India and role of physicochemical parameters on their diversity.The Objectives of the study are to know the diversity of molluscs in the intertidal habitats of Karnataka and the rela-tionship between environmental, physicochemical param-eters on the diversity.Abiotic parameters such as air temperature, water temperature, wave frequency were noted in the field. Environmental

variable such as precipitation was studied. Physico-chemical parameters of water (salinity, electrical conductivity, pH of water) were analysed using standard methods. A total of 36 species of molluscs were recorded from the intertidal habitats of coastal Karnataka. It includes 21 species of gastropods and 15 species of bivalves.A significant negative correlation of wave frequency with molluscan abundance was observed which shows that reduced wave-action increases the molluscan diversity. A significant correla-tion between the electrical conductivity of water with species richness indicates that this is the important physico-chemical parameter responsible for the distribution of molluscan species on the coast. Wave frequency and electrical conductivity are the parameters are responsible for molluscan diversity in the intertidal zones. Thus the littoral zones of the Karnataka coasts provide suitable habitats for mollusca.

Studies on land and freshwater molluscs in the collection of Western Ghat Regional centre(2014) by researchers S.K. Pati, R.M. Sharma and P .M.Sureshan attempted to study land and freshwater molluscs deposited at the National Zoological Collections (NZC) of Western Ghat Regional Centre (WGRC), Zoological Survey of India (ZSI), Kozhikode.Western Ghats, a global biodiversity hotspot, Has 269 land molluscs (with 75% endemic Species) and 65 freshwater molluscs (with about 39% endemic species)

In 2020 studies onMacro-benthic molluscan spectrum in three maritime eastern states and one union Territory of India conducted by Dutta et al., deals with the spatial variation of macro benthic mollusca community structure in the intertidal zone along East coat of 4 states in India.17 inhabiting the inter-tidal zones were recorded from the four major estuaries. These species represent 85-90% of the total molluscan spectrum in the study area 6 bivalve species and 4 gastropod species were recorded during the study period along the Shankarpur coast of West Bengal, 9 bivalve species and 8 gastropod species were recorded in the Bahuda estuary of Odisha, 8 bivalve species and 8 gastropod species from the East Godavari mudflats of Andhra Pradesh. In the Kalapet coast of Puducherry, the number of bivalve and gastropod species was 9 and 7 respectively .

Taxonomic studies of some indo Pacific molluscs(conducted by W.O. Cernohorsky ,A new ovulid Primovula from the Red Sea and a subspecies of the Miocene Mitra sowerbyi d‟Orbigny, are described as new to science. Three species of Mitridae are re-assigned to the genera Mitra, Subcancilla and Neocancilla. An aberrant form of Cerithium (Pseudovertagus)

aluco (Linnaeus) and a recently collected specimen of Bursa (Colubrellina) condita (Gmelin), are discussed and illustrated.

Hendy et al(2009) Studies about the topic Late Miocene turnover of molluscan faunas, New Zealand: Taxonomic and ecological reassessment of diversity changes at multiple spatial and temporal scales by uses an occurrence-based dataset (derived from published literature) to examine this pattern in further detail with both traditional synoptic measures and subsequent sampling standardization. Findings suggest that spatial scale and temporal resolution are important considerations in determining the magnitude of diversity and ecological change observed in paleontologic studies. Contemporaneous biodiversity may not be similarly expressed at varying spatial or temporal scales in the fossil record. Rather, regional patterns of diversity change are governed by a complex interplay of not only large-scale environmental factors (e.g. temperature control), but also independent basin-scale processes (e.g. basin subsidence) and local sampling intensity.

Taxonomic studies on the occurrence of the snails(Mollusca: Gastropoda) in the agroecosystem by Javaria Altaf Naureen Aziz Qureshi andMuhammed Javed Iqbal Siddiqui identified the specimens on the basis of number of Whorls, coiling of the shell, umbilicus, shape, colour, shape of the aperture, presence or absence of operculum, Height (mm), diameter (mm) and the diameter of the aperture (mm) using vernier caliper. Microscopic Identification was done by using recent identification keys and diagrammatic description provided in them and also found snails belonging to 2 orders 7 families 9 genera and 15 species. This is a baseline study to get the basic Information about the malacofaunna of Faisalabad which will be important in various applied fields. However, New sibling species might be proposed of Zooctecus insularis after molecular characterization.There were found 6 families from the suborder Stylomatophora and only one family was found Belonging to the suborder Bassomatophora. Out of Nine genera two genera named Ariophanta and Oxychilus belong to the family Zonitidea, two genera Named Monacha and Cernuella belong to family
Hygrommiidea. Only one genera belong to family Succineidae, Subulinidae, Pupillidae, FerussaciidaeEach referred as Ox Loma, Zootecus, Pupoides, Cecilioides respectively.

L Rizhinashvili discussed Problems emerging in the course of taxonomic studies and species diagnostics of freshwater bivalves by the example of one of the bivalve groups (the family Unionidae). It is shown that one of the causes of the current, diametrically opposing views on

specific and generic systematics of Bivalvia is the fact that researchers revising taxonomic groups ignore complex analysis of several independent characters (conchological, anatomical, biochemical, genetic, etc.).

Studies about the topic Late Miocene turnover of molluscan faunas, New Zealand: Taxonomic and ecological reassessment of diversity changes at multiple spatial and temporal scales by Austin J.W. Hendy uses an occurrence-based dataset (derived from published literature) to examine this pattern in further detail with both traditional synoptic measures and subsequent sampling standardization. Findings suggest that spatial scale and temporal resolution are important considerations in determining the magnitude of diversity and ecological change observed in paleontologic studies. Contemporaneous biodiversity may not be similarly expressed at varying spatial or temporal scales in the fossil record. Rather, regional patterns of diversity change are governed by a complex interplay of not only largescale environmental factors (e.g. temperature control), but also independent basin-scale processes (e.g. basin subsidence) and local sampling intensity.

A.Bijukumar et. al conducted studies on the molluscan fauna of Lakshadweep included in various schedules of Wildlife (Protection) Act of India.Out of the 24 species of marine molluscs included in Schedule I and IV of the Wildlife (Protection) Act (WPA) of India, 19 species were recorded from the coastal waters of Lakshadweep.Â A recent survey conducted by the authors recorded the presence of 14 scheduled molluscs in Lakshadweep.Â Scheduled species such as Placuna placenta (recorded from Kavaratti) and Tudicla spirillus (recorded from Kalpeni) are new records from Lakshadweep.Â The paper provides details for taxonomic identification of scheduled molluscs and discusses strategies for conservation of scheduled molluscs of Lakshadweep.

From the studies onFreshwater molluscs of the Eastern Congo: notes on taxonomy, biogeography and conservation,Roland Schulthei B et .al provided report on species obtained in the Eastern Congo in 2010. In total, 20 gastropod and bivalve taxa were collected from 24 freshwater habitats of the Nile and the Congo drainage system. By compiling faunal and taxonomic data we also aim to provide information of relevance to conservation efforts.

Dr A. G. Beu provided notes on taxonomy of New Zealand Mollusca.Four new species of Miocene and Pliocene Mollusca are described, in the genera Arca, Buccinulum, Nassicola and

Colubraria. Arca cottoni Waghorn is recorded from several localities of Waipipian to Castlecliffian age and graphically differentiated from the new species. Ovicardium Marwick is ranked as a subgenus of Acrosterigma Dall and A.(O.) parki (Marwick) is synonymised with A.(O.) rossi, an excellent specimen of Eumarcia benhami Marwick is figured, Thracia magna Marshall and Murdoch and Calliostoma (Maurea) waiparaense Suter are recorded from the Nukumaru Brown Sand, "Modelia" nukumaruensis Laws is transferred to Calliostoma (Maurea), Cheilea cf. plumea Laws and Zemacies prendrevillei Marwick are recorded from Waipipian rocks, Kaiparathina Laws is transferred from the Janthinidae to the Trochidae, "Merica" haweraensis Laws is placed in Trigonaphera Iredale, and Aeneator contractus Laws is synonymised with Penion haweraensis Powell.A previously unrecognised shellbed member of the Waverley Formation (Wanganui coastal section, Pliocene) is named and its fauna briefly listed.

The paper on Status of Taxonomy and Ecology of Marine Molluscs in Sri Lanka by Darshani de Silva described the current status of taxonomy of marine molluscs and their distribution in Sri Lanka, demonstrating that the state of taxonomic, biological and ecological knowledge regarding marine molluscs is generally poor within the country.The paper also gives some basic information regarding the intricate linkages between various processes and habitat features that affect the distribution patterns, with some special reference to post El Nino years (after 1998) and highlighting areas of interest and research needs to obtain a comprehensive understanding of the status of marine molluscs in Sri Lanka, Checklists of marine molluscs from post mid-1990s records taken from published and reliable resources are being included within the paper, Finally, the paper illustrates the issues affecting the taxonomy, ecology and conservation status of marine molluscs in Sri Lanka and some concluding remarks including recommendations to address conservation issues.

Through the taxonomic studies of tropical west African bivalve, Rudo von and Cosel introduced 6new genera and eight new species described, among them, one well known species in clarification of an unclear taxonomic situation. Four of the species treated here are large species from deep water. Moreover, five other species are redescribed in detail and placed in the context of our present knowledge of the Lucinidae.(Mollusca ,Bivalvia).

The chapter the scaphopoda in the article Molluscan Radiation -Lesser known Branches by A J Southward et al clearly describes about the class scaphopoda.Their

morphology,anatomy,diversity,ecto or endo symbiontic associations with other organisms,position of Scaphopoda in molluscan phylogeny etc were discussed in the chapter.Enrico Savazzi and Yao Peiyi ,in the paper Some morphological adaptations in fresh water bivalves focuses on unique shell morphologies. The present paper deals principally with a few such species from the Pleistocene and Recent of the People's Republic of China. In order to provide a basis for comparison, unspecialized bivalves from the same area also are considered, together with extremely specialized forms from other regions.

In the paper Constructional morphology of bivalves: Evolutionary pathways in primary versus secondary bottom dwellers ,Adolf Seilacher studied on the constructional morphology of bivalves.In contrast to the minor within-habitat improvements in shell shape and sculpture of primary soft-bottom dwellers, the transition of fixosessile rock dwellers back to soft substrates has resulted in fast and drastic morphological changes. They were facilitated by the available ecologic stepping stones that caused morphogenetic programmes-first to „derail‟ (rock habitats), then to be shortened (to fit the size of dead shell habitats), and finally to extend again (in order to increase mechanical stability on soft bottoms). In the book Phylogeny and Evolution of the Mollusca(2002),Gonzalo Giribet examines the phylogeny and evolution of the molluscan class Bivalvia in the chapter Bivalvia. It discusses the diversity and abundance of bivalves, evaluates their economic significance and human impacts and provides a brief account of bivalve morphology and anatomy. It describes fossil records and fossil bivalves in phylogenetic studies and highlights the need to conduct more ultrastructural and developmental studies on bivalves.

METHODOLOGY

Materials required:

Formalin, Bucket, Water, Gloves, Bleach, Scale, Thread, Bottles of dry and wet specimens.

Method:

30 specimens placed in the museum classified under phylum Mollusca were observed.On the basis of morphological features, specimens are identified and classified into different phylum. First of all, the specimens were taken out of the museum and their external features were observed and scientific measurements were taken. The dry specimens were dipped in bleach solution made with three spoons of bleach in water for certain hours and rubbed with a brush

for cleaning and old formalin solution of wet specimens were removed and fresh formalin solution were added in the ratio of 10:1 after cleaning the specimen bottles. The specimens were then put back into the bottles. Finally labels were tagged on each specimen bottles which contain information on their Kingdom, Phylum, Class, Order, Genus and species.

OBSERVATIONS AND RESULT

Mollusca is the second largest phylum of invertebrate animals after the Arthropods.Phylum mollusca has 7 classes .Among them class Bivalvia and Scaphopoda were studied in this work.27 species of bivalvia and 2 species of scaphopoda from museum were identified by this work

1. *Placuna placenta* **(Plate . 1; Fig. 1 & 2)**

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Pectinida

Family: Placunidae

Genus: *Placuna*

Species: *placenta*

HABITAT:

The mollusks are found in muddy or sandy shores, in bays, coves and lagoons to a depth of about 100 m (330 ft).

DESCRIPTION:

The nearly flat shells of the capiz can grow to over 150 mm (5.9 in) in diameter, reaching maturity between 70 to 100 mm (2.8 to 3.9 in). The shell is secured by a V-shaped ligament. Males and females are distinguished by the color of the gonads. The shell has many concentric growth lines. The shell is white in colour and translucent in nature.

GEOGRAPHICAL OCCURANCE:

India: Andaman and Nicobar islands, Andhra Pradesh, Goa, Gujarat, Maharashtra, Orissa, Tamil nadu, and West Bengal.

Worldwide: Gulf of Aden,Malaya,China,Borneo and Philippines.

2. Lithophaga teres **(Plate 1; Fig. 3 & 4)**

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Mytilida

Family: Mytilidae

Genus*:* *Lithophaga*

Species: *teres*

Lithophaga teres is also known as cylinder date mussel

HABITAT:

Benthic; depth range 0 - 66 m. Tropical, boring in soft rocks and dead coral or lithothamnion. Littoral and sublittoral to a depth of at least 66 m. Sometimes found burrowing in massive coral heads, but the burrow opening is always located in those portions which lack living polyps.

DESCRIPTION:

Individuals can grow to 7.5 cmbilaterally symmetric body. They are yellowish or brownish, almost cylindrical, rounded at both ends. The interior is whitish iridescent purple with a pink tinge. These shells are relatively thin. The surface is nearly smooth, covered with growth lines.

GEOGRAPHICAL DISTRIBUTION:

India: Andaman and Nicobar Islands, Andhrapradesh, Lakshadweep Tamil Nadu, Kerala, Orissa, Gujarat, Minicoy islands.

Indo-Pacific: from East Africa, to eastern Polynesia; north to Japan and south to southwest Australia, Queensland, and New Caledonia.

3. Perna indica **(Plate .1;Fig.5&6)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Mytilida
Family: Mytilidae
Genus: *Perna*
Species: *indica*

HABITAT:

The brown mussel naturally colonizes rocky shores but can also attach to submerged manmade objects such as navigation buoys, petroleum platforms and shipwrecks. The adult brown mussel can tolerate a temperature range of 10 to 30 °C and a salinity range of about 15 to 50 ppt. Its colonization of the hard strata improves that surface's marine ecology. The colonization increases surface area, encouraging other marine organisms such as limpets, polychaetes, barnacles, snails and algae to settle there as well.

DESCRIPTION:

Perna is usually 90 mm long although it can reach sizes of up to 120 mm. The mussel is easily recognized by its brown color but its identifying characteristic is the "divided posterior retractor mussel scar". Its pitted resillal ridge also differentiates the mussel from other bivalves.

GEOGRAPHICAL DISTRIBUTION:

India:west coast of India, brown mussel is native to the tropical and sub-tropical regions of the Atlantic Ocean and Western Indian Ocean. It is found in waters off the west coast of Africa and the coast of South America up to the Caribbean, as well in the East Coast of Africa and Madagascar. It is accidentally introduced as an invasive species to the coast of Texas via the boat hulls and water ballasts of ships from Venezuela. Its distribution include:

Chile, Peru, South Africa.

4. Unio crassus **(Plate.1;Fig.7&8)**

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Unionida

Family: Unionidae

Genus: *Unio*

Species: *crassus*

HABITAT:

Fresh Water Rivers

DESCRIPTION:

Unio crassus, the thick shelled river mussel, is a species of freshwater mussel, an aquatic bivalve mollusk in the family Unionidae, the river mussels. Shell is oval, thick (up to 8.9 mm in the anterior shell area) and moderately inflated. The ratio of shell width to its height is 0.61–0.80, and the ratio of shell height to its length is 0.46–0.62. The umbo is wide projecting considerably above the dorsal margin. Umbo sculpture is wrinkled or consists of doublelooped waves and knobs. Periostracum ranges from green to dark brown, sometimes with rays from the umbo to the ventral margin. Nacre is light blue, light violet or pinkish-white. Pseudocardinal teeth are flattened relatively thick (2.5–3.0 mm) and curved. The outer and inner pseudo cardinal teeth of the left valve are generally separated with similar lengths and levels of

projection, but occasionally the inner is higher than the outer pseudo cardinal tooth. A dark strip on the foot may be well pronounced or not. The papillae of the incurrent aperture are short, conic, and located in two rows close to each other.

GEOGRAPHICAL DISTRIBUTION:

Its native distribution is Europe and Western Asia.

Croatia, Czech Republic - in Bohemia, in Moravia, endangered, Finland - in southern Finland, France, Germany - critically endangered, Netherlands - locally extinct, Poland – endangered, Slovakia - nearly threatened, Sweden - very rare. Denmark - very rare.

5. Pecten fumatus **(Plate.2;Fig.9&10)**

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Pectinida

Family: Pectinidae

Genus*:* *Pecten*

Species: *fumatus*

HABITAT:

Marine habitats, Patches of bare soft sand and mud, in discrete beds, to depth of 120 found on soft substrates

DESCRIPTION:

Shells of this species are characterised by a flat left valve, and a strongly convex right valve, each with 12-16 strong radial ribs. The external shell colour is extremely variable among specimens, ranging from light brown to pink and orange. Shell up to 14 cm across.

GEOGRAPHICAL DISTRIBUTION:

Most states of Australia

6. Pholas **(Plate.2;Fig.11&12)**

Kingdom:Animalia

Phylum:Mollusca

Class:Bivalvia

Order:Myida

Family:Pholadidae

Genus:*Pholas*

HABITAT:

Bores into a wide range of substrata including various soft rocks such as chalk and sandstone, clay, peat and very occasionally in waterlogged wood. Found from the lower shore to the shallow sublittoral.

DESCRIPTION:

Pholas dactylus is a boring bivalve, approximately elliptical in outline with a beaked anterior end, up to 12 cm long. The shell is thin and brittle with a sculpture of concentric ridges and radiating lines. The shell is dull white or grey in colour, the periostracum yellowish and often discoloured. The siphons are joined and at least one to two times the length of the shell, white to light ivory in colour. They have an ability to bore through clay, earth, wood and soft rock.

GEOGRAPHICAL OCCURANCE:

Pholas occurs in Britain from Kent along the south and south-west coasts including south Wales, Anglesey and Solway. Also recorded from several sites on the east coasts of Yorkshire and Northumbria and southwest Ireland. Global distribution Distributed from
Britain south to the Iberian Peninsula, the Mediterranean and Black Sea and the Atlantic coast of Morocco. Distributed from Britain south to the Iberian Peninsula, the Mediterranean and Black Sea and the Atlantic coast of Morocco.

7. Martesia striata ***(Plate.2;Fig.13&14)***

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Myida

Family: Pholadidae

Genus*:* *Martesia*

Species*:* *striata*

HABITAT:

Circumglobal distribution in temperate and tropical marine waters.Depth range is inter tidal.

DESCRIPTION:

Size ranges to 50mm. Shell structure is with main body robust but brittle; posterior extension fragile and equilateral valves. Tumid, especially across the umbos. Main body subovate, posterior extension narrower and may be irregular; anterior broadly rounded with initial pedal gape filled by the callum. Umbonal reflection covered by a large subcircular mesoplax; dorsal area behind mesoplax covered by a long lanceolate metaplax; posterior ventral region covered by a long lanceolate hypoplax. Main body of shell divided by a radial groove;posterior extension distinctly demarcated.

GEOGRAPHICAL DISTRIBUTION:

Described from Jamaica.A wood borer, primarily a warm temperate to tropical species recorded rarely from British waters. in Dorset, Brixham, Devon and off Irish counties Sligo and Clare.

8. ***Teredo*** **(Plate.2;Fig.15&16)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Myida
Family*:* Teredinidae
Genus: *Teredo*

Teredo is a genus of highly modified saltwater clams which bore in wood and live within the tunnels they create. They are commonly known as"shipworms;" however, they are not worms, but marine bivalve molluscs (phylum Mollusca) in the taxonomic family Teredinidae.

HABITAT:

*Teredo i*s found in temperate and tropical seas and oceans worldwide. It may have originated in the northeast Atlantic Ocean, but it is difficult to establish where it originally came from because it has spread so efficiently around the world on debris and hulls of ships. It is found in the littoral zone, living inside submerged timber, pilings, driftwood, and in the hulls of wooden boats. It is found in brackish waters as well as the open sea, and tolerates salinities ranging

from five to thirty-five parts per thousand. It is also tolerant of a wide range of temperatures. Individuals have survived temperatures as high as 30 °C (86 °F) and as low as 1 °C (34 °F), though growth and reproduction are restricted to the range from 11 to 25 °C (52 to 77 °F).

DESCRIPTION:

Teredo has an elongated, wormlike body which is completely enclosed in a tunnel it has made in floating or submerged timber. At the front end of the animal are two triangular, calcareous plates. These are up to 2 cm (¾ in) long and correspond to the valves of other bivalve molluscs. They are white, with a covering of pale brown periostracum, and have rough ridges.

GEOGRAPHICAL DISTRIBUTION:

World wide distribution

9. *Perna viridis* **(Plate.3;Fig.17&18)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Mytilida
Family: Mytilidae
Genus: *Perna*
Species: *viridis*

Perna viridis, known as the Asian green mussel, is an economically important mussel, a bivalve belonging to the family Mytilidae. It is harvested for food but is also known to harbor toxinsand cause damage to submerged structures such as drainage pipes.

HABITAT:

The mussel inhabits estuarine habitats and is found in densities as high as 35,000 individuals per square meter on any submerged marine object. Although vivid green in appearance, the mussels are shrouded with overgrowth and are often hard to find. The mussels live in waters that are 11–32 °C (52–90 °F) with a wide-ranging salinity of about 18-33 ppt.P. viridis grows fastest at 2 metres (2 yards) below the surface, in high salinity and a high concentration of phytoplankton, although it can tolerate a range of salinity and turbid water.

DESCRIPTION:

Perna viridis ranges from 80 to 100 millimetres (3 to 4 in) in length and may occasionally reach 165 millimetres (6 in). Its shell ends in a downward-pointing beak. The smooth periostracum is dark green, becoming increasingly brownish towards its point of attachment (umbo), where it is lighter. Younger mussels are bright green and that becomes darker as it ages. The shell's interior has a pale-blue sheen.

GEOGRAPHICAL DISTRIBUTION:

India: Andhrapradesh, Andaman and Nicobar islands,Goa, Gujarat, Karnataka, Kerala, Maharashtra,Orissa, Puducherry, Tamilnadu,West Bengal.

Red sea, Pakistan, Thailand, Indonesia, Philippines, China.

10. Pinctada fucata **(Plate.3;Fig.19&20)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Pteriida
Family: Pteriidae
Genus: *Pinctada*
Species*:* *fucata*

Pinctada fucata, the Akoya pearl oyster is a species of marine bivalve mollusk in the family Pteriidae, the pearl oysters.

HABITAT:

Native to marine shallow waters in the Indo-Pacific region.

DESCRIPTION:

Pinctada fucata has two valves connected by a long straight hinge. The length of the shell is slightly greater than its width, and the latter is about 85% of the length of the hinge. The right valve is flatter than the left and there are hinge teeth in both valves. The anterior ear is larger than that in other members of the genus and there is a slit-like notch for the byssus threads to pass through at the junction of the ear and the rest of the shell. The posterior ear is large. The outer surface of the valves is scaly and reddish or golden brown with pale radiating streaks. The inner surface of the valve is lined with a thick layer of golden-yellow nacre with a metallic sheen.

GEOGRAPHICAL DISTRIBUTION:

India: Andaman and Nicobar Islands, Andhrapradesh, Lakshadweep, Tamil Nadu

Native to the Indo-Pacific region. Its range includes the Red Sea, the Persian Gulf, China, Korea, Japan, and the Western Pacific Ocean. It has been introduced in coastal waters of Venezuela

11. ***Lithophaga lithophaga*** **(Plate.3;Fig.21&22)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Mytilida
Family: Mytilidae
Genus: *Lithophaga*
Species: *lithophaga*

Lithophaga lithophaga is also known as date shell or date mussel.

HABITAT:

These bivalves lives mainly in the area battered by the waves, but they can reach depths of 125 to 200 m.They bore into marine rocks, producing a boring called Gastrochaenolites.

Their growth is very slow, and to reach the 5 cm length, they require 15 to 35 years.

DESCRIPTION:

Shells of *Lithophaga lithophaga* can reach a length of about 8.5 centimetres (3.3 in). They are yellowish or brownish, almost cylindrical, rounded at both ends. The interior is whitish iridescent purple with a pink tinge. These shells are relatively thin. The surface is nearly smooth, covered with growth lines, which sometimes can be quite rough.

GEOGRAPHICAL DISTRIBUTION:

India: Gujarat

Northeast Atlantic Ocean, the Mediterranean Sea and the Red Sea.They are found on the Adriatic coast of Croatia and Montenegro.

12. ***Tellina listeri*** ***(Plate.3;Fig.23&24)***

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Cardiida

Family: Tellinidae

Genus: *Tellinella*

Species*:* *listeri*

Tellinella listeri, the speckled tellin, is a bivalve mollusc in the family Tellinidae, the tellins

HABITAT:

Marine, in sandy areas at 5-15 metres depth

DESCRIPTION:

The shells of these bivalves are pale or yellowish white colour. right valve of a shell of *Tellinella listeri*, anterior end towards the right.The shell is brittle and flattened and grows to a length of twenty millimeters. The outline is oval but the shell is asymmetric with the hinge slightly off centre and the beaks slightly behind the midline. . The periostracum is with tinges of yellow or brown. There is a sculpture of fine concentric lines on both valves. The inner surface of the valves is white, sometimes tinted with yellow or orange.

GEOGRAPHICAL DISTRIBUTION:

St. Vincent, Barbados and other Eastern Caribbean islands -in sandy areas at 5-15 metres depth

13. ***Solen marginatus*** **(Plate.4;Fig. 25.&26)**

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Adapedonta

Family: Solenidae

Genus*:* *Solen*

Species: *marginatus*

Solen marginatus is also known as “grooved razor shell”

HABITAT:

Found in lagoons andestuaries. Lives buried in sand and/or muddy sand in low intertidal and subtidal zones. Found in fine well sorted sand asociated with *Zostera marina* seagrass beds. Benthic; depth range 5 – 35 m. Subtropical; 56°N – 16°S, 18°W – 36°E

DESCRIPTION:

Shell of this bivalve is rather narrow, convex, fulvous. Epidermisis thin; dorsal margin is straight and dorsal area linear and inconspicuous. The umbonal area is broad, rather rough; ventral margin very slightly excavated in the middle; anterior margin oblique, raised, singleribbed, constricted behind the rib by a deep canal.

GEOGRAPHICAL DISTRIBUTION:

Eastern Atlantic and the Mediterranean Sea.Norway.

14. ***Arca*** **(Plate4.;Fig.27&28)**

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Arcida

Family: Arcidae

Genus: *Arca*

Arca is a genus of saltwater clams in the family Arcidae, the ark clams.

HABITAT:

Marine habitat.

DESCRIPTION:

As is typical for ark clams, species in this genus have a long, straight hinge line. Such clams are characterized by boat-shaped shells with long, straight hinge lines bearing many small, interlocking teeth. The shells are usually coated with a thick, sometimes hairy periostracum (outer organic shell layer). Many of these clams have rows of simple eyes along the mantle margins. Some species in this genus, such as *Arca zebra* and *Arca noae*, have a brown-andwhite striped pattern.

GEOGRAPHICAL DISTRIBUTION:

Many species are reported in India.

Mediterranean Sea, Atlantic coast of North America, ranging from North Carolina to the West Indies and Bermuda,Brazil.

15. ***Sanguinolaria*** ***(Plate.4 ;Fig.29&30)***

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Cardiida
Family: Psammobiidae
Genus*:* *Sanguinolaria*

Sanguinolaria is a genus of saltwater clams, marine bivalve molluscs of the family Psammobiidae **HABITAT**:
Marine waters.

DESCRIPTION:

Sanguinolaria can reach a size of 30–70 mm. It is a facultatively mobile infaunal deposit feeder. Features of *Sanguinolaria* includes thin, elongate or rounded-oval shells, Inequilateral and mostly inequivalve, Valves usually slightly gaping,Posterior end often more or less pointed,Umbones small and low,Ventral margin often sinuate,Smooth or only weakly developed ornament,Pallial sinus well developed,Usually thin periostracum.

GEOGRAPHICAL DISTRIBUTION:

This species is present along the Pacific coast of United States, Mexico and Central America (Costa Rica, Nicaragua, Honduras, Ecuador).Reported in India also.

*16.****Perna canaliculus*** **(Plate.4 ;Fig.31&32)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Mytilida
Family: Mytilidae
Genus: *Perna*

Species: *canaliculus*

Perna canaliculus is also known as green lipped mussel.

HABITAT:

Marine, It is usually found below the intertidal zone, but it can occur in the intertidal zone.Seen as attached to beach-cast seaweeds.

DESCRIPTION:

This shellfish is economically important to New Zealand. It differs from other mussel species in that it has dark brown/green shells with green lips around the edges, and has only one adductor muscle. It is also one of the largest mussel species, reaching 240 millimetres (9 in) in length.

GEOGRAPHICAL DISTRIBUTION:

Perna canaliculus occurs around all of New Zealand's mainland.

17. Corbicula fluminea ***(Plate.5;Fig.33&34)***

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Venerida

Family: Cyrenidae

Genus: *Corbicula*

Species*:* *fluminea*

Corbicula fluminea is also known as Asian clam.

HABITAT:

Fresh water environment , sandy or muddy bottoms of streams, lakes, or canals

DESCRIPTION:

The periostracum of the shell is normally yellow-green, brown with concentric growth rings of the prismatic layer visible through the proteinous outer layer. The periostracum can flake, allowing the white prismatic layer to show through. The shells exhibit a light purple nacre on the inside. Adults can reach a length of about 5 cm.

GEOGRAPHICAL DISTRIBUTION:

Eastern Asia, including Russia, Thailand, the Philippines, China, Taiwan, Korea, and Japan, Africa.

18.***Tawera spissa*** **(Plate.5;Fig.35&36)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Venerida
Family: Veneridae
Genus: *Tawera*
Species*:* *spissa*

Tawera spissa is also known as Morning star shell.

HABITAT:

Individuals occupy fine to coarse sand and light gravel substrates just below the surface. Their depth range is typically slightly below the low tide mark down to 200m in depth. They tend to be found in areas where there is some water movement.

DESCRIPTION:

Tawera spissa is 20-25 mm in length and has a triangular shape with oblong valves. Each valve has rows of ridges. The valves are often white with a variety of brown patterning, but can also be completely white or completely brown in colour. On the internal surface, the valves are white, with brown adductor scars.

GEOGRAPHICAL DISTRIBUTION:

New Zealand.

19. Tellina tenuis ***(Plate.5 ;Fig.37&38)***

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Cardiida
Family: Tellinidae
Genus: *Tellina*
Species*:* *tenuis*

HABITAT:

Marine environment, buried in sandy sediments

DESCRIPTION:

The shell of *T. tenuis* is brittle and flattened and grows to up to nineteen millimeters in length. The outline is oval but the valves are asymmetric with the hinge slightly off centre and the beaks slightly behind the midline. The posterior of the valves is attenuated slightly and the right valve is slightly larger than the left. An olive green ligament joins the two valves. The periostracum is glossy and the colour varies through shades of pink, yellow and brown, often in bands. There is a sculpture of fine concentric lines which is grouped into growth stages and which may be emphasized by bands of colour. The inner sides of the valves are similarly coloured but paler. The mantle is fringed with tentacles and is creamywhite.

GEOGRAPHICAL DISTRIBUTION:

Coasts of north west Europe and Morocco and in the Mediterranean Sea and the Baltic Sea.It is widely distributed and common around the coasts of the British Isles.

*20.**Petricolaria pholadiformis*** **(Plate.5 ;Fig.39&40)**

Kingdom: Animalia

Phylum: Mollusca

Class: Bivalvia

Order: Venerida

Family: Veneridae

Genus*:* *Petricolaria*

Species: *pholadiformis*

Petricolaria pholadiformis is also known as false angelwing.

HABITAT:

Marine habitat,

DESCRIPTION:

Petricolaria pholadiformis closely resembles the angel wing (*Cyrtopleura costata*), the main distinguishing feature being that it lacks the apophyses, the spoon-shaped wings located near the beak, of the real angel wing. It grows to about 5 centimetres (2.0 in) long and is usually

white. The anterior end is extended and has a rounded point while the posterior end is blunt and curved. There are ridges radiating from the beak, which are more pronounced at the posterior end, and fainter growth rings running parallel with the margin.

GEOGRAPHICAL DISTRIBUTION:

This species is native to the Eastern Coast of North America including the Gulf of Mexico.This clam was introduced and has become established in the British Isles and on the West Coast of North America.

21.Donax scrotum **(Plate.5;Fig.41&42)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Cardiida
Family: Donacidae
Genus*:* *Donax*
Species*:* *scrotum*

HABITAT:

Marine, Benthic. Tropical,sandy beaches.Leather donax was found to be the burrower in sand and loamy sand substrate while the salinity was between 14.6-33 ppt, temperature 25.633.9 deg C, pH 6.8-8.7 and dissolved oxygen 5.40 mg/l – 8.70 mg/l

DESCRIPTION:

Donax is a genus of small, edible saltwater clams, marine bivalve molluscs. The genus is sometimes known as bean clams or wedge shells.The ather Donax (*Donax scortum*) is a unique-looking clam that is abundant on most of our sandy beaches. The strongly-keeled anterior margin with spine-like projections is an easy feature to identify this species.

GEOGRAPHICAL DISTRIBUTION:

Indo-West Pacific: from East Africa to the Philippines; north to China and south to Indonesia

22. ***Vepricardium asiaticum*** **(Plate.6;Fig.43&44)**

Kingdom : Animalia

Phylum : Mollusca

Class : Bivalvia

Order : Veneroida

Family : Cardiidae

Genus: *Vepricardium*

Species: *asiaticum*

HABITAT:

Found in intertidal mudflats, up to a depth of 180 meters.

DESCRIPTION:

Vepricardium asiaticum attains a maximum length of 40-60 mm, width of 34.05-35.45 mm and height of 29.50-31.45mm. Globose, equilateral shell sculptured with radial ribs. Umbo smooth.Lamelliferous projections seen towards the posterior margin. 37-39 raised, narrow ribs separated by deep grooves on the shell surface. The inner surface of the valves strongly ribbed corresponding to the outer ribs. The shell is whitish with a pale yellow tinge in middle and a fine purplish rose colour towards the posterior margin.

GEOGRAPHICAL DISTRIBUTION:

India: Kerala

Indo-West Pacific: from East Africa, including Madagascar and the Persian Gulf, to the Philippines; north to Taiwan Province of China and south to Indonesia.

*23.**Cardites bicolor*** **(Plate.6 ;Fig.45&46)**

Kingdom : Animalia

Phylum : Mollusca

Class : Bivalvia

Order : Carditoida

Family : Carditidae

Genus: *Cardites*

Species*:* *bicolor*

HABITAT:

Marine, Attached by byssus, on various littoral and shallow sublittoral bottoms . Also in sandy substrates

DESCRIPTION:

Cardites bicolor attains a maximum size of 15-50 mm. Shell creamy white externally with brown blotches and white internally. Triangular shaped, thick, solid, round equivalve, deep shell with strong ribs and narrow interspaces. Radial ribs 20-22 radial ribs.Umbo curved anteriorly. Oblique shell valve. No pallial sinus. Ligament external.Two cardinal teeth in eachvalve.

GEOGRAPHICAL DISTRIBUTION:

Indo-West Pacific,Reported in India also.

*24.**Pinctada maxima*** **(Plate.6 ;Fig.47&48)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Pteriida
Family: Pteriidae
Genus*:* *Pinctada*
Species: *maxima*

Pinctada maxima is also known as South sea pearl or Philippine pearl.

HABITAT:

Marine,it attaches itself to the sea bottom by tiny threads

DESCRIPTION:

Pinctada maxima oysters grow very large, up to 12 in (30 cm) in diameter. The two color varieties have different coloration in the outer edge of the interior. This mother of pearl or nacre is responsible for the color of the pearls that the oyster can produce. Water temperature, plankton and sediments determine which color variety is more common in a given area.

GEOGRAPHICAL DISTRIBUTION:

Pinctada maxima is distributed in the central Indo-Pacific region from Myanmar to the Solomon Islands, including Southeast Asia, the Philippines, South China Sea, Australia, Papua New Guinea, Indonesia, Polynesia, Micronesia, and southern Japan.

*25.**Villorita cyprinoides*** **(Plate.6 ;Fig. 49&50)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Venerida
Family: Cyrenidae
Genus: *Villorita*
Species*:* *cyprinoides*

HABITAT:

backwaters of Kerala, mainly in Vembanad backwaters. This species occurs in salinity range of 3 ppt in August to 16 ppt in May .Occurs in fine sand, clay and silt just below the surface of soft bottom sediments

DESCRIPTION:

Villorita cyprinoides, the black clam, is found in the backwaters of Kerala, mainly in Vembanad backwaters. Shell is black in colour with many line like ridges..This clam is about 2 to 3 cm in length.

GEOGRAPHICAL DISTRIBUTION:

Western Indian Ocean: India,Backwaters of kerala

*26. **Pecten maximus*** **(Plate.7 ;Fig.51&52)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Pectinida
Family: Pectinidae
Genus*:* *Pecten*
Species: *maximus*

HABITAT:

Marine habitat, It prefers offshore waters down to 100 metres (330 feet; 55 fathoms)depth.

DESCRIPTION:

The shell of *Pecten maximus* is quite solid with ears of equal size on either side of the apex.The right, or lower, valve is convex and slightly overlaps the flat left, or upper, valve, which is flat. Larger specimens have a nearly circular outline and the largest may measure 21 cm in length. The sculpture of the valves is distinctive and consists of 12 to 17 wide radiating ribs and numerous concentric lines. The radiating ribs reach the margins of the valves and this creates a crenulated form. The left valve is normally reddish-brown while the right valve varies from white through cream to shades of pale brown contrasting with pink, red or pale yellow tints; either valve may show zigzag patterns and may also show bands and spots of red, pink or bright yellow. The colour of the body of *Pecten maximus* is pink or red with the mantle marbled brown and white. When young they are attached to the substrate by a byssus but mature animals are capable of swimming by the opening and rapid closing of the valves.

GEOGRAPHICAL DISTRIBUTION:

Pecten maximus occurs in the eastern Atlantic along the European coastfrom northern Norway, south to the Iberian peninsula, it has also been reported off West Africa, off theMacaronesian Islands. In Great Britain and Ireland it is distributed all round the coast but it isuncommon and localised on the eastern North Sea coast.

*27.**Tegillarca granosa*** **(Plate.7 ;Fig.53&54)**

Kingdom: Animalia
Phylum: Mollusca
Class: Bivalvia
Order: Arcida
Family: Arcidae
Genus: *Tegillarca*
Species: *granosa*

HABITAT:

Inshore and brackish water bottom

DESCRIPTION:

Commonly called as blood clam, shell equivalve, very inflated, thick and heavy; covered with a dark brownish non-hairy periostracum. Umbo broad and situated midway between the anterior and posterior ends. Shell valves broaden rapidly from the apex. Apex pointed towards the anterior. The number of hinge teeth ranges between 23 and 25 at the anterior side and between 35 and 38 at the posterior. The teeth are shortest beneath the umbones. The radial ribs on the surface of the valves are distinct, strong and deeply, set and showing their impressions on the inner side of the shells. The radial ribs are strongly tuberculated as small granules (hence the common name). The ribs are generally 20-21 in numbers. The ligament area is narrow and kite shaped, hinge straight with teeth converging towards the centre.

GEOGRAPHICAL DISTRIBUTION:

Southeast Asian countries, particularly Indonesia, Malaysia and Thailand.Reported in India also.

28.Dentalium sp. **(Plate. 7:Fig.55&56)**

Dentalium is a large genus of tooth shells or tusk shells, marine scaphopod molluscs in the family Dentaliidae. The genus contains 50 described species and about 50 extinct species.

Kingdom: Animalia
Phylum: Mollusca
Class: Scaphopoda
Order: Dentaliida
Family: Dentaliidae
Genus*:* *Dentalium*

HABITAT:

Marine and found in sandy floor

DESCRIPTION:

The mantle of *Dentalium* species is entirely within the shell. The foot extends from the larger end of the shell, and is used to burrow through the substrate. They position their head down in the substrate, with the apical end of the shell (at the rear of the animal's body) projecting up into the water. These molluscs live on seafloor sediment, feeding on microscopic organisms, detritus and foraminiferans.

The shells are conical and curved in a planispiral way, and they are usually whitish in color. Because of these characteristics, the shell somewhat resembles a miniature elephant's tusk. They are hollow and open at both ends; the opening at the larger end is the main or anterior aperture of the shell. The smaller opening is known as the apical aperture.The shell shows some lines on the surface of the shell.

GEOGRAPHICAL DISTRIBUTION:

World wide distribution including India ,Pacific coast of North America,South east Alaska,New Zealand.

*29.**Dentalium*** sp.2 **(Plate.7; Fig57&58)**

Kingdom: Animalia

Phylum: Mollusca

Class: Scaphopoda

Order: Dentaliida

Family: Dentaliidae

Genus*:* *Dentalium*

HABITAT:

Marine and found in sandy floor

DESCRIPTION:

.The shells are conical and curved in a planispiral way, and they are usually whitish in color. Because of these characteristics, the shell somewhat resembles a miniature elephant's tusk. They are hollow and open at both ends; the opening at the larger end is the main or anterior aperture of the shell. The smaller opening is known as the apical aperture.Ring like markings are present around the shell.

GEOGRAPHICAL DISTRIBUTION:

World wide distribution including India

Fig.1.*Placuna placenta*

Fig.2. *Placuna placenta*

Fig.3.*Lithophaga teres*

Fig.4.*Lithophaga teres*

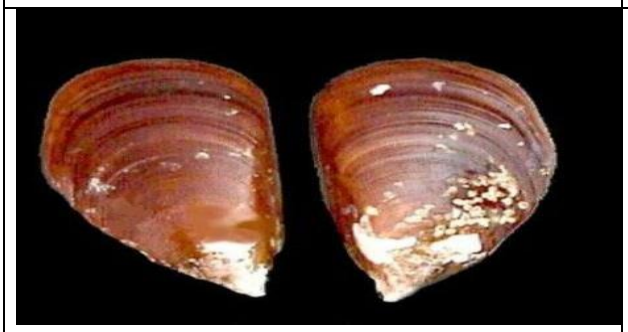

Fig.5.*Perna indica*

Fig.6.*Perna indica*

Fig.7.*Unio crassus*

Fig.8.*Unio crassus*

Plate 1

Fig.9.*Pecten fumatus*

Fig.10.*Pecten fumatus*

Fig.11.*Pholas*

Fig.12.*Pholas*

Fig.13.*Martesia striata*

Fig.14.*Martesia striata*

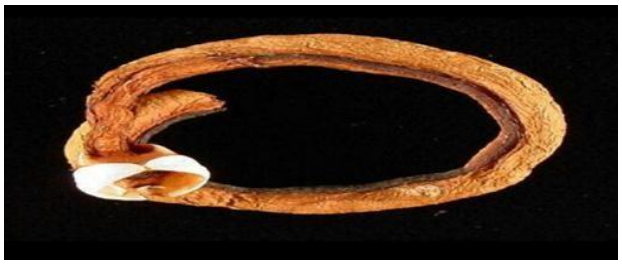

Fig.15.*Teredo*

Fig.16.*Teredo*

Plate 2

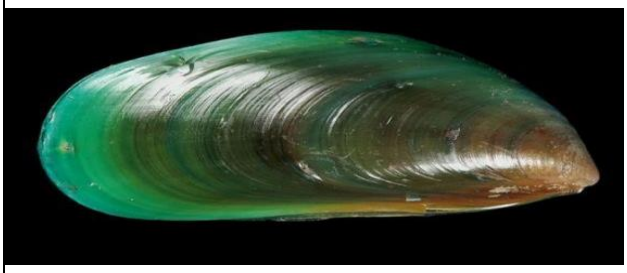

Fig.17.*Perna viridis*

Fig.18.*Perna viridis*

Fig.19.*Pinctada fucata*

Fig.20.*Pinctada fucata*

Fig.21.*Lithophaga lithophaga*

Fig.22.*Lithophaga lithophaga*

Fig.23.*Tellinella listeri*

Fig.24.*Tellinella listeri*

Plate 3

Fig.25.*Solen marginatus*

Fig.26.*Solen marginatus*

Fig.27.*Arca*

Fig.28.*Arca*

Fig.29 *Sanguinolaria*

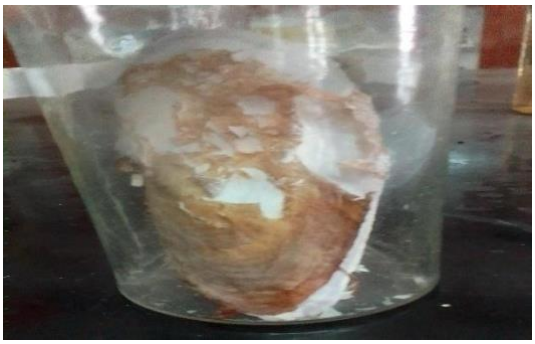

Fig.30.*Sanguinolaria*

Fig.31.*Perna canaliculus*

Fig.32. *Perna canaliculus*

Plate 4

Fig.33.*Corbicula fluminea*

Fig.34.*Corbicula fluminea*

Fig.35.*Tawera spissa*

Fig.36.*Tawera spissa*

Fig.37.*Tellina tenuis*

Fig.38.*Tellina tenuis*

Fig.39. *Petricolaria pholadiformis*

Fig.40. *Petricolaria pholadiformis*

Fig.41.*Donax scrotum*

Fig.42. *Donax scrotum*

Plate 5

Fig.43.*Vepricardium asiaticum*

Fig.44.*Vepricardium asiaticum*

Fig.45.*Cardites bicolor*

Fig.46.*Cardites bicolor*

Fig.47. *Pinctada maxima*

Fig.48.*Pinctada maxima*

Fig.49.*Villorita cyprinoides*

Fig.50.*Villorita cyprinoides*

Plate 6

Fig.51.*Pecten maximus*

Fig.52.*Pecten maximus*

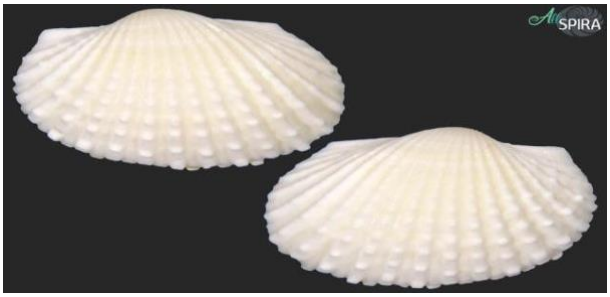

Fig.53. *Tegillarca granosa*

Fig.54. *Tegillarca granosa*

Fig.55.*Dentalium* sp 1

Fig.56.*Dentalium* sp 1

Fig.57.*Dentalium* sp 2

Fig.58.Dentalium sp 2

Plate 7

CONCLUSION

Taxonomic keys are used for the taxonomic identification where they provide the unique characteristics of species with written descriptions and pictures. They are also capable of conveying natural variation in the morphology of species nor the mall, yet characteristic morphological features of a species. Museum specimen observation is very interesting and its observation is interesting as each species with minute differences like shell shape, pattern, size, colour etc. so taxonomic work is carried out and proper cataloguing is done. Even though many species of mollusca observed in the museum were originally distributed in water bodies other than those around India like Pacific Ocean, these may have become invasive (A species is regarded as invasive if it has become introduced to a location, area, or region where it did got previously occur naturally and becomes capable of establishing a breeding population in the new location).In this work 27 species of class bivalvia and 2 species of class scaphopoda were studied.

DISCUSSION

Bagatov and Prozorova (2015)worked on the taxonomy and diversity of fresh water bivalve mollusks of China and was assessed on the basis of critical analysis of original published data on fauna, morphology, Taxonomy, molecular genetics of this group.In this work 26 species of bivalvia from the museum were identified based on the morphological features and distribution on the basis of data from internet sources and by referring books.

Bijukumar et al., (2015) recorded 19 species from the coastal waters of Lakshadweep which were included in schedules of Wild Life Protection act of India. Scheduled species such as *Placuna placenta* and *Tudicla spirillus* are the new records from the Lakshadweep. The paper also provides details for taxonomic identification of scheduled molluscs. The scheduled *Placuna placenta* was identified from the museum based on its morphological characteristics such as flat shells with translucent nature.Their shells are highly valued due to their shell.The shells have been used for thousands of years as a glass substitute because of their durability and translucence. More recently, they have been used in the manufacture of decorative items such as chandeliers and lampshades.

Gribet(2008)clearly mentioned and described bivalvian morphology in the chapter Bivalvia.Characters such as 2 shell valves hinged dorsally and connected by an elastic ligament,presence of crystalline microstructures of the shell etc.This work considers shell sculpture as very important distinguishing character between species. Species from the museum is mainly identified by differences in shell sculptures.Every species were showing differences in shell sculpture which is helpful in identification of species.

Enrico Savazzi and Yao Peiyi(1992) reported some morphological adaptations in fresh water molluscs in the paper some morphological adaptations in fresh water bivalves.Some of the adaptations seen in solen was mentioned in it.Being bottom dwellers they possess elongated shell with truncated posterior commissure.Their extremely quick vertical movements within their burrow is possible by its highly mobile foot that extends from the shell through a prominent anterior gap.A species of solen with these features was identified from the museum.

In the paper constructional morphology of bivalves, researcher Adolf Seilacher elaborated on drastic morphological changes in bivalves such as shell shape, sculptureetc. By analysis of the species in the museum, differences in morphology such as shell size ,shellshape, shell sculptures were observed.

A dentallium sp of class scaphopoda was identified from the museum with characters mentioned in the chapter The scaphopoda by Patrick D Reynold(These specimen is having tusk shell which is open at both ends, Their burrowing foot protrude anteriorly while respiratory current pass through the posterior opening.

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