Volume 6, Issue 2, April 2019 ISSN: 2348-8565 (Online)

International Journal of Modern Engineering and Research Technology

Website: http://www.ijmert.org Email: editor.ijmert@gmail.com

The Debate of Morphological Diversity and Nutrient Analysis of Molluscs in Gulf of Mannar, Thoothukudi

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ABSTRACT

Mollusks are also considered excellent ecological indictors, their status providing a window into the health of entire ecosystems. Some bivalve molluscs play important roles in stabilizing the bottom or protecting the shoreline from erosion by waves and currents. Mussels on rocky shores are not likely to play any role in stabilizing the rock substrate, and infaunal bivalves and scallops play only a modest role in stabilizing sediments. Bivalves like clams, oysters, scallops and mussels are commonly used throughout the world as a source of food for both humans and other animals.

Keywords:— *Molluks, diversity, Meat, Bivalves*

I. INTRODUCTION

Molluscs are both familiar and mysterious. Gastropods (snails and slugs), bivalves (clams and oysters) and cephalopods (octopus and squid) are of global economic importance. The other five taxonomic classes of molluscs are less familiar: polyplacophorans are armoured slugs with metal teeth and millions of sensors embedded in their articulating shell armour; scaphopods are predators in a tubular shell with superelastic feeding tentacles; monoplacophorans are headless deep-sea limpets that were discovered alive only in 1957; finally, Solenogastres and Caudofoveata are two different types of worm-like molluscs that have no shells at all. Molluscs are the second largest animal phylum; (K.M. Kocot, F. Aguilera, et.al 2016) in terms of species number they are only trumped by arthropods. But in terms of morphological diversity, or disparity, molluscs far outstrip arthropods and are the hands-down champions. If we could unpick the exact evolutionary relationships among the different groups of molluscs, (J. Vinther, L. Parry, et.al 2017) it might help reveal the genomic traits that underpin this capacity for extreme morphological plasticity Ganesh, K. and Geetha, B. et.al (2017). Mollusks can be segregated into seven classes: Aplacophora,

Monoplacophora, Polyplacophora, Bivalvia, Gastropoda, Cephalopoda, and Scaphopoda. These classes are distinguished by, among other criteria, the presence and types of shells they possess.

II. Review of Literature

In most of the molluscs, the shell forms a large percentage of body weight. If the molluscan fisheries are to be economically viable, profitable uses for the shells have to be found besides the meat which generally commands fairly attractive prices. It was therefore, considered important to estimate calcium and calcium carbonate in the shells of various species of mollusks Ranjiga Anjali, A. Ganesh, K. et.al (2018). This perhaps may help the number of calcium based small or medium scale industries in Gujarat. Gokhale (1960) has indicated the use of window pane oyster for obtaining calcium. The marine edible razor shell, Solen sp. (Fam Solenidae) occurs throughout the year in good quantity between the inter tidal areas in the Gulf of Kutch, particularly on the northern side of Gopi (lat. 22°24' N long. 69°04' E). Razor shell is used as food and partly as fish bait for long lining in Maharashtra (Nayar and Mahadevan, 1974). However, this bivalve is not used for human consumption in Saurashtra, but used only as bait. As the razor shells escape quickly into their burrows, their collection is not easy. Hence a mixture of sodium chloride and commercial sodium carbonate (soda ash) in a proportion of 1:1 was sprinkled in burrow Nazerath Nisha, Ganesh, K. et. al (2018). Then a thick stick was rotated in the burrow and slowly pulled up with rotating movement. Thus razor shell came out with stick. Live specimens were brought to the laboratory, washed and weighed after removing adhering water with filter paper. The length of each specimen measured and segregated into five groups viz. 121 - 130 mm (A), 111 - 120 mm (B), 101 - 110 mm (C), 91 - 100 mm (D) and upto 90 mm (E) in case of razor shell. The weight of shell and meat was obtained as per the methods described earlier (Sarvaiya, 1977 a, b). Group wise shell and meat percentage were obtained in case of razor shell. Calcium and calcium carbonate in the shells and moisture, protein, ash, salt and fat in the meat were estimated by the methods of Venkataraman R (1988). Calcium and calcium carbonate values reported here are for the entire gross shell without removing the outer shell layer.

People often associate the animal phylum ‘Mollusca’ with their most species-rich or popular subgroups: gastropods (snails, whelks, slugs, and limpets), bivalves (mussels and clams), and cephalopods (the pearl boat *Nautilus*, sepias, squids and octopuses, and the many fossil ammonites and belemnites) Ganesh, K. Geetha, B. et. al (2018). of these, the gastropods, with more than 100,000 extant species, comprise about 80% of all molluscs (J.D. Sigwart, D.R. Lindberg, et.al 2015) and are by far the most diverse group within the phylum.

III. Meat Composition

Meat percentage (453-53.8%) in the case of razor shall relatively higher as compared to the meal percentage of most of the species of pelecypoda. The meat percentage of razor shell is also relatively higher as compared to most of the species of gstropods. The water, protein, fat, salt and ash contents of the meat varied from 74.99-78.4%, 60.37-70.00%, 2,50-4.25%, 1.19-3.69% and

6.25-10.00% respectively. The water content of Solon sp. was lower than recorded for most of the species of Pelecypoda and Cephalopoda. Solon sp. had a higher protein content than most of the species of pelecypods but the value was lower than cephalopods. Lower and higher ash content was observed in Soler sp. as compared to most of the species of gastropods and cephalopods respectively. Comparison of water, protein, fat and ash contents in five size groups indicate interesting relationships, With the increase of water content, the fat content decreased and vice versa.

IV. Major Groups of Mollusks

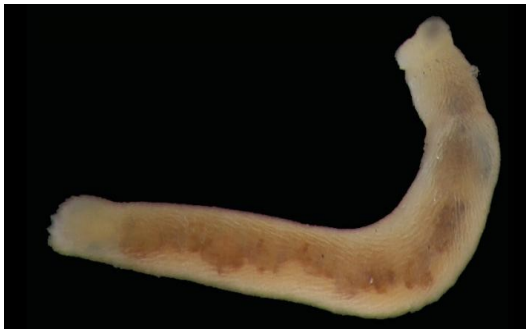
Solenogastres (Neomeniomorpha; crawling worm-molluscs) is a small (280 species), marine group of worm-like animals of 1 mm up to 30 cm body length covered with a chitinous cuticle with aragonitic spicules or scales. They live interstitially, most crawling by their narrowed foot sole on mud or climb on cnidarians, on which they feed with their radular teeth. Their foot sole is narrowed, reproduction is via copulation, larvae (modified trochophores or pericalymma-type) are lecithotrophic.

Caudofoveata (Chaetodermomorpha; burrowing worm-molluscs) is another small (180 species), marine group of worm-like animals of 2 mm up to 15 cm body length covered with a chitinous cuticle with spicules or scales. They burrow with their head-shield in sand or mud; the foot sole has been lost entirely. By means of bifid radular teeth or a modified forceps-like radular apparatus they feed mainly on foraminiferans. Fertilization is ectaquatic (in the free water), larvae (modified trochophores) are lecithotrophic.

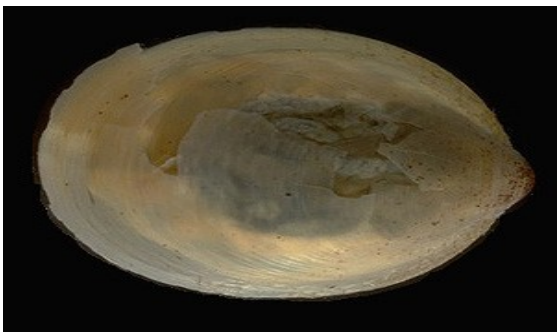
Polyplacophora (Loricata; chitons) includes about 1000 marine species of 3 mm up to 30 cm body length. The broad, sucker-like foot sole is surrounded by a mantle rim that may also house gills. The dorsal surface is protected by eight serial shell plates being surrounded by a girdle of aragonitic scales or spicules. Most species are herbi- or detritovorous and use their strong rasping tongue (radula) for food uptake. Fertilization is ectaquatic (there are few brooders), larvae (trochophores) are lecithotrophic.

Monoplacophora (Tryblidia) includes many fossil taxa, while only less than 30 extant species are known. These are 1–40 mm long and live from about 200 m down to 7000 m depth. The sucker-like foot, the surrounding mantle rim with the gills, the buccal apparatus, and the mode of feeding resemble those of chitons; however, the dorsal side is protected by a single, cup-like, true shell.

Bivalvia (Pelecypoda, Lamellibranchia; mussels and clams) comprises more than 20,000 extant species with a size range from 1 mm to over 150 cm that live in all kinds of marine and freshwater habitats. Aside from the bivalved shell and the entire lack of a buccal apparatus, bivalves are remarkably diverse and are not only filter-feeders, but also include detritovorous and even carnivorous forms; many also use endosymbiotic bacteria or zooxanthellae for nourishment. Most live epibenthic or burrow in soft bottoms, some burrow in limestone, sandstone or wood (shipworms). Fertilization is mostly external. Lecithotrophic (trochophore-



Aplacophora

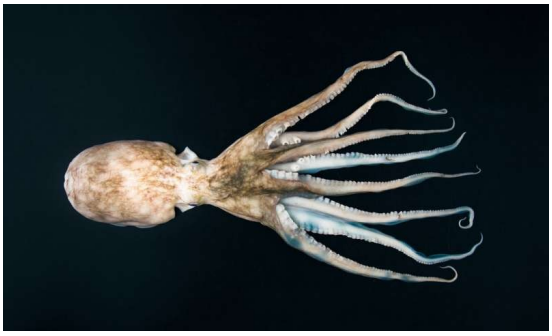


Monoplacophora

Polyplacophora

Bivalvia

gastropoda



Cephalopoda

Scaphopoda

Figure 1: Phylum of Mollusca

like) or planktotrophic (veliger-like) larvae as well as exceptional types such as glochidia (freshwater unionids) or pericalymma larvae (protobranchs such as *Nucula*) are known, freshwater species often show brooding.

Scaphopoda (tusk-shells) is a small (800 species), purely marine group of animals with typical, elephant tusk-like shells of 2 mm to up to 20 cm. They burrow with their conical foot in sand or mud and feed mainly on foraminiferans by using numerous head -tentacles (captaculae). Fertilization is ectaquatic, the trochophore-like larvae are lecithotrophic. These animals bear a single conical shell, which has both ends open. The head is rudimentary and protrudes out of the posterior end of the shell. These animals do not possess eyes, but they have a radula, as well as a foot modified into tentacles with a bulbous end, known as captaculae. Captaculae serve to catch and manipulate prey. Ctenidia are absent in these animals.

Gastropoda (limpets, snails, whelks, slugs) is by far the most diverse group of molluscs with about 100,000 species (0.5 mm to 100 cm long) that inhabit all marine, freshwater and terrestrial habitats. They have various types of shell, a freely moveable head with eyes, a foot sole and a helicoid visceral hump, but there are numerous exceptions in the phenotypic expression of all these characters. All life styles (detritovores, herbivores, predators, filter-feeders, ecto- and endoparasites) and all modes of reproduction (ect- and entaquatic, internal, copulatory organs, spermatophores) are found. Animals in class Gastropoda ("stomach foot") include well-known mollusks like snails, slugs, conchs, sea hares, and sea butterflies. Gastropoda includes shell-bearing species as well as species with a reduced shell. These animals are asymmetrical and usually present a coiled shell.

Cephalopoda (nautilids, ammonites, sepias, squids, octopuses) includes more than 30,000 extinct, but only about 1,000 extant species, which are exclusively marine and range from 3 cm up to 7 m in body length (with arms up to 18 m). Nautiloidea and Ammonitoidea have external shells, all other (Coleoidea) have internal, reduced or lost shells. All are predators with large eyes and 8 or 10 (or up to 80 in *Nautilus*) arms for prey capture. Fertilization is always internal, the development of the large, yolky eggs is modified and direct. Class Cephalopoda ("head foot" animals) includes octopi, squids, cuttlefish, and nautilus. Cephalopods are a class of shell-bearing animals as well as mollusks with a reduced shell. They display vivid coloration, typically seen in squids and octopi, which is used for camouflage. All animals in this class are carnivorous predators and have beak-like jaws at the anterior end.

Aculifera (scale-bearers) is a major subdivision of Mollusca with a notum (at least partially) covered by a chitinous cuticle in which aragonitic scales or spicules are embedded. Mono- or paraphyletic, composed of Solenogastres, Caudofoveata, and Polyplacophora.

Conchifera (shell-bearers) is the second major subdivision of Mollusca with a dorsal shell (at least during early ontogeny produced by a dorsal shell gland) consisting of an outer organic layer (periostracum) and various mineralized layers below. Usually considered as monophyletic composed

of Monoplacophora, Bivalvia, Scaphopoda, Gastropoda, and Cephalopoda.

V. CONCLUSION

Bivalves living in coastal areas, such as clams, oysters, and scallops, are the most commonly eaten mollusks. People also eat octopuses and squid (calamari), whelks, and land snails (escargot). Mollusks have been - and are still - important food sources for many people. Freshwater snails also provide food for fish, including native trout and salmon, and are also important recyclers of plant and animal waste, essentially keeping water clean and healthy. Mollusks are also considered excellent ecological indictors, their status providing a window into the health of entire ecosystems. Mussels on rocky shores are not likely to play any role in stabilizing the rock substrate, and infaunal bivalves and scallops play only a modest role in stabilizing sediments.

ACKNOWLEDGEMENT

I extend my heartfelt gratitude to the my research guide Dr. B. Geetha, Associate Professor, P. G and Research Department of Zoology, V. O. Chidambaram College, Tuticorin, for her valuable guidance in the preparation of manuscript and guidance at every stage of my research work. I owe my sincere thanks to Dr**.** C**.** Veerabahu, Principle, V. O. Chidambaram College, Tuticorin for his help constant encouragement and for the facilities provided for undertaking this study. I record my extremely thankful to Mr. K. Ganesh, Ph.D. Research Scholar for his help during my study period.

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