

ZOOACOR03T: UNIT-5

Mollusca: Pearl Formation in bivalves

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What is Pearl?

Natural organic or inorganic
materials

Pearls- A Biological Product

- Processed by bivalved molluscs, either an oyster or mussels,calms- Examples are following-
- 1. Marine bivalves-*Pinctada fucata*, *P. vulgaris*, *P. margaritifera*, *P. martensii*, *P. maximus*
- 2. Freshwater bivalves – *Lamellidens marginalis*, *L. corianus*, *Mytilus edulis*
Margaritifera margaritifera

VARIOUS PEARLS



Formation of Pearls: Why?

- It is a DEFENSE MECHANISM
- Causative Agents: SOLID PARTICLES as wood,sands, rock etc ; MANTLE TISSUE AND DISPLACED SHELL due to injury or attacks; PARASITES
- Analogous to IMMUNE RESPONSE EVOKED IN HUMAN due to foreign antigens.
- PHAGOCYTOSIS method of cellular ingesion.

Formation of pearl due to deposition of nacre, secreted from nacreous layer of mantle, plastered over around erroneous solid particle (wood, shell, sand etc.) from accidental entry

PHYSICAL COMPOSITION **PEARL** CHEMICAL COMPOSITION

- Shape: 1. Regular with circular or semicircular, flat, pear shaped. 2. Irregular shaped pearls with tails.
 - Hardness- fair with 3.5-4.5
 - Specific Gravity- Quality pearls with 2.65-2.68 and freshwater with 2.7
 - Colour- pale yellow, white silvery, pinkish, golden tip or black tip pearls are high quality and economic value.
- According to Dubois, 1909
 - 1. Calcite and aragonite- CaCO_3 -91.53%
 - 2. Organic matter- Conchiolin, a horn-like complex of protein- 3.83%
 - 3. Water- 3.97%
 - 4. Others- 0.61%

BIOLOGY OF PEARL PRODUCING MOLLUSCS

- Habitat- Pearl Oysters in sea and freshwater mussels in lake, pond or river
- Habit- Mainly planktophagous by means of filter-feeding mechanism.
- Morphology- bilaterally symmetrical with hard calcareous laterally compressed two shells with valves, mantle covering whole visceral mass, presence of pallial line at outer extremity of mantle.



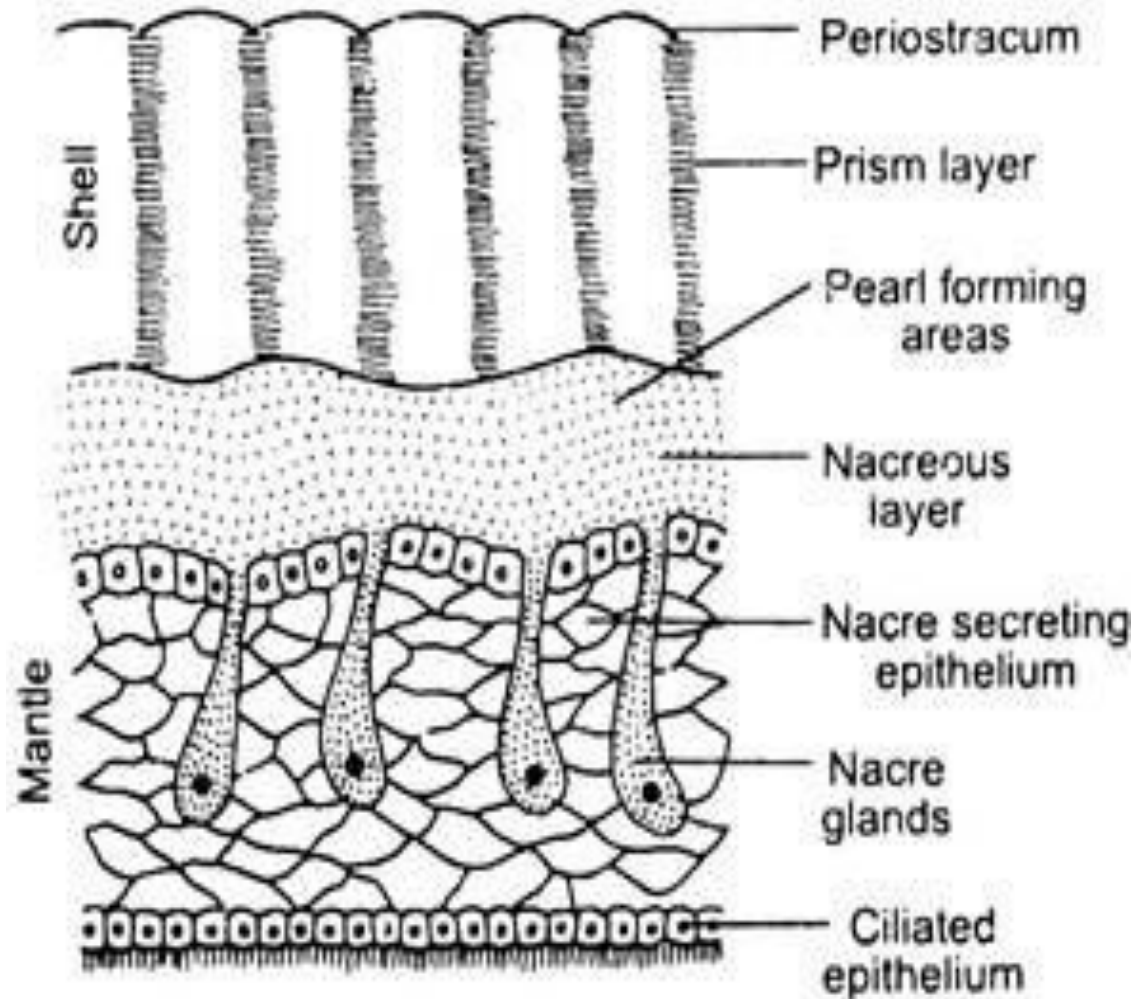
Microscopic structure of shell and mantle

1. Shell- 3 distinctive layers from outer to inner-

**PERIOSTRACUM,
PRISMATIC LAYER,
NACREOUS LAYER**

2. Mantle- triploblastic as follows:

**NACREOUS GLAND,
CONNECTIVE TISSUE
LAYER, CILIATED
EPITHELIUM LAYER**



What do you mean by 'Mother of Pearl'?

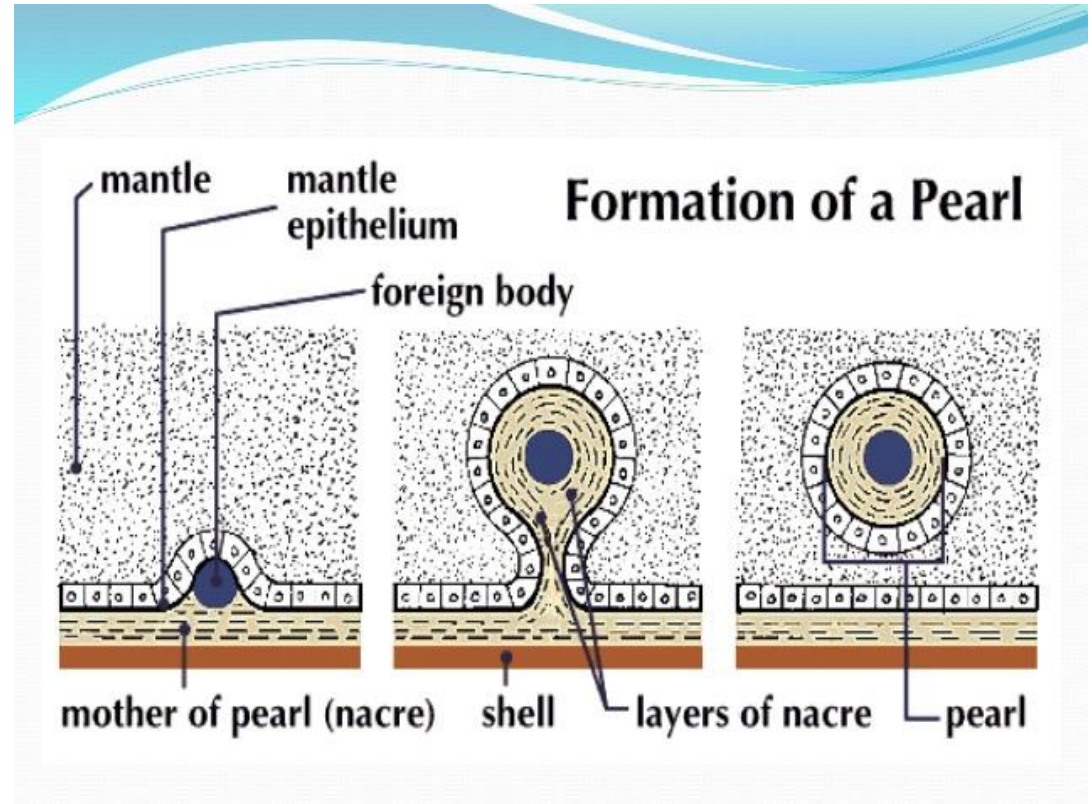
- Nacre - Strong iridescent inner shell layer of molluscs.
- Composed of hexagonal platelets of aragonite, a form of calcium carbonate.
- Safeguard of soft mantle tissue against parasite or foreign solid particles.
- Forming either 'blister pearl' attached to nacre or 'Free pearl' covered in mantle soft tissue.



NACRE

BASICS OF FORMATION OF PEARLS

1. INCORPORATION OF FOREIGN MATERIAL OR DISPLACED PART OF SHELL INTO SOFT MANTLE TISSUE.
2. FORMATION OF PEARL SAC , OUTER EPITHELIAL LAYER, TO SEAL OFF THE IRRITATION.
3. PEARL SAC SECRETS NACREOUS PEARLY SUBSTANCE ON THE SURFACE OF FOREIGN BODY.
4. CONCENTRICALLY ARRANGED SHEETS OF NACRE, ARGONITE AND CONCHIOLIN COVERED THE IRRITANT.
5. TOOK 3-4 YEARS TO FORM PEARL.



PEARL CULTURE — Generally two method types of Pearl cultured around the world, In India along east coast-Gulf of Kutch, Gulf of Mannar, Boroda and Tuticorin

- Raft Culture-
- Japanese Way
- Near the Shore, shallow beds
- Spat rearing in cages with compartments.
- Preparation of nucleus and Graft tissue
- Implantation and Rearing
- Harvesting and Polishing
- Longline Culture-
- Advanced
- Deep water culture
- Longlines fixed at shores to deep underwater by galvanized pins drilled in rock
- Pearl rearing in Trays, lantern nets, bags, tube modules
- Rearing and harvesting as per general method

Prospect in India

- Vast coastal region as well as freshwater bodies.
- Huge availability good species of pearl producing oysters
- Suitable Indian water conditions