PEARL FORMATION

INTRODUCTION:

Pearls are considered as one of the naturally occurring precious gems. These are round structures formed in bivalve molluscs. Quality pearls are formed in bivalves of ***Pinctada vulgaris, Pinctada fucata, Pinctada margaritifera*** and ***Pinctada maxima***. Pearls of low quality are formed in other bivalves like ***Mytilus, Lamellidens*** and ***Unio***.

Pearl formation is a very rare phenomenon in nature. So, pearls are made artificially in industrial scale. Japan is famous for pearl production. A scientist named Kokichi Mikimoto is considered as the father of pearl industry. He produced pearls in reared oysters. Tokichi Nishikawa was the first scientist to produce artificial pearls.

In India, pearls are collected from Kutch and Mannar since ages. CMFRI (Central Marine Fisheries Research Institute) is engaged in artificial pearl production these days.

STRUCTURE OF A PEARL:

Pearl is made up of a number of concentric layers around a particle. These layers are mainly composed of CaCO3. The chemical composition of pearls is – 90% CaCO3, 2 to 4% water, 3.5% to 5.9% organic matter, 0.1% to 0.8% - other substances.

PEARL OYSTERS:

Pearl oysters are general found among submerged stones called Paars. These animals are also found among corals. Oyster beds are present at a depth of 10-12 fathoms and at a distance of 19 km from the shore. Pearl oysters feed on ***foraminiferans,*** small embryos and larvae of other animals, diatoms, flagellates, copepods and other plankton. Oysters can tolerate salinity range between 24% to 50%, and hence they are euryhaline.

FORMATION OF NATURAL PEARLS:

The **“pearl”** is literally formed by the mantle epithelium, which becomes deposit around any external body or particles, these external particle or body invade in between the shell and mantle in any way. By nature, pearl formation is a defence mechanism in Oysters. When an external particle or body, such as a grain of sand or a small parasite invades in between the mantle and the shell it becomes enclosed in a sac of mantle epithelium which produces irritation. The irritation stimulates the mantle epithelium to secrete thin concentric layers of mother of pearl around the foreign body. The amount of deposition is in direct proportion to

the degree of irritation. To avoid this damage, oyster secretes a substance called ‘nacre’ in concentric rings around the foreign particle. The nacre glands in the mantle begin to secrete calcareous substances. Finally, the foreign particle is encased in layers of nacre to form a pearl. The iridescence of the pearls is produced by the refraction of the light rays from various nacre layers of the pearl. Duration of the pearl growth may vary according to species and usually takes 3 to 4 years. The giant ***Tridacna*** clam which can produce a pearl of the size of a golf-ball, may take as long as 10 years. The shell of an oyster has three layers. These layers are – **Periostracum**, **Ostracum** and **Nacreous** layer. Periostracum is the outermost layer. Ostracum is the middle layer. Nacreous layer is the innermost. Periostracum and ostracum are secreted by the edge of the mantle, while nacreous layer is secreted by the entire surface of the mantle. Periostracum is made up of chonchiolin (similar to chitin), ostracum is made up of calcium carbonate, and nacreous layer is made up of a combination of chonchiolin and calcium carbonate. The innermost nacreous layer forms the pearl and called the mother of pearl.

Pearls are formed by various clams and oysters, but those produced by the marine pearl oysters, ***Meleagrina*** of Eastern Asia are the most valuable.

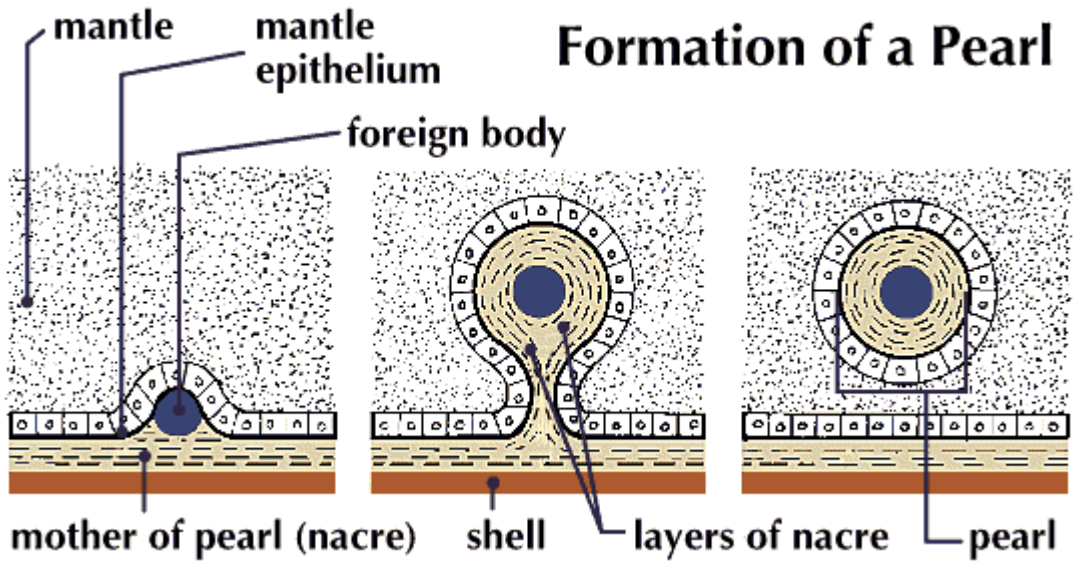

Fig. Pearl formation in Mollusca.