

## Pearl culture

In this article we will discuss about:- 1. Meaning of Pearl Culture 2. Important Pearl-Producing Oysters 3. Distribution in Indian Waters 4. Biology of Pearl Oyster 5. Formation of Pearl 6. Artificial Pearl Culture 7. Large-Scale Pearl Culture.

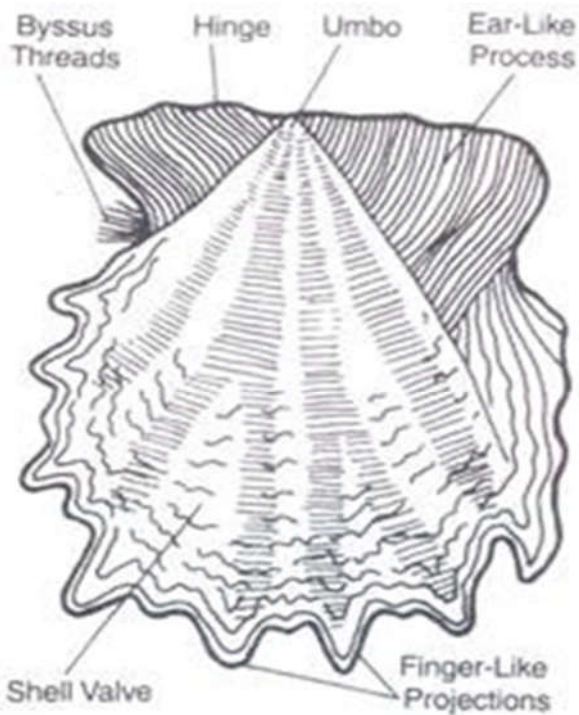


Fig. 38. External features of a pearl oyster.

## History

Fishing of pearl oyster in order to obtain pearl is known to Indians since ancient days. The chief sources of pearls are marine pearl oysters, however the fresh-water molluscs are also known to produce pearls but they are of poor quality and almost worthless. Pearl is known to human beings since ancient times. A pearl due to its delicate appearance and shine has retained its position as a costly ornamental object. Due to its properties, it occupied important place in the crown of great emperors and queens. The origin of pearl is not known to us however Chinese records show that pearl was known to them as far back as 2300 B.C.

## Pearl producing oysters

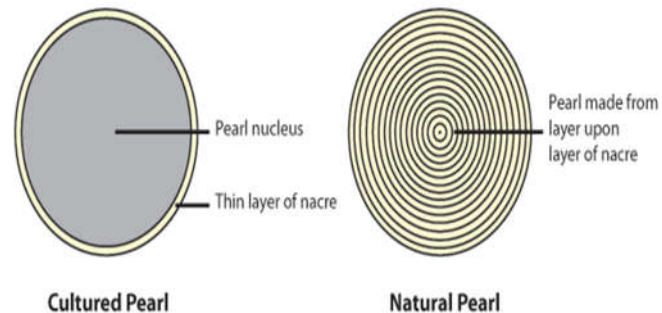
The pearl oyster belongs to genus *Pinctada*, family pteriidae, and class bivalvia and phylum mollusca.

a. *Pinctada fucata*

- b. *Pinctada chemnitzii*
- c. *Pinctada margaritifera*
- d. *Pinctada anomioidea*
- e. *Pinctada atrapurpurea*

## Distribution of Pearl oyster beds

The Internal structure of a natural and cultured pearl



main sites of production of pearl are the Persian Gulf, Gulf of Manar (Ceylon), Sulusea (near Philippines). Besides these, coast of Australia and shores of Central America

Nowadays Japan has surpassed all the countries in the bulk of pearl production by invention of pearl culture techniques.

## Pearl Fisheries of India:

Pearl oyster beds in India are present on both eastern and western coasts. However, the east coast is more productive and extensive than the west coast. The two zones of Indian coast known for pearl oysters are

(A) Gulf of Mannar:

The Indian pearl fisheries in the Gulf of Mannar along with Sri Lanka produces the true oriental pearls of the finest quality. The species common to this area is *Pinctada fucata*. Gulf of Mannar has 72 beds,

(B) Gulf of Kutch: In the Gulf of Kutch there are about 42 pearl oyster reefs, known as 'Khaddas'.

## How pearl produced

Pearl is secreted by the mantle of the pearl oyster as a protection against foreign objects which may be sand particles, minute larval forms or other such things. To study the mode of formation of pearl it is essential to know the structure of the shell and mantle.

Shell of pearl oyster is composed of three distinct layers. They are as follows.

**Periostracum:** It is the outermost, greenish-brown, thin, translucent layer made up of an organic substance "Conchiolin". It is secreted by mantle. It serves to protect the underlying layers from harmful effects of weak carbonic acid in water.

**Prismatic Layer:** It is the middle layer secreted by mantle. This layer is made up of minute crystals of calcium carbonate, It gives strength and rigidity to the shell.

**Nacreous Layer:** It is the inner most layer of the shell and is better known as mother of pearl", because this layer is responsible for the formation of pearl. It consists of alternate layers of calcium carbonate and conchiolin. This layer is also secreted by mantle and its function is to protect the delicate surface from harmful effects of the foreign particles. that pearls are formed due to irritation caused to the mantle by the entry of foreign bodies. Whenever any sort of foreign body enters and gets between the mantle and shell, it becomes enclosed in a sac of mantle epithelium. This foreign body now acts as an irritant and stimulates the mantle epithelium

Time taken for the formation of a pearl of average size is three to five years.

Places	Diameter of the nucleus	Diameter of the pearl	Time taken for culture
1. Gulf of Mannar (India)	3 mm	3.63 mm	6 months 11 days
2. Ego (Japan)	3.05 mm	3.70 mm	2 years

The chemical analysis of a pearl shows that it contains about 90% calcium carbonate, 5% organic substances and 5% water and other residues.

The natural pearl is rarely a sphere, as it assumes the shape of the nucleus. The process is very slow and continues for the whole life of an oyster. The value of a natural pearl depends on its size, shape, colour and lusture.

### Biology of Pearl Oyster:

The oyster usually breeds several times in succession. The larvae are free-swimming and feed upon microscopic organisms. They undergo metamorphosis and finally settle, at the bottom, in large numbers. The young oyster has a fast growth rate and attains about 50 mm size in a year. Pearl oysters feed on small algae found in the water column through filtering large amounts of water.

### Formation of Pearl:

If a small foreign particle, an inert material, e.g. sand particle, hard object, etc.; living object, e.g. parasite, penetrates the mantle of the oyster, the cells of the mantle get attached to it.

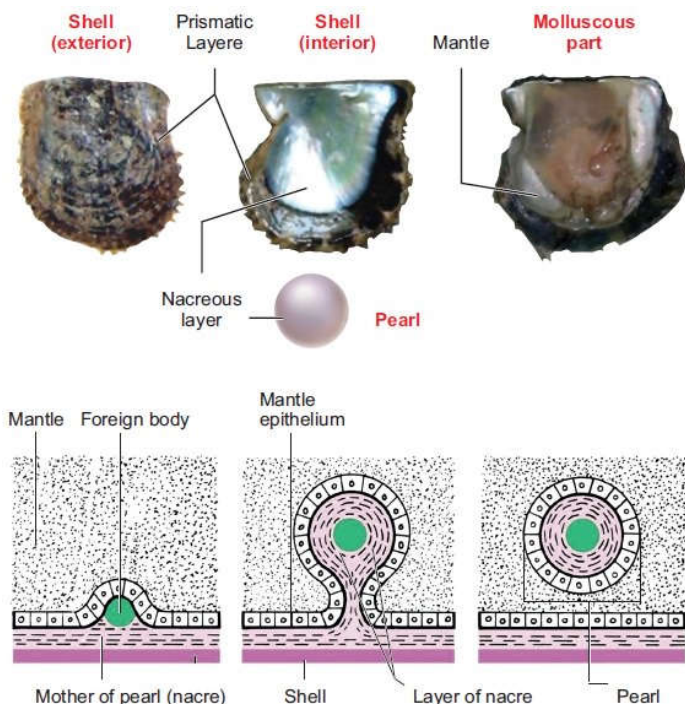
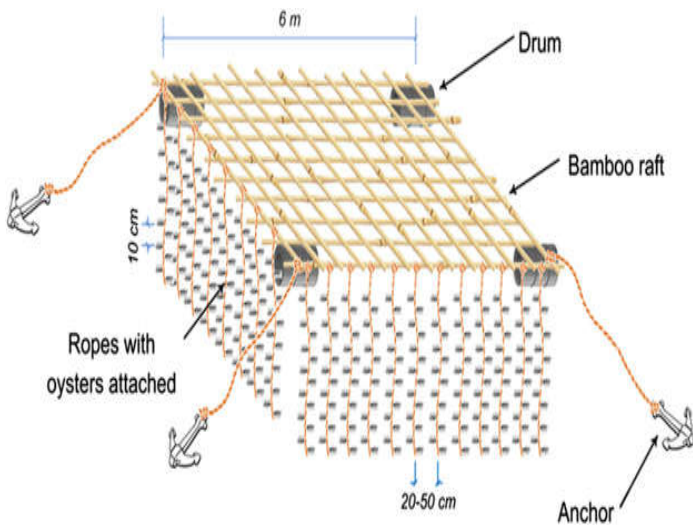


Figure 13. 12 Pearl and Pearl Formation

to secrete concentric layers of nacre around this foreign body. These layers when harden becomes pearl. (Fig. 40)

Size of pearl is directly proportional to the degree of irritation cause by foreign agents.

The foreign particle forms the nucleus over which more or less concentric layers of mother of pearl is secreted.



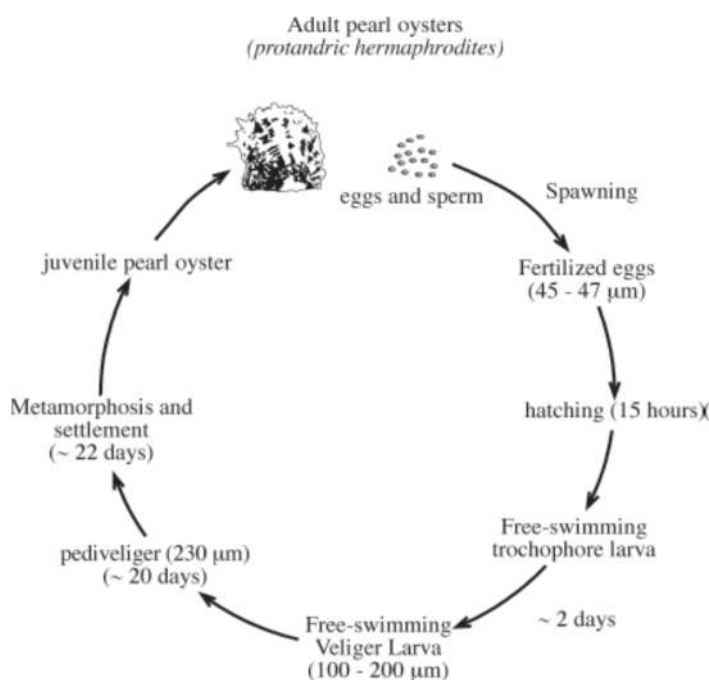
In case the particle penetrates deep enough, a sac or cyst is first formed around the particle and pearl formation occurs within the sac.

With time, due to more secretion, it enlarges in size and the pearl is formed.

### Artificial Pearl Culture:

Japan was the first to develop scientific pearl culture in 1907. Introduction of large particles of desired shape and size made it possible to get pearls of different shapes and sizes.

The basic principle of Pearl-Culture is to



introduce some foreign materials between mantle and shell of the oyster, which out of

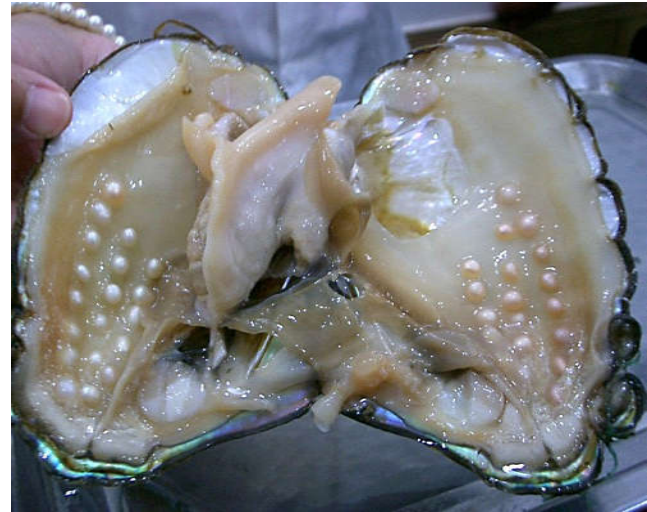
irritation will produce nacreous layers around that foreign body which in time will become pearl.

### **PROCESS OF PEARL CULTURE**

The process of pearl culture includes the following steps.

**Step 1: Construction of pearl farm.** It includes 2 steps

a. **Selection of farm site:** A site is selected that provides- constant temperature,



protection from waves, shallow waters.

b. **Construction of pearl farm:** Wooden Rafts of 5x5 meters are placed in seawater using proper anchors. Lines of ropes are hung on to these rafts.

### **Step 2: Collecting oysters**

After the construction of pearl farm, the divers set out to the bottom of the sea, to collect the oysters. Oysters are generally located on a flat rock bottom. The shells collected, are cleaned, sized, and placed into baskets for storage until they are transferred to the pearl farm. The larvae of the oysters can also be collected. That process is called spat collection. These larvae are again grown upto 2 years so that they can be seeded (introduction of foreign particle)

### **Step 3: Seeding**

Two-three year old healthy oysters are considered for surgical implantation known as seeding. This is a very delicate operation and involves three stages:

**Preparation of the graft:** A donor oyster is sacrificed to obtain mantle. Mantle is needed



by the host oyster to accept the nucleus. Nucleus is a foreign particle usually a sand or glass particle.

**Attaching the graft:** The oyster is opened with special wedges and pliers, sand/glass particle is introduced between the shell and mantle and the oyster is then returned back to the water. The inserted core irritates the oyster, provoking it to gradually coat the core with thin layers of mother of pearl nacre. After some time, the oysters are collected, and x-rayed to see whether the implants have been accepted. Oysters which have rejected the implant are returned to the water and are once again operated. The oysters which have accepted the implant are transferred to the pearl farm.

#### **Step 4: Caring the oyster**

The shells which have been grafted are transferred to the pearl farm are placed in baskets or ropes attached to the floating rafts. The oyster can produce more than one pearl in its lifetime.

#### **Step 5: Harvesting**

After 2-3 years, the oysters are harvested. It is necessary to make a trial harvest to determine whether the pearls have a sufficient coating. If it is not sufficient then an additional six months to a year of culturing is necessary. The oysters are split open and pearl bags are cut by the scalpel to remove the pearls.

#### **Step 6: Sorting pearls**

There are many different steps involved with the sorting of pearls. Firstly, the pearls are sorted according to their size, colour and lustre. They are marketed.