Pearls - About Pearls

Contributed by Administrator
Tuesday, 13 November 2007
Last Updated Tuesday, 13 November 2007

Pearls

Unlike a gem stone, the pearl is an organic product of nature. It com¬bines beauty with rarity and is highly prized in the world of jewels. Natural pearls are obtained from shellfish, though it must not be taken for granted that all shellfish produce pearls. Only two groups, the pearl oysters and the pearl mussels, normally give us these gems.

The pearl oysters live in the sea, while the pearl mussels are found in rivers and streams. It is wishful thinking to hope to find a pearl in an edible oyster, because only very rarely are pearls found in them, and even then they are far too tiny and too lusterless to be of value.

earl oysters occur in the southern oceans of the world and thrive best in a temperature of about 25° centigrade.

They congregate in vast numbers attached to rock banks in the more shallow waters. Rarely are they found below a depth of about 30 feet. One of the most productive pearl areas in the world is the Persian Gulf, and the pearl industry there is carried on from many thousands of primitive small fishing boats, and not, as might be imagined by some, from modern motor boats. Each boat is manned by a small crew and a diver. Usually these divers work with only a rope and a knife, the rope being used as a life line to help the diver to surface with his load of shells. These he collects in a net or basket tied around his waist by a stout leather belt. The knife is his only protection against possible attacks by sharks. A diver can remain under water for about 2 minutes, and during this time he has to collect as many shells as possible. The diver's life is often in danger. In Australia, however, pearl divers do not face the same risks because they wear proper diving equipment.

Pearls are of different colors. Indeed, there are many shades, depending upon the locality where they were fished. For example, pearls from the Persian Gulf have a delicate creamy sheen, while on the coast of Western Australia there is an area known as Shark Bay, where the oysters yield yellowish pearls. Then again, in the Gulf of California or the Gulf of Mex¬ico, some black pearls with a rich metallic luster are found. Nobody really knows what determines the color of pearls, except that it is known that their shade is caused by the nature of the water in which the oysters live, by the species, and by the location in the animal where the pearl has grown.

Just by looking at the color of a pearl an expert can usually tell from which part of the world it came. On the other hand, pearls that come from fresh-water mussels used to be much sought after at one time. Today, most pearl-mussel seekers are usually amateurs who search for the fun of it. It would not be worth it to a professional to search for them.

There are some rivers in the United States as well as abroad where the pearl mussel is to be found, and if one cares to provide himself with high boots, a forked stick, and a drum with a glass bottom, he might yet find a real pearl. The drum with the glass bottom enables one to see the river bed, and the forked stick will dislodge the shells. Apart from these simple gadgets, the hunt will require a great deal of patience, for few shells will contain pearls and fewer still will have that appearance that makes them so attractive and therefore valuable.

The question is, how can a simple creature like a mussel produce such a beautiful object? The animal itself lives between two shells (called valves) that are this soft and defenseless creature's only protection against the many hazards it meets in the rivers. Like ourselves, these animals must breathe, and this they do through gills in a way similar to fish. That means they pass water through the gills and in doing so extract oxygen from the water. Attached to the gills are tiny hairs called cilia that are in constant motion. These set up a continuous current of water that enters a small opening, the inhalant siphon (Fig. 50). The ingoing current of water carries with it not only oxygen for breathing, but also many microscopic orga¬nisms are swept into the mouth by the action of the cilia, so mussels can both feed and breathe in one efficient operation.

The mussel also possesses ^n organ looking like a tongue that protrudes between the shell valves. This is called a foot. By means of its foot, the mussel is able to plow its way through sand and mud. Normally, when the animal is at rest, the two shell valves are opened so that it can breathe, feed, and expel waste materials. When the mussel is attacked, it quickly with¬draws its foot, and the two shell valves close tightly. In this position, it is practically safe from its enemies. If the shell of an oyster or mussel is cut through vertically and placed under the microscope, it would look something like a sandwich First, there would be a hard, horny outer layer. This is part of the shell that is in contact with the outside and is called the periostracum. It is made from the material conchiolin. Next comes a thicker layer, called the prismatic layer, which consists of minute regular crystals of calcium carbonate, all of which lie in the same direction, at right angles to the shell. Finally, the shells are lined by a substance called nacre, better known as mother-of-pearl.

This layer is made up of tiny plates of calcium carbonate that over¬lap one another rather like slates on a roof. Their

edges are zigzagged and irregular and are so close together that they can be seen only under the microscope (Fig. 52). It is this last layer that gives the inside of oyster or mussel shell its iridescent luster.
All the parts of the shell are produced by the oyster that lives inside it, and this is accomplished in the following way. The body of the oyster is contained in two flaps of tissue, the mantle. This mantle is covered with minute cells, which have the power to pour out shell-forming substances. The outer horny layer and thicker prismatic layer are normally produced by the edge of the mantle only, and the layer of mother-of-pearl is secreted from cells of the whole mantle surface.
A pearl is formed in a very similar way. Imagine, for example, that a grain of sand or a minute worm gets into the shell and begins to irritate the soft body of the animal. Obviously, the oyster or mussel will first endeavor to expel it.

Failing this, the only other alternative is to cover the foreign matter with layers of smooth shell material so as to allay any irritation. The same mantle that normally secretes substances to form the shell will now begin to deal with the intruding sand grain by secreting around it layer after layer of horny organic material and calcium carbonate. Many hundreds of such layers will be secreted around the sand grain until, over a long period of time, a pearl is formed. Each layer of organic material is minutely thin and cannot be seen without high magnification. It consists of a delicate network of cells, rather like a honeycomb, made from the horny substance, conchiolin, and these cells are filled with minute crystals of calcium carbonate.

Why a pearl shines can be explained by examining the pearl's surface under the microscope. There it will look like a large, silver-white dome crossed by the same zigzag lines as on the insides of the shells. Those zig¬zag lines are the exposed edges of tiny plates of calcium carbonate that overlap one another and form the mother-of-pearl layer. The behavior of light and how it travels along in the form of minute waves was discussed earlier. Red light waves are the longest, and, passing from the red to the yellow and green to the violet, the waves become shorter and shorter. In the ordinary way, all these waves stay together, and their combined effect on the eye is that of ordinary white sunlight. But if light strikes the surface of a very thin transparent film like the wall of a soap bubble or the thin trans¬parent plates on the surface of the pearl, things begin to alter; some of the waves will interfere with one another. A red wave may reinforce another one of its kind and increase its intensity, while, conversely, two blue waves may mutually destroy one another, and darkness results. This phenomenon is called interference, and it explains the many shimmering colors on soap bubbles and also the iridescent luster of pearls. The luster of the mother-of-pearl lining on the inside of the shells is also caused by the same phenomenon.

As with other precious gems, man has for centuries endeavored to find ways and means of producing pearls artificially. Unlike some gem stones, pearls cannot be synthesized, but man has found an ingenious way of culturing them.

Cultured pearls are usually associated with Japan, but it was the Chinese who, nearly five hundred years ago, discovered the fact that if a foreign object were introduced between the shell and the mantle of a fresh-water pearl mussel, that object would eventually become coated with a layer of mother-of-pearl. Sometimes the Chinese inserted small stones, a splinter of wood, or even the image of a\Buddha cast in metal. The mussel was then returned to the river and allowed to live there for a few years. When it was fished up and opened, the foreign object had become coated with mother-of-pearl and was fixed to the shell.

Over the centuries, many have tried to improve on these ancient methods, but it was not until the early part of this century that the Japanese made enormous improvements in the technique of forcing shellfish to produce pearls. The resulting products are today known as cultured pearls.

In Japanese waters, there are several species of shellfish that produce natural pearls, but only a few of these can be used as "mother shells" for cultured pearls. The one most commonly selected for culturing operations is the akoya oyster, or Pinctada martensi. It is one of the most hardy of the species and stands up well to the rather harsh treatment of the culturing operation.

To satisfy world demand for cultured pearls, a large number of healthy pearl oysters are needed, because only really strong and healthy specimens can produce the best gems. This means that they have to be specially bred, and for this purpose many thousands of young oysters have to be collected.
In the months of June and July in the waters around Japan, each mother oyster is said to produce one hundred to two hundred thousand young, and, since there are many millions of mother oysters in the waters, each year astronomical numbers of young oysters will be produced. Not all of these will survive. The majority will be killed by natural enemies, such as the star¬fish and the octopus, and many will be carried far out into the ocean and die there.

The first task of the cultivator, then, is to find some method whereby the young oyster larvae can be readily collected. Collectors, consisting of twigs taken from the Japanese cedar tree, are cut into 2- or 3-foot lengths, then tied together. Sometimes, old fishing nets with fine meshes are used. When the spawning season arrives, the collectors are hung in the water from rafts, and the oyster larvae attach themselves to these. The larvae are allowed to grow on the collectors until they are about the size of a fingernail. Then they are taken from the collectors and placed into fine-mesh wire baskets. As the young oysters grow, they are removed into new baskets with larger mesh, and their numbers are, at the same time, decreased.

There are some difficulties to overcome, however. Oysters are cold¬blooded creatures and cannot adapt themselves to changes in the temper¬ature of the sea water. If the water is either too cold or too hot, the oysters may weaken and die. As the cold season approaches, they must be removed to winter quarters where the temperature of the sea water does not fall below 10° centigrade. There, they grow up for a period of 2 to 3 years until they reach maturity and are ready for the culturing operation. When the oysters are mature, they are removed from the sea, and some of them are opened, and small squares of healthy mantle tissue removed. These oysters are then discarded. The operator now wedges open the remain¬ing oysters and makes an incision into their mantle tissues. He next takes a mother-of-pearl bead, together with a square of previously prepared mantle tissue, and inserts it into the incision (Fig. 54). After this operation, the oysters are put in wire baskets and returned to a quiet part of the sea.

After a period of rest and recuperation, they are placed in wire baskets in groups of 20 to 40 per basket and taken to the cultivation farms where they hang from rafts into the sea. At this stage, cultivation proper commences. The oyster, as has been said, is able to render intruders into its shell harm¬less by surrounding them with layer upon layer of calcium carbonate, and this is what takes place now. Slowly, the mother-of-pearl bead is surrounded by layer upon layer of fresh mother-of-pearl substance.

Cultivation may take any time from one year for small pearls to 4 years for really large ones. Four or five' times a year, the outer shells and baskets have to be cleaned and freed from other small sea creatures that may have become attached to them. In addition, they must be able to obtain food. This con¬sists mainly of minute animal or vegetable plankton, and the oyster rafts must be placed in the correct positions to enable the tidal flows to supply them with enough food. Oysters are, in fact, quite fussy customers, since a too plentiful supply of food can be bad for them.

When all has gone well, and the pearls are ready for harvesting, the oysters are fished up again during the winter months when the secretion of the mother-of-pearl substance is at a minimum. At this time the oysters are killed, and the pearls are extracted and cleaned. Tremendous wastage is unavoidable. Only about 85 per cent of the one-year oysters and 45 per cent of the 4-year oysters will have produced successful pearls, while a mere 5 per cent will be found to be absolutely faultless.
Cultured pearls are not as valuable as natural ones, but a good deal will depend on the quality of both. Recently, some magnificent cultured pearls have been produced, some of which are said to be as big as hazel nuts, and these are indeed valuable.

But do not imagine that producing cultured pearls on a big scale is an easy task. There are hazards. Typhoons, which frequently sweep the coastal waters of Japan, can cause millions of dollars worth of damage. High winds and gigantic waves may destroy and scatter the rafts so that many oysters are killed or lost. Heavy prolonged rain may swell the rivers run¬ning to the sea and reduce the saline content of the sea water near the oyster farms. This will kill many of the oysters. Luckily, river water flows above the sea water, and, by suspending the baskets close to the bottom of the sea, some of this hazard can be minimized.

Few people realize that pearls must be treated with care to allow them to retain their full beauty. They are of organic origin and therefore mav deteriorate under certain conditions, but, naturally, much will depend on how carefully they are kept. The pearls that hang from the arches of the English State Crown have retained their luster after nearly 400 years.

As with most precious gems, there have also been famous pearls. The giant of them all measured nearly 2 inches at its longest, had a circumfer¬ence of almost 4 inches, and weighed about 3 ounces. But the most beauti¬ful pearl known in history was named "La Pellegrina." It was said to have originated in the Indian Ocean. In perfection of shape it outshone all com¬petitors. It was white in color, symmetrical and pear-shaped, and weighed 111 pearl grains. The pearl grain is equal to ¼ carat.

The natural combination known as the great Southern Cross is famous. This consists of nine pearls naturally united in the form of a cross. It was discovered in the 1880's in a pearl oyster fished off the coast of Western Australia.

The pink, or conch pearls, produced by the univalve Strombus gigas are of commercial importance. Pink or white in color, these pearls have a porcelainlike appearance, somewhat similar to coral. Under a lens they show flamelike markings, which distinguish them from coral.