

The different kinds of cultured pearls

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Extended Abstract

Introduction

Cultured pearls are filling the gap between the enormous demand for pearls by the consumers and the small amount of incidental natural pearls available. A few species of saltwater oysters and freshwater mussels are used today to culture pearls that are the reaction of a surgical intervention. Therefore I am discussing in the following the different products that result from operated bivalves: freshwater cultured pearls and saltwater cultured pearls. Application of the term "cultured" is mandatory in the same way as it is "synthetic" for laboratory grown crystals.

The principle

The external mantle tissue is the organ that is responsible for producing the shell of an oyster or mussel. Nacre, being part of the shell, is the appreciated material of which pearls consist. It is thus the external mantle tissue that has the capacity to produce nacre. The clue of the invention the technique of producing cultured pearls was to remove a sample of this tissue and graft it to another shell that is selected to breed the cultured pearl. Therefore some oysters with very beautiful nacre are selected as tissue donors, and other serve as recipients and adopt the graft. The graft itself forms a pocket and starts to fill it with nacre material. Mantle tissue is forming calcium carbonate in tiny tablets (nacre) regardless if it is still part of its original external mantle, or transplanted into another shell. The tissue graft does not form a nucleus once transplanted, but grows to form a sac in which the pearl grows.

Three main options

Beaded or beadless: Although a cultured pearl forms after a tissue transplant alone, bead implanting is a common technique, too. The final shape of a good pearl should be round, and this can be easier achieved when a round bead is placed with the tissue graft. Also the cultured pearl obtains faster an acceptable size more quickly when a spherical bead is preset. We recognize thus two possible types of cultured pearls, one without a bead and one with a bead.

Mantle-grown or gonad-grown: On the search for a possible place in the body of a recipient shell two positions were located where the tissue graft finds optimum conditions for a good growth of the pearl: the conjunctive layer of the mantle and the gonad (reproductive organ). We are thus facing again two possibilities for successful cultured pearl production: mantle grown or gonad grown cultured pearls.

Saltwater or freshwater: The third option one has to grow cultured pearls is the choice of the type of bivalve: freshwater or saltwater. For freshwater production mussels such as *Cristaria plicata* or *Hyriopsis cumingii* are mainly used. In saltwater *Pinctada martensii*, *Pinctada maxima* and *Pinctada margaritifera* are mainly used. In general, saltwater cultured pearl production uses the gonad-growth technique, while freshwater mussels produce mantle grown cultured pearls.

When we combine three possible pairs out of the six options we get the following possibilities (Table 1):

Limited combinations for CP's

Oyster saltwater	Gonad grown	beaded	Akoya, Tahiti, South Sea, etc.
Oyster saltwater	Gonad grown	beadless	"Keshi" bead rejected
*Oyster saltwater	Mantle grown	beadless	New Type Baroque
Oyster saltwater	Mantle grown	beaded	not seen ?

*Mussle freshwater	Mantle grown	beadless	Biwa, Chinese freshwater, US
Mussle freshwater	Mantle grown	beaded	China freshwater coin, round
Mussle freshwater	Gonad grown	beadless	not seen ?
Mussle freshwater	Gonad grown	beaded	not seen ?

More in details

It is thus of major importance to select donor oysters for the sampling of tissue bits, and to transplant these into recipient oysters for the formation of a cultured pearl. In any case, accepted grafts grow out to a pearl sac and its inner surface starts to deposit calcium carbonate, whether there is a bead or not. We therefore distinguish between beaded and beadless cultured pearls. Further explanations are necessary to illuminate other details. General practice is that freshwater mussels receive a large number of grafts into both wings of the mantle tissue. Also a general practice is that gonad grown cultured pearls are made with a bead, and mantle grown pearls are grown beadless. Analysis of the processes shows that these general rules are broken

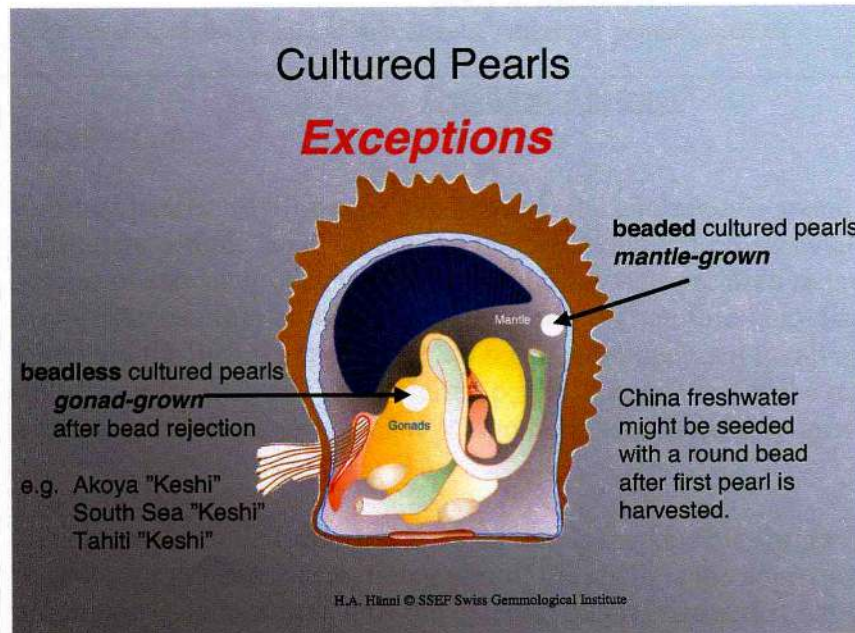
in that in gonads the beads may be rejected, and we thus receive a beardless salt-water cultured pearl, often named "keshi pearls". It is also possible that some mantle grown pearls are grown with a bead, however after formation of a pearl sac in advance. With saltwater oysters a first bead is added to the tissue graft to form a well-shaped pearl sac of some size. After a short period the product is gently removed in a first harvest and a second bead is introduced into the same pearl sac. By this method larger cultured pearls are produced and harvested as a second generation.

We have seen similar productions in steps with freshwater cultured pearls where a flat round tablet is added to the tissue, and placed into the mantle. After removal of a coin shaped cultured pearl (first harvest) the shell is much larger than at the beginning of the process. Also the pearl sac that contained the coin pearl is large enough so that it can house a second, spherical bead. So it comes that mantle grown cultured pearls also can also be made with beads, although the vast majority is beardless. Gonad-grown cultured pearls that are formed by a pearl sac after bead rejection do exist in two kinds: from first bead rejection, or from second bead rejection.



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