Pearl or gemstone? Galatea pearls: a 'new' pearl product from French Polynesia

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Introduction

Cultured pearls can be produced both with and without a nucleus. The nucleus material used for these beaded cultured pearls is traditionally from freshwater Mississippi mussels. In recent years, there have been a number of attempts to use alternative pearl and shell materials as nuclei. This includes different types of shells, bironiteTM (processed dolomite, Snow 1999), laminated/powdered shell, freshwater cultured pearls, organic substances and even natural pearls (Superchi et al., 2008; Hänni et al., 2010; Cartier and Krzemnicki, 2013). An altogether different approach is to use gemstone beads as nuclei for pearls; these are subsequently artistically carved to show both a gemstone nucleus and surrounding mother of pearl (Figure 1). This type of pearl product - named Galatea Pearls - has been on the international market since 2007 and grown in importance in recent years (Roskin, 2007; Hänni, 2009; Strack, 2011). In 2012, CIBJO changed its Pearl Blue Book definition of a cultured pearl bead to accommodate other types of nuclei (e.g. turquoise bead cultured pearl) (CIBJO, 2012).

Figure 1: Carved Galatea cultured pearls from French Polynesia containing a treated turquoise nucleus. Photo: Laurent E. Cartier.

Figure 2: The pearl farm that currently produces Galatea cultured pearls from French Polynesia. Photo: Laurent E. Cartier

The Culturing Process

At present, all Galatea cultured pearls are produced at one farm in the Gambier Islands of French Polynesia (Figure 2) using indigenous Pinctada margaritifera oysters. In French Polynesia, all the necessary oysters can be obtained through wild spat collection by introducing spat collectors in selected areas of the lagoon twice a year (March-June, September-December). The oysters are nursed and may be placed in baskets to protect them from predating fish (Southgate and Lucas, 2008). At an age of around 3 years, the oysters usually reach a size (10-12cm in shell diameter) when they can be operated. In a first generation, a piece of donor mantle tissue ('saibo') along with a plastic nucleus (see Figure 3) are operated into the gonad of a host oyster. A plastic nucleus is chosen because of lower costs: the first generation pearl produced with these is not marketed. It has to be noted that French Polynesia export regulations

would not allow the export of pearls containing a plastic nucleus (JOPF, 2010).
After 6 months, the first generation cultured pearls containing the plastic nucleus can be harvested. A gemstone nucleus, for example turquoise, can then be inserted into the existing pearl sac. The pearl sac will secrete nacre covering the gemstone nucleus to form a cultured pearl; this can then be harvested 10-12 months later. Retention- and success rates are relatively high. Gemstone beads are not used in first generation because trials have shown that these can induce higher rejection rates and inconsistent nacre deposition, whereas they are fully suitable to a 2nd generation operation (pers. comm., John Rere 2012).

Production of Galatea is expected to reach 100,000 cultured pearls in 2014 (pers. comm., John Rere 2012). Galatea cultured pearls were previously also cultured in Pinctada margaritifera oysters in Vietnam, but no longer so. The manufacturing of associated pearl products remains there though: the pearls are carved and the Galatea jewellery is manufactured in Vietnam.

Studied Pearl Samples

Both carved and non-carved samples of harvested cultured pearls were studied. The non-carved samples have the same surface properties as can be expected of common Tahitian cultured pearls from Pinctada margaritifera. However, the SG of the samples is not the same as for normal cultured pearls because the nucleus material has a different SG (see also Hänni, 2009). An X-ray image of the non-carved samples will also show different absorption of the nucleus as is usually found for cultured pearls with a $CaCO_3$ nucleus derived from Mississippi freshwater shells. The carved samples can be clearly identified because the nucleus - of different colouration- is clearly visible.

We will present results on nacre thickness and internal structure of these samples using X-ray shadow images and X-ray luminescence. UV-vis and Raman spectrometer has been used to confirm the Pinctada margaritifera origin of these pearls. SG was determined for different pearl samples. The nucleus material was studied using FTIR and Raman spectrometry to determine the natural or artificial origin of the nucleus material and whether it is treated or not (see also Hänni, 2009). Depending on how the pearl is carved, it is more or less difficult to analyse the nucleus. In non-carved samples, it is not possible to conclusively identify the nucleus material using traditional methods.

Figure 3: Plastic nuclei used in first generation operation. The different colours correspond to different sizes. Photo: Laurent E. Cartier

Figure 4: Two harvested first generation cultured pearls that contain plastic nuclei are seen on the left. On the right are the nuclei that are used for insertion during a second operation and that produce the desired Galatea cultured pearls. Photo: Laurent E. Cartier

Conclusions

Nacre thickness of studied samples falls within the required 0.8 mm minimum limit set by Tahitian authorities. We will present a wide range of materials available as nucleus, which have been used in production, ranging from amethyst to emerald, topaz and turquoise. A number of samples have been examined to determine the origin of the nucleus material and determine if it is treated or not, to ensure correct disclosure according to CIBJO regulations. These pearls represent a niche market and an interesting innovation in cultured pearl production, and as production continues to increase their presence on the international market is set to become more important.

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