UNUSUAL CULTURED PEARLS

GIT Gem Testing Laboratory (GIT-GTL)
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Introduction

Recently, the GIT-GTL has received three pieces of said-to-be natural pearls from Australia for identification (Figure 1).

Figure 1: Three pieces of pearls submitted for identification with total weight of 4.78 g (1.08 g for the front piece, 2.40 and 1.29 g for the back right and back left pieces, Photo. by Warinthip K.)

Color and other features

These pearls are baroque in shape and white in color. Microscopic examination revealed prominent terrace surface which are usual for any pearl from the bivalve mollusk. All pearls gave chalky blue luminescence under LW UV and greenish blue under SW UV. Semi-quantitative EDXRF analyses indicated very low content of manganese (Mn) that appear to be in the chemical characteristic range of pearl from seawater origin.

Real time X-radiography images

The real-time X-radiography images by Softex SFX-100 unit at the GIT-GTL revealed rather unusual internal structure in those pearls (Figure 2). Interestingly, the images of all pearls show rather contrasting internal features of both radial structure as well as void structure in the same pearl. The radial structure which appears in certain area is identical to features commonly found in natural pearls, whereas the void structure which appears in some part is a typical feature of non-beaded cultured pearl (see Figures 3-5).

Figure 2: Real time X-Radiography unit (Softex model SFX-100) at the GIT-GTL

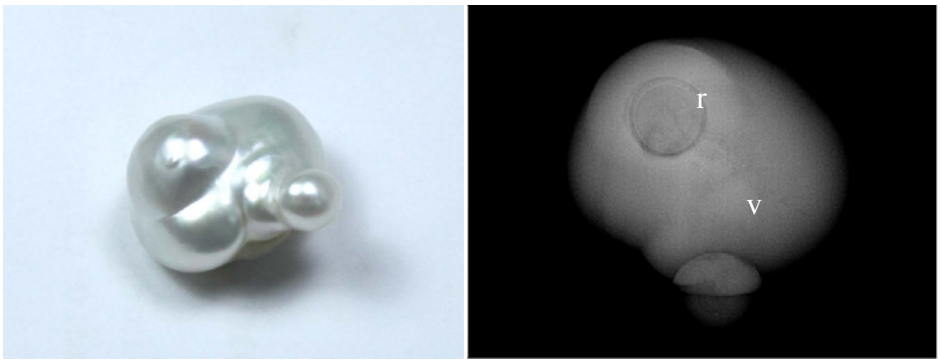

Figure 3: A close-up of pearl weight 2.40 g (left) and its negative X-ray image (right) showing radial structure (r) and void structure (v).

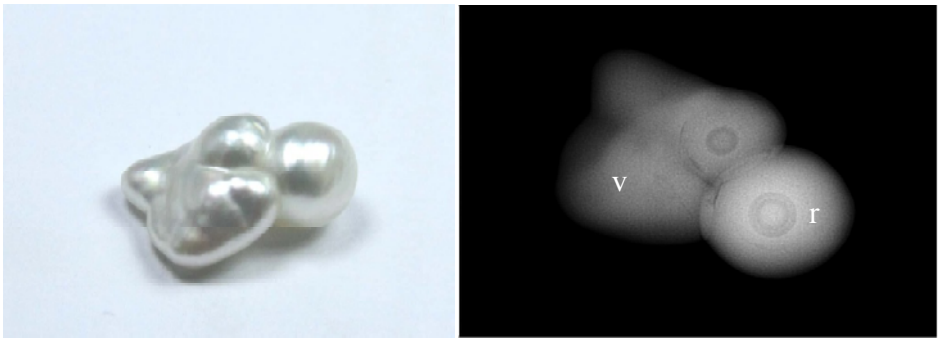

Figure 4: A close-up of pearl weight 1.29 g (left) and its negative x-ray image (right) showing radial structure (r) and void structure (v) .

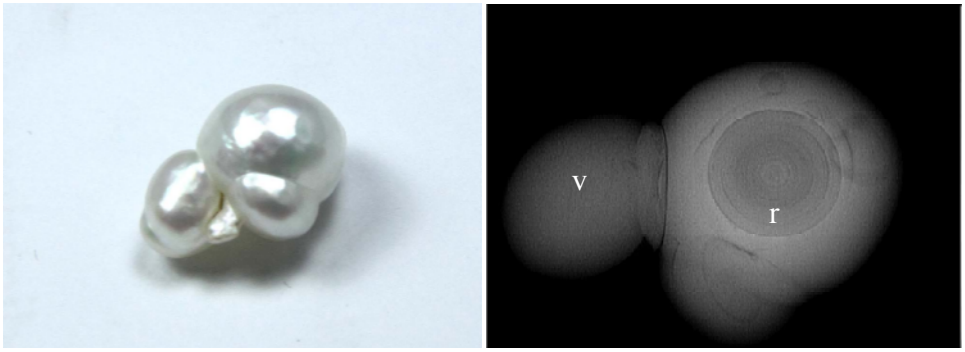

Figure 5: A close-up of pearl weight 1.08 g (left) and its negative x-ray image (right) revealing radial structure (r) and void structure (v)

Discussion and Conclusion

Based on the data presented above, there is an interesting question that needs to be answered first. Why are there such contrast internal characteristics (i.e., radial versus void structures) appeared together in the same pearl? The most reasonable explanation are that these pearls were cultivated by using natural pearl instead of traditional shell bead as a nucleus. The support evidence for this explanation can be seen clearly in the X-ray image in Figure 6. This figure shows the organic-rich layer surrounding portion of the radial structure part that is very similar to the feature commonly seen in beaded cultured pearl image. Such organic rich layer is usually interpreted to be the boundary between the bead nuclei and the overgrowth nacre. Thus, these pearls should be grouped into the " bead nucleated seawater cultured pearl" category . Up to date, there are many types of bead used as the nucleus in the cultured pearl industry worldwide, such as shell of both freshwater and seawater origin, wax , plastic, travertine, marble, low quality pearl of both cultured and natural origin etc.

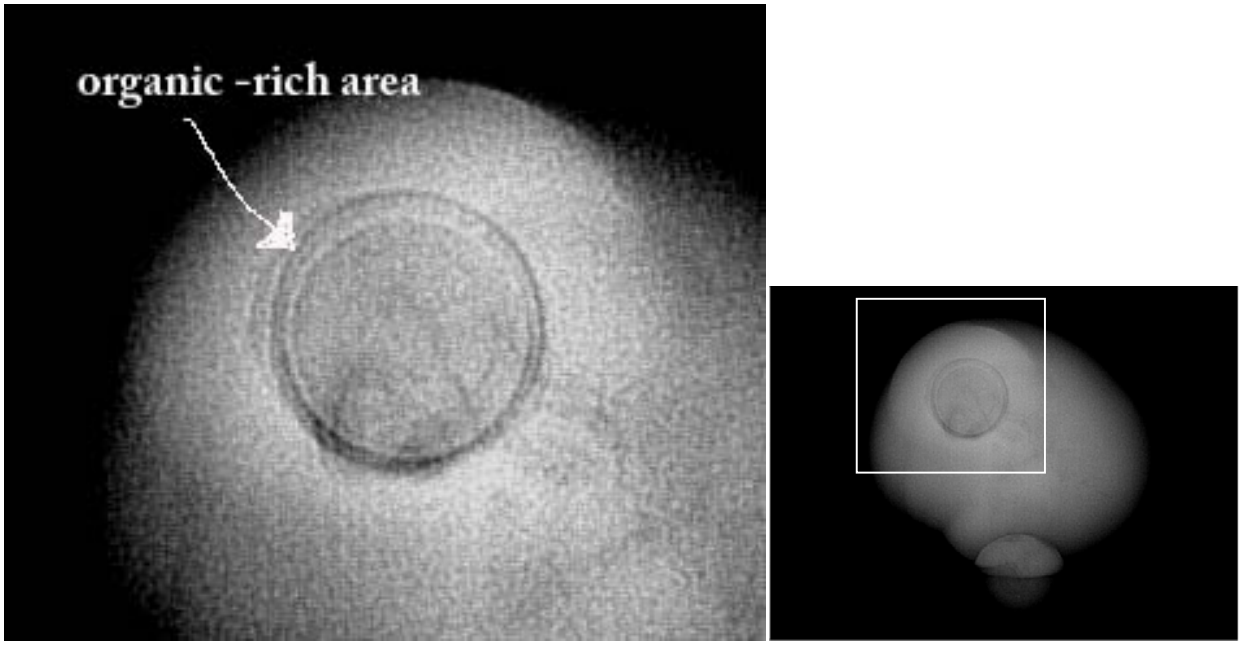

Figure 6: A close-up X-ray image of pearl in Figure 3 showing an organic-rich layer surrounding the radial structure area. (note the micro cracks in natural pearl nucleus also appear in this image)

Acknowledgement

The GIT-GTL would like to thank Mr. Tay Kunming , Far East Gemological Institute (Singapore) for his kindly corporation and allow us to use his samples for this report.

Reference

Krzemnicki, M.S. 2010 : ***Addendum to the SSEF Keshi cultured pearl trade alert: May 2010***.

http://www.ssef.ch/en/news/news_pdf/newsletter_pearl_2010May_add.pdf