Black Non-Nacreous Natural Pearls from *Pteria sp.*

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Figure 1: One 5.70 ct black pearl (left; 9.49–9.51 × 8.75 mm) and one 11.84 ct black and brown pearl (right; 13.63–13.71 × 9.55 mm) were recently examined at DANAT. Both pearls are of button shape, with the one on the left being non-nacreous and the one on the right showing areas that are non-nacreous (black part) and nacreous (brown part). Photo by H. Abdulla, © DANAT.

The Bahrain Institute for Pearls & Gemstones (DANAT), Manama, recently received a 5.70 ct black pearl (9.49–9.51 × 8.75 mm) and an 11.84 ct black and brown pearl (13.63–13.71 × 9.55 mm), both of button shape (Figure 1). Viewed with the microscope, the samples showed hexagonal-like cellular patterns linked with calcite columnar structures, similar to those observed on non-nacreous pearls of similar colour (Sturman et al., 2014). The brown part of the larger sample showed a nacreous appearance. EDXRF analysis revealed Sr/Mn>>12, characteristic of saltwater pearls.

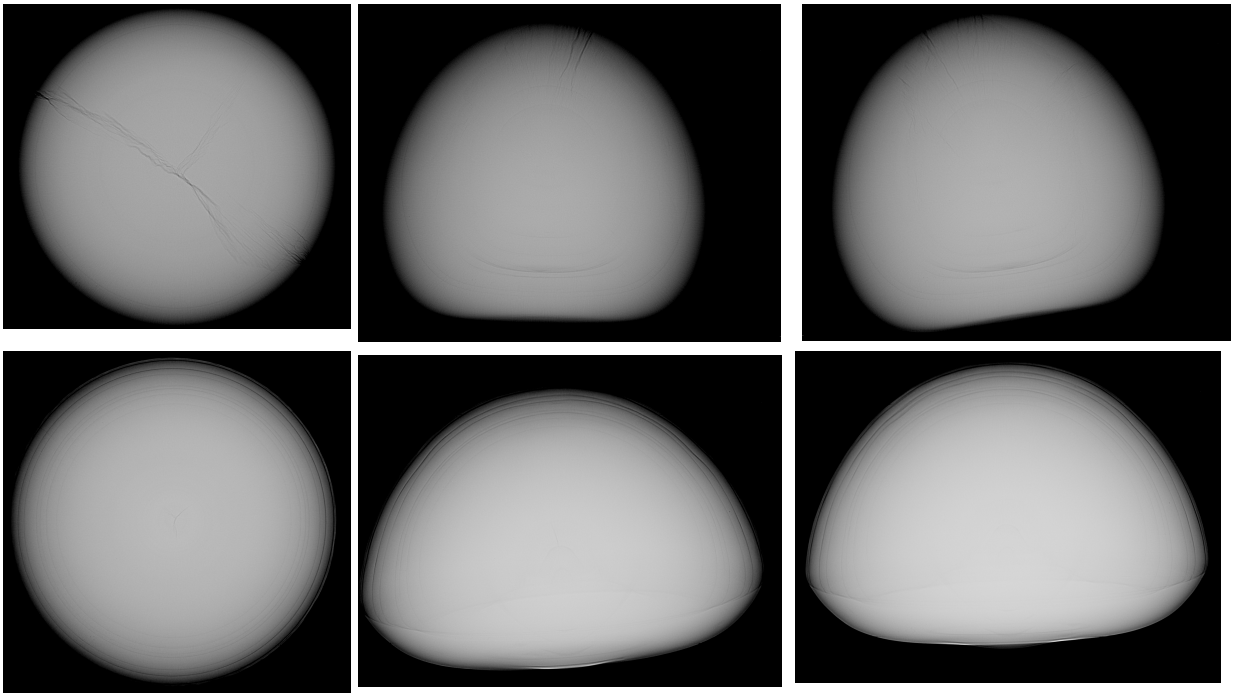

Figure 2: Digital X-microradiographs are shown in three different directions for the 5.70 ct sample (top row) and for the 11.84 ct sample (bottom row). The contrast has been adjusted to reveal features that the authors consider most insightful. Depending on the contrast used, the X-microradiographs showed subtle features characteristic of natural pearls, including radial and concentring structures with a darker centre (note that these features may only be visible in the original hardcopy of this issue, and not in the PDF version).

Digital X-microradiographs of the samples in three orientations, taken perpendicular to one another, are shown in Figure 2. Lighter tones indicate materials with higher density

such as calcium carbonate, and darker tones represent lower-density materials such as organic matter or cracks. Both samples present radial structures, as well as concentric structures pronounced toward the rim and a dark centre (mainly observed in the larger sample; see middle and right radiographs at the bottom row of Figure 2) characteristic of natural pearls. The fully non-nacreous pearl also shows some cracks, mainly visible in the radiograph taken along the longest dimension (top-left in Figure 2). Small cracks also are visible in the centre of the other sample (bottom-left in Figure 2). It is worth noting that cracks in non-nacreous calcitic pearls are observed along their columnar structures.

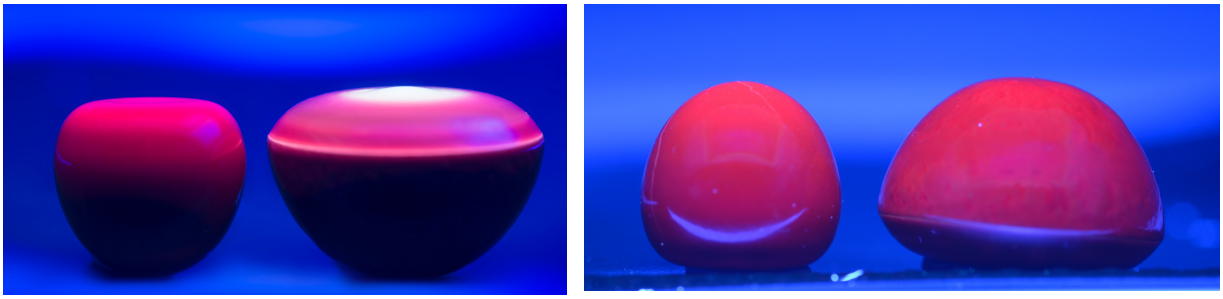

Figure 3: The samples show orangey red luminescence to long-wave UV radiation, on both their top and bottom sides, as is characteristic of pearls from Pteria sp. Photos by H. Abdulla, © DANAT.

Under long-wave UV radiation (365 nm, 6 watt), both samples exhibited orangey red fluorescence (Figure 3), similar to that observed in pearls from *Pteria* sp. (Kiefert et al., 2004). Under short-wave UV radiation (254 nm, 6 watt), both samples showed a very weak yellowish green reaction. A similar fluorescence reaction, which is linked with a kind of porphyrin, was observed for a partially non-nacreous and nacreous pearl from a *Pteria penguin* bivalve when viewed with the microscope using 300–410 nm excitation (Hainschwang et al., 2013). A porphyrin-type pigment also has been identified in natural and cultured pearls from other molluscs (e.g., *Pinctada margaritifera*); however, samples from *Pteria* sp. present orange-red fluorescence to long-wave UV. Thus, even though black-coloured non-nacreous pearls are found in different molluscs (e.g., from the *Pinnidae* family, also known as pen shells commonly show chalky yellow fluorescence to long-wave UV; Sturman et al., 2014), the fluorescence of these two samples leads us to the conclusion that they originated from *Pteria sp.*

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