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## SYNTHETICS AND SIMULANTS

### Gastropod Shell Beads Disguised in a Coral Necklace

The GGTL Laboratories – Gemtechlab in Geneva recently received a coral necklace (e.g. Figure 21) for identification that weighed 100.55 g and consisted of eight round white freshwater cultured pearls and 107 ‘salmon’-coloured beads (3.3–10.2 mm in diameter). Microscopic

examination showed that most of the coloured beads consisted of coral (i.e. *Corallium elatius*: Ridley, 1882). However, the beads present on either side of each freshwater cultured pearl had a distinctly different origin: they were cut from the shell of a gastropod (i.e. *Strombus gigas*:



Figure 21: A portion of a 'coral' necklace containing 'salmon'-coloured beads (3.3–10.2 mm in diameter) and white freshwater cultured pearls is shown here. The two beads adjacent to each cultured pearl in the necklace proved to have been cut from *Strombus gigas* shell. Photo by E. Disner.

Linnaeus, 1758). *Strombus gigas* is the host mollusc for conch pearls, and indeed pink and orange coral beads are occasionally mistaken for conch pearls (Farn, 1986, cited by Fritsch and Misiorowski, 1987).

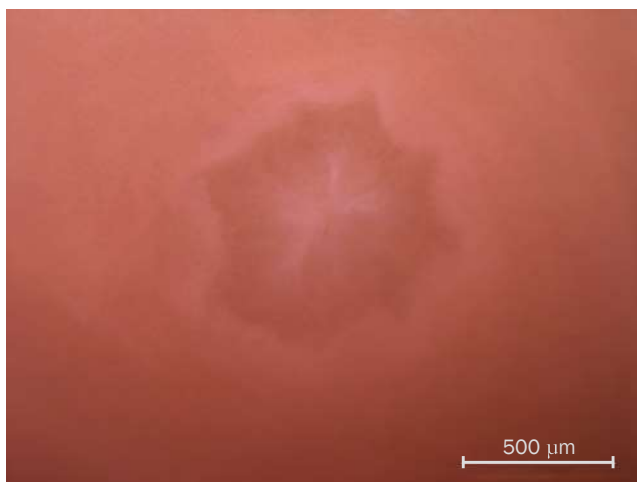
The discrimination of *Strombus gigas* shell from coral is made by structural observations and may be aided by hydrostatic SG measurements. A diagnostic flame-like structure (Figure 22, left), is exhibited by non-nacreous pearls (and shell material, to a lesser extent) of various gastropods (*Strombus gigas*, *Voluta melo*, etc.). This pattern is caused by domains of stacked aragonite tablets in alternating orientations (Hänni, 2010). In the best specimens, the 'flames' can be seen by microscopic observation as thin lamellae that are almost parallel to one another and are sometimes perpendicular to the axis of pearl, thereby giving rise to a rough chatoyancy (Fritsch and Misiorowski, 1987). By contrast, polished coral beads display banded striations that are much more regular than the flame structures seen in conch pearls and shells. These parallel lines have a spacing of 0.25–0.5 mm, and in cross-section they appear as radiating shapes with very faint concentric lines joining them, in a pattern

somewhat resembling a spider web (Figure 22, right), also called a 'tree-ring' structure (Campbell Pedersen, 2004).

Note that the characteristic flame-like and spider-web patterns are not always present or directly seen in these materials. If the flame structure is not visible in a conch pearl with the unaided eye, it is called porcelaneous (Fritsch and Misiorowski, 1987). Also, depending on the location of the drill hole, the spider-web pattern in coral may be invisible. Lack of the radial lines may indicate the presence of shell material. Striations should be easily visible in red coral, but may be harder to discern in lighter coloured coral; a complete lack of structure always raises suspicion (Campbell Pedersen, 2004).

SG measurements may also be effective for differentiating coral from shell material. The SG of 'precious' coral is between 2.6 and 2.7 (Webster, 1994) and is dependent on the porosity of the sample (Karampelas et al., 2009), whereas that of a pink conch pearl is around 2.85 (Webster, 1975). This SG value corresponds to a mixture of about 40% calcite (SG = 2.71) and 60% aragonite (SG = 2.95; Webster, 1975, cited by Fritsch and Misiorowski, 1987). It must be emphasized that

Figure 22: These photos show the flame-like structure in a *Strombus gigas* pearl (left) and the typical spider-web structure in coral (right). Photomicrographs by F. Notari.



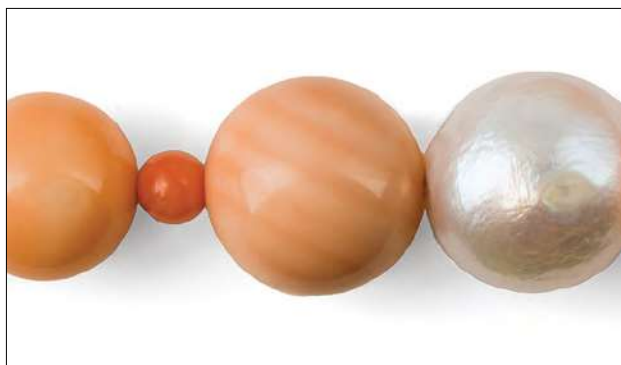


Figure 23: Within the 'coral' necklace, this bead cut from *Strombus gigas* shell (10 mm in diameter) displays a layered structure. Photo by E. Disner.

SG measurements should only be used as an indication, due to the approximate results given by the hydrostatic balance and because coral and conch pearl may have overlapping values.

In general, beads cut from shell material can be distinguished from non-nacreous pearls using only a microscope: Shell beads display a layered structure with an uneven distribution of the flame-like pattern, if any (e.g. Figure 23). This is in contrast to the uniform flame structure that is visible from all directions in those pearls that show this effect (Figure 22, left). In the authors' experience, the distribution of the flame pattern in shell beads is even more irregular than in pearls that have been reshaped.

As demonstrated by the necklace reported here, careful microscopic examination should be systematically done on every sample found within a piece of purportedly coral jewellery.

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