A Worked Shell Bead as an Imitation of a Melo Pearl

Michael S. Krzemnicki

SSEF Swiss Gemmological Institute
gemlab@ssef.ch

近期瑞士 **Swiss Gemmological Institute SSEF**收到了一顆貌似罕有的南亞區非石灰質 **Melo**螺珠，經測試後証實為一顆用海螺殼打制的螺珠，經染色而成。

Recently the Swiss Gemmological Institute SSEF received a specimen for testing, which visually resembled a melo pearl but which, in the end, proved to be an imitation made from the shell of a marine snail.

Melo pearls are non-nacreous calcareous concretions, which are produced by a marine snail (melo melo) commonly found in Southern Asia (Vietnam, Thailand, Myanmar). Melo pearls are usually orange to yellowish brown and are characterised by a so-called flame structure, similar to that of conch pearls and tridacna (giant clam) pearls. Due to their rarity and exquisite beauty, melo pearls are very expensive gems, which are highly sought after by collectors. For interested readers, we recommend the book "The Pearl and the Dragon" (ed: D.J. Content, 1999) which gives a detailed historical and gemmological description of an outstanding collection of 23 melo pearls.

The sample we investigated is button-shaped and undrilled. It measures about 23 mm in diameter and 16 mm in height and weighs 63.25 ct. Its specific gravity, determined with a hydrostatic balance, is 2.82, similar to the SG of non-nacreous pearls such as the melo, conch and tridacna.

The specimen is mostly orange with some linear colour concentrations. It also shows a colourless transparent patch (see Fig. 1), not so far described as having been observed on melo pearls. While a distinct flame structure is present, there is no spotty structure, as often seen on melo pearls (see Fig. 2).

Under the microscope, the intense orange colour concentrations along cracks and "flames"closely resemble features familiar from dyed material (see Fig. 3). When excited by a long wave ultraviolet lamp, the orange part showed an orange red, swirly fluorescence. In contrast to this, untreated melo pearls normally show rather a yellow dotted LWUV fluorescence reaction. Based on these observations it became obvious that the sample had been artificially coloured using an orange dye. The colourless patch on the sample remained unaffected by the dyeing, as this part of the bead shows no pores in which the dye could enter. Apart from this detection of treatment, the microscope also revealed the true nature of the sample. A curved internal layering, cross-cutting the flame structure, is seen when the sample is illuminated by a fibre optic light (Fig. 3). Such layering has never been reported in a melo pearl. It is interpreted as the growth layering of the shell of a marine snail. In reflected light, the surface of the bead shows fine polish tracks running in all

directions, indicating that the bead was polished into its present shape.

Based on these observations, our specimen was identified as a manufactured bead expressly designed to imitate a melo pearl similar to the specimens described recently by C.Y. Wentzell (2006). The conclusion was that the sample had been made from the shell of a marine snail and artificially coloured by an orange dye.

The shell of the melo melo is commonly very delicate and thin (Fig. 4). So the production of a bead of this size from a melo shell would be quite difficult, if not impossible. Most probably the bead was made from a marine snail such as the tridacna (giant clam) (Fig. 5), which has a shell thick enough to allow a bead of this size to be cut from it. Tridacna shells worked into round beads have also been used recently for coated pearl imitations (Hänni, 2004). It should be remembered that the tridacna is protected internationally under the CITES agreement.

The orange dye, which was used to imitate a melo pearl was analysed using a Renishaw Raman microprobe (using a 514 nm argon laser). Figure 6 presents the baseline corrected Raman spectra of the sample bead compared with the ones of red eosine dye (Bruker Inc.) and a melo pearl. Apart from the vibrational peaks due to aragonite, the sample bead shows no peaks at 1134cm^{-1} and 1527cm^{-1} characteristic of the natural colour pigment in melo pearls (and conch pearls). However, it reveals three broad peaks at 1363cm^{-1}, 1499cm^{-1}, 1519cm^{-1} which match quite closely with the broad Raman peaks of red eosine. This dye becomes orange when dissolved and it may have been this dye that was used for the artificial colouring of the bead.

An experienced gemmologist should be able to detect the true nature of such a manufactured and dyed bead easily, mainly based on careful microscopic observations. However, in the case of a manufactured "pearl" that has not been dyed, the identification may prove much more difficult (e.g. for "pearls" made from the conch shell). The main criterion for identification would then be the presence of layering as described above. No such feature has been reported in any natural non-nacreous pearl concretions to date.

Fig. 1 The investigated specimen shows an orange colour similar to that of a melo pearl. A colourless transparent patch such as that seen on the top of the bead has never been reported on a melo pearl. The diameter of the bead is 23 mm. © M.S. Krzemnicki, SSEF 2006

Fig. 2 Melo pearl showing spotty surface structure in combination with flame-structure. © H.A. Hänni, SSEF 2006

Fig. 3 Orange colour concentrations along cracks and "flames" on the specimen indicate dyeing. Further, a slightly curved horizontal layering, cross cutting the generally vertical flame structure, becomes visible under strong fibre optic light. This layering is interpreted as growth markings of the shell from which the bead has been made. © M.S. Krzemnicki, SSEF 2006

Fig. 4 The melo gastropod forms rather a thin shell. Manufacturing a bead from such a shell would be quite difficult. © H.A. Hänni, SSEF 2006

Fig. 5 Shell of a Tridacna. © H.A. Hänni, SSEF 2006

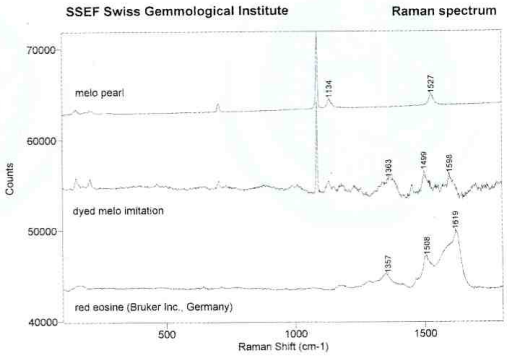

Fig. 6 Baseline corrected Raman spectra of the investigated dyed bead, red eosine dye and a melo pearl. Note the difference between the spectra of a melo pearl and the sample bead. © M.S. Krzemnicki

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