combinations have been seen: Freshwater mussel + mantle grown + beadless = a Japanese Biwa cultured pearl or the classic Chinese freshwater cultured pearl. Saltwater oyster + gonad grown + bead = a product such as Akoya or South Sea cultured pearls. Less well known are South Sea "keshi" cultured pearls (saltwater oyster + gonad grown + beadless; see H. A. Hänni, "A short review of the use of 'keshi' as a term to describe pearls," *Journal of Gemmology*, Vol. 30, 2006, pp. 51–58). A more recent development consists of freshwater mussels with coin-shaped beads (freshwater mussel + mantle grown + bead; see D. Fiske and J. Shepherd, "Continuity and change in Chinese freshwater pearl culture," Summer 2007 *Gems & Gemology*, pp. 138–145).

The cultured pearls we examined appeared to be a new variation: saltwater oyster + mantle grown + beadless. These samples (again, see figure 27) showed all the characteristics of a product that was the result of tissue grafted into the mantle of *P. maxima*. It is possible that the host oysters were used for culturing two types of pearl at the same time: beaded, gonad-grown cultured pearls and these beadless mantle-grown products. That the baroque-shaped cultured pearls contained multiple centers joined into a single body reminded us of similar-appearing Chinese freshwater cultured pearls reported in the GNI entry that follows in this issue. As with the "twin" cultured pearl described in that entry, the samples documented here may have resulted from the mantle pieces being placed too close to one another, or the cultured pearls were left in their host mollusks for too long a period of time.

The trade has typically referred to beadless cultured pearls from *P. maxima* and *P. margaritifera* as "keshi." We expect that these new products will appear under this name on the market. While South Sea and Tahitian keshis so far have consisted of gonad-grown cultured pearls formed after bead rejection, the pearls described here are obviously mantle grown, as indicated by their flattened base which suggests formation close to the shell.

Henry A. Hänni

Twinned cultured pearl. The SSEF laboratory is seeing an increasing number of natural pearls for examination. The majority show the typical features of saltwater natural pearls: diagnostic X-ray structures and the absence of Mn as a trace element. The identification of freshwater natural pearls is more challenging because they typically lack beads, so their shape and growth structures are usually the only characteristics that offer clues for identification. LA-ICP-MS is still not a routine technique, and research and chemical sampling are in progress.

In February 2008, we received an unusual 5.61 ct "twinned" pearl (i.e., two intergrown pearls) for identification. Unlike most such pearls, though, the two parts of the intergrowth were different colors (figure 29). There was also a broken surface on one side that suggested that a third pearl was once attached to the other two. X-radiography in two perpendicular directions (figure 30) showed clear evidence that this was a beadless cultured pearl, with two typically shaped central cavities. Analysis of the Mn

Figure 29. This bicolored freshwater cultured pearl (15 × 8 × 6 mm) is actually an intergrowth of two pearls that were undoubtedly stimulated by tissue pieces taken from different areas of the mantle of the donor mollusk. They are shown on the shell of Hyriopsis cumingii, *the most common source of mantle tissue for freshwater pearls cultured in China. The surface of the shell illustrates the variety of nacre colors that can be produced by the mantle tissue. Photo by H. A. Hänni, © SSEF.*

Figure 30. X-radiographs of the twinned pearl show features typical of beadless cultured pearls, especially the characteristic complex-shaped central cavity. Image by H. A. Hänni, © SSEF.

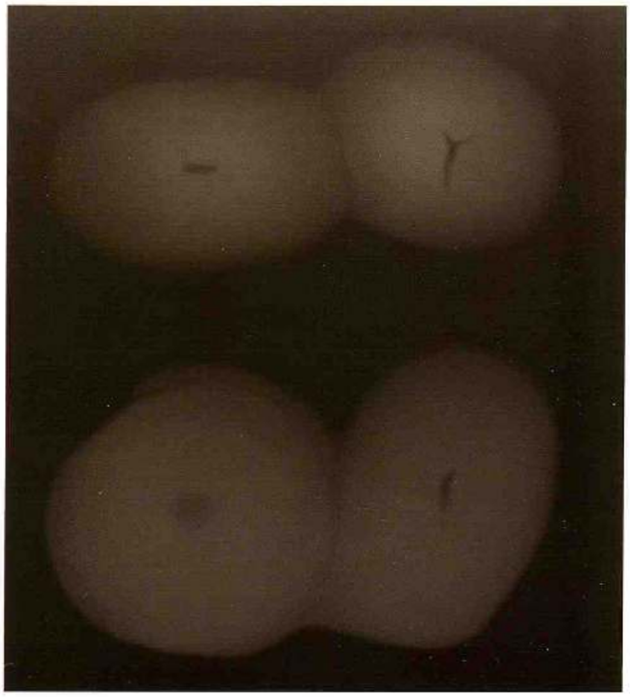

Figure 31. These pallasitic peridot specimens came from an undisclosed location in the United States. The slab measures 45 × 30 mm, and the other samples weigh 1.06, 0.50, 0.67, and 3.47 ct (from left to right; photo by Robert Weldon). The 0.36 ct cabochon in the inset shows good chatoyancy (photo by R. Stinson).

content (by luminescence to X-rays and EDXRF spectroscopy) gave results consistent with freshwater origin. We concluded that this was a beadless cultured pearl such as those produced in China.

Chinese pearl farmers typically culture freshwater pearls by grafting numerous pieces of mantle tissue in multiple closely spaced rows in the mantle of the host mollusk. The color of the resulting cultured pearl is directly related to the original location of the tissue in the donor mollusk. The bicolored nature of this sample probably resulted when tissue pieces taken from different locations of the donor mollusk were placed adjacent to one another. The "twin" resulted either because they were too close, or the cultured pearls were left in the mollusk for too long a period of time.

Henry A. Hänni

Interplanetary cat's-eye peridot. Pallasite, a type of stony-iron meteorite first described in the 18th century, is known for the yellowish green olivine that can be extracted from it. Yet pallasitic peridot, the gem variety of olivine, is extremely rare. (For historical background and a gemological examination of nine faceted samples, see J. Sinkankas et al., "Peridot as an interplanetary gemstone," Spring 1992 *Gems & Gemology*, pp. 43–51.)

At the 2008 Tucson gem shows, meteorite hunter Steve Arnold of Kingston, Arkansas, showed the *G&G* editors five pallasitic specimens: one faceted peridot, one oval peridot cabochon showing chatoyancy, a rough piece of peridot, an irregularly shaped cabochon, and a slab of pallasite containing gem-quality peridot (figure 31). Using a metal detector, Mr. Arnold discovered several kilograms of the material in 2006 near a known meteorite location in the United States. He took the rough to Rick Stinson (Stinson Gemcutting Inc., Wichita, Kansas), who observed that some of the peridot was chatoyant (figure 31, inset), a phenomenon that is very rare in terrestrial peridot. According to Mr. Arnold, the American Museum of Natural History in New York later identified the cause of chatoyancy as parallel, tube-like hollow inclusions.

Peridot is a relatively soft gem material (6.5 on the Mohs scale), and the pallasitic material seems more fragile than peridot mined on Earth, perhaps due to the stress of its passage through the atmosphere and subsequent impact. In fact, a small piece of the peridot cabochon chipped off as the stone was being prepared for photography in Tucson.

Because extracting the gem-quality peridot is so difficult and destructive, Mr. Arnold estimates that less than 1% of the total weight of the recovered meteorite material will be converted into finished gemstones. So far 40 stones have been faceted, ranging from 0.20 to 1.04 ct, and only a few cabochons showing chatoyancy have been cut.

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New rubies from central Tanzania. At last April's BaselWorld jewelry fair in Switzerland, the SSEF Swiss Gemmological Institute received a number of attractive rubies (e.g., figure 32) with uncommon features. The stones, which were submitted by different dealers, all had a rather saturated red hue, and their internal features indicated they were clearly unheated. The largest weighed 10.75 ct (figure 33). EDXRF qualitative chemical analysis of all the samples established that Cr and Fe were the main trace elements, while Ga was low and Ti and V were below detection limits. The client was sure of the stone's Tanzanian origin and expected to see the country identified on the test report. Because SSEF had not seen faceted rubies with such characteristics before, it was not possible to specify the origin at that time.

However, we recalled a small parcel of rough corundum

Figure 32. These unheated rubies (2.2–3.6 ct) are apparently from a new locality in Tanzania called Winza, near the town of Mpwapwa. Photo by H. A. Hänni, © SSEF.