Large Chinese Freshwater Cultured Pearls

by Antoinette Matlins

"Errors, like straws, upon the surface flow; He who would search for pearls must dive below."

— John Dryden (1631-1700)

Large Chinese freshwater cultured pearls—those that "rival the South Sea variety"—have been getting extensive media attention recently. Unfortunately, most of it is inaccurate, misleading and deceptive. As an author and educator in the field, I realize how important it is to provide the public with reliable information, but how can this occur if the trade is being deluded into thinking these pearls are something they are not? At a time when disclosure and consumer protection issues are paramount, it is the jeweler whose reputation is on the line. So let me set the record straight.

**MYTH #1:** The trade magazines have been describing these large, round Chinese freshwater cultured pearls as “non-nucleated” or “tissue-nucleated.” Both are wrong. They ARE NUCLEATED, with ALL-NACRE nuclei fashioned from surplus tissue-nucleated, all-nacre freshwater cultured pearls.

**MYTH #2:** The trade press has reported that these pearls remain in the mussel (implying “the same” single mussel) for 6-9 years. This is misleading. At this time, I estimate that pearls currently in the market are the result of numerous reinsertions into different mussels, each time remaining in the mussel for much shorter periods than 6-9 years, probably about 18 months to two years, at most.

**MYTH #3:** That the cost—several thousand dollars and more—is justified not only by their beauty, but by their rarity and longevity in the mussel. They are rarer now than they will be in the not-too-distant future, and their rarity will diminish with each year, as larger and larger numbers are produced, in shorter and shorter cultivation periods.

It is all very clever, and the product is lovely and more affordable than alternatives, but we are being misled as to (1) what the product is, (2) the time involved to produce them, (3) their “rarity,” and thus, (4) value.

For those who know anything about nacre production and deposition, it was clear from the start that what was being reported in the trade press was not possible. First, if there is no “round” nucleus, the rarity of such pearls—in such round shapes—would be much,

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Welcome 2000

The new millennium is an election year for the AGA. If you’re interested in taking over the reigns, let us know here at the headquarters so we can help you find your place. There will be spots open for officers and Board members. Elections are in November so put your name in early. We are looking forward to seeing which members are interested in taking our organization into the future (sorry, I’m still caught up in the millennium hype).

But it is an important time for the AGA. We have revitalized some of our past traditions (Dinner Dances), created some new ones (the Bonanno Gemologist of the Year Award) and strengthened current ones. This year’s Symposium boasts a list bursting with reputed gemologists.

In fact, two of the articles in this Cornerstone are teasers for upcoming lectures at the Symposium.

Ted Themelis will speak about the latest heat treatments of ruby and sapphire from Mogok—so if his article leaves you with some questions or you want to see some slides (for those visual folks among us) then be sure to catch his lecture in February.

Another surprise lecturer is Greg Sherman (EGL), assisted by Branko Deljanin (also EGL). They will present information about the new NovaDiamond color enhancement process. This process is similar to the GE/POL process which came to light last year (check your Cornerstone back issues). Greg promises that there will be lots of slides and information that will help us begin to understand the process, as well as some identification tips.

Unfortunately, Dr. Adolf Peretti had to withdraw from his speaking engagement for personal reasons. However, he has been replaced by a perennial AGA favorite, Alan Hodgkinson and his associate Bill Hanneman. We all know from experience that this will be an interactive event guaranteed to get your hands out of your pockets and your mind in gear.

And, of course, we will top it all off with the annual dinner dance and the official presentation of the first Antonio Bonanno Gemologist of the Year Award. I hope you got your nominations in, but if not, don’t worry. We plan to make this a great new tradition!

See you in Tucson!
Thom Underwood, President
San Diego, California

2cson 2000 is coming!

The AGA will host its Symposium and Dinner Dance on Thursday, February 3, 2000 at the Marriott—University Park in Tucson. Be on the look-out for promotional materials with information about our speakers and other details—or you can call the AGA at (619) 286-1603 or e-mail us at thomu@home.com for more information now.

The Annual Membership Meeting will take place immediately after the Symposium (approximately 5:00) in Tucson at the Marriott—University Park. The meeting is scheduled to last no longer than an hour.

The AGA Board Meeting will also be held in Tucson, on Friday, February 4, 2000 at 9:00 a.m. at the Tucson Convention Center (room TBA). It is scheduled for one hour.
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much greater than is currently the case. Second, the stated timetable (6-9 years) is much too short for the sizes being produced; without a nucleus having been inserted, it would take 15-25 years for a mussel to produce pearls in the large sizes we are now seeing from a small tissue insertion only.

So, by logical deduction, there must be a nucleus. The only question: what type of nucleus? Since it doesn't show up in an x-ray, it must be an “all-nacre” nucleus. And as I have been saying in my pearl lectures for several years, given the abundance and low cost of tissue-nucleated “rice-krispie” type freshwater pearls, it takes very little imagination to figure out what was being used as nuclei in the smaller near-round “potato” pearls! The logical extension of the process leads to the large, round pearls we are seeing today. And looking inside the pearl confirms it!

The manner in which these pearls are cultivated becomes clear immediately if you take an 11-millimeter round Chinese freshwater cultured pearl, for example, and cut it in half. The evidence is there if you know what to look for. This evidence proves that these large pearls are produced by a process that involves the harvesting of freshwater pearls; polishing them into round nuclei; and reinserting them, along with another piece of mantle tissue, back into another mussel. In other words, they are nucleated with all-nacre, freshwater pearls! It is clever and effective, and produces an “all-nacre” cultured pearl! And it is much more economical than using Tennessee shell because there is no shortage of inferior quality, small, near-round, all-nacre, potato pearls (which, as I mentioned earlier, have themselves been nucleated with small nuclei fashioned from even cheaper all-nacre rice krispie pearls).

The end product is all-nacre, and virtually impossible to detect by routine x-ray examination. The only way to know for sure is to cut one open—thus destroying the pearl. Clearly, most people won't want to destroy the pearl, but some of us in the gemological arena have! And what we see is definitive. When you cut one of these pearls apart, you will notice several different COLORATIONS of nacre rings, each different “color zone” indicating where there has been a reinsertion. It reveals how many reinsertions have taken place, and some show evidence of 3-4 reinsertions.

It all starts with tissue nucleation—yielding the elongated, rice-krispie type, all nacre pearl. The next phase is to use the rejected rice-krispie pearls to fashion “all-nacre” potato pearls. Next, we have increasingly large potato pearls and with each harvest, an ever increasing supply of rejects that can be polished into “all nacre” nuclei to be reinserted with another small piece of mantle tissue. Again and again. And for each harvest of larger and larger pearls, there are more and more rejects that get stockpiled for use as nuclei. By repeated reinsertions, producers can essentially control the size and shape they want, by the size of the nucleus used and the number of nuclei inserted into any given mussel. The maximum size will be limited only by the size of the freshwater mussel itself. Given the size of the mussel, I doubt we will see many above 12 millimeters (unless they are able to successfully breed a larger variety of freshwater mussel).

One can easily see, as time passes and the pearl producers have had the opportunity to stockpile increasing quantities of nuclei in a range of sizes, it will be possible to produce the “large” all-nacre pearls with only 1-2 insertions, dramatically cutting the time required to produce them. In fact, the potential to produce huge quantities of large pearls grows dramatically—in a direct relationship to the growth of the Chinese stockpile of “all-nacre” nuclei in the larger sizes. We are already seeing more and more “large” Chinese freshwater cultured pearls in the market. And as cheap as they may currently appear to be compared to South Sea cultured pearls, if past performance is any indicator, prices will continue to drop significantly as supply increases.

I have no problem with what the pearl producers are creating. In fact, I think they are beautiful, and offer another wonderful cultured
recent years, the heat treating of rubies and sapphires from Mogok, Burma (now Myanmar) has increased considerably. This is due to improved methods, techniques and increased knowledge gained from past experience in heating rubies and sapphires. The author visited the Mogok mining district six times during 1997, 1998 and 1999 and obtained ruby and sapphire specimens from verified mining localities having distinct geological features. These specimens were carefully examined at the author's laboratory in Bangkok and fully documented.

Certain specimens with characteristic inclusions were selected and heat-treated under fully controlled atmospheric conditions—ranging from fully oxidizing to $\text{PO}_2=10^{-12}$ in a special 1800°C vertical muffle furnace built for the purpose. Numerous heating experiments were performed on silky rubies and the results were recorded. On certain silky rubies, their silk was partially dissolved at a temperature as low as 1400°C when heated in air, while the silk of some other rubies emanating from different mines was barely disassociated from its basic structure. These experiments were repeated in reducing atmospheres, at the same soaking temperature and cooling rate. It was observed that as the oxygen content in the heating environment was gradually reduced, the resulting blue tinge coloration characterizing these rubies proportionally increased.

Some heated Mogok cabochon-grade rubies were compared with their Vietnamese (Quy-Chau) counterparts, which were heated under the same conditions. The author concluded that there is great difficulty in distinguishing the origin of these rubies since the key characteristic inclusions were altered during the heating processes. Also, the strong fluorescence (under short wavelength), typical of Mogok rubies was very faint or absent on some Mogok rubies coming from different mines.

Some Mogok rubies with considerable amounts of cracks, fissures and cavities were experimentally heated with additives (fluxes). These fluxes consisted mainly of borax, mixed with other undisclosed chemicals. On certain rubies, considerable healing noted and the fissures were not visible at the surface of the stone. In other stones, the healing was incomplete showing large cavities, while the opening of the fissure was clearly seen at the surface. In both cases, the "glassy" reflectance was detected when the stone was tilted at a certain angle.

There have been cases where some fractured Mogok rubies—especially in small sizes (2-3mm)—intended for jewelry manufacturing, were heated using additives and then mixed with non-heated rubies and sold in lots without disclosing the deception..."
Heating

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additives (fluxes) and then mixed with non-heated rubies and sold in lots without disclosing the deception to the buyer. These stones have been seen at the author's laboratory in Bangkok. They displayed super-fine red color with a high degree of luster. The flux is quite difficult to detect due to its minute size and to the nearly complete healing of the surfacereaching fractures.

A few blue sapphires from alluvial deposits at selected mines in Mogok were investigated. These specimens were characterized by intense amounts of silk and were heated under the same heating parameters in order to remove/reduce their silky appearance. After heating, the overall blue coloration in nearly all sapphires was severely affected. Some dark blue silky sapphires turned lighter blue, while silky medium blue sapphires from Thurin-taung (22° 54’ 12” N, 96° 22’ 20” E) turned a darker blue. In both cases, their silk was nearly dissolved when heated in the air at about 1650° C. However, these sapphires developed hazy spots and clouds in their interiors that could not be removed on subsequent heating processes.

On related, but separate experiments, the cool-down rate was set to 10° C per minute, which resulted into partial recrystallization of the TiO₂. The silk on these sapphires appeared as a straight “dotted” line. These sapphires were compared with their heated Sri-Lankan counterparts. With the exception of guest solid crystals having a higher melting point than corundum (such as zircons), nearly all other characteristic features were severely altered due to the heat-treatment and the determination of country-of-origin was not possible.

The author concluded that it is quite difficult to distinguish certain types of heated or natural Mogok sapphires from their Sri-Lankan counterparts. Contrary to the general gemological belief that long silk is rarely encountered in Mogok blue sapphires, the author has observed that long silk is frequently present in Mogok blue sapphire.

Preliminary investigations on certain sapphires from the Win-Hta-yan mine (22° 55’ 30” N, 96° 26’ 05” E), just west of Pyaung-pyin in Mogok, revealed the presence of a certain mineral of the zirconolite family, not matching any mineral registered on the SEM data bank. These mines have been visited several times by the author this year and additional specimens were collected for research and study.

Additional facts on the Mogok history, mines/mining, geology, gemology, inclusion characteristics and other aspects are included in the forthcoming book “Mogok-Valley of Rubies and Sapphires” by the same author, currently under publication (available by March 2000?).

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Chinese Pearls

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the pearls have no means to control supply; and as supply increases dramatically, prices will fall dramatically, and the trade will once again undermine consumer confidence in pearls and in what they buy from jewelers in general. This is my major concern.

We must all do whatever we can to correct the impression that large Chinese round freshwater cultured pearls are “rare,” non-nucleated pearls that take years to cultivate. They are nucleated pearls, cultivated in about the same period of time as any other freshwater cultured pearl and they are rare only at the moment. We must also recognize that current prices imply a rarity that does not exist, so we must ask ourselves if we are serving the best interests of our customers to buy them now, at these prices. As retailers and consumers become more knowledgeable about what they are buying, I believe there will be a natural adjustment of the price, and it will fall into line with what we are truly getting.

When these lovely, large, round, all-nacre freshwater cultured pearls are available at affordable prices, I’ll be at the front of the line to buy. But unless we all stop paying current prices, we will soon be paying even greater prices: the price of our reputations and, once again, the loss of consumer confidence.
Enhancement and Identification of Colored Diamonds by the NovaDiamond HTHP Process

by Branko Deljanin, GG, FGA
Director of Identification and Research
and
Gregory E. Sherman, GG, FGA,
Director of Education

As if gemologists really needed another identification challenge, a new color enhancement for diamonds has just been revealed. The new process was announced to the trade in December at a press conference in the New York headquarters of the International Colored Stone Association by EGL researchers Gregory E. Sherman, GG, FGA and Branko Deljanin, GG, FGA. The EGL gemologists witnessed and participated in the process of transforming brownish-colored diamonds into vivid fancy green and vivid fancy yellow diamonds without using radiation—instead, they used a process called High-Temperature High-Pressure (HTHP). This is similar to the one used by General Electric to improve the color grade of certain diamonds.

NovaDiamond Corporation of Provo, Utah, the company responsible for the new enhancement, made the discovery by accident when a diamond dealer asked them to do some color change experiments. During one of the experiments, the samples became too hot and burned. After polishing the burned surface, technicians found a green diamond underneath. It took NovaDiamond several months to repeat the process, which requires three factors: exact timing and precise combinations of heat and pressure.

NovaDiamond's client later submitted several green diamonds to EGL for an origin-of-color report. “The diamonds were quite unusual for a variety of reasons and showed none of the lines associated with radiation treatment,” says Branko Deljanin, EGL’s director of gem identification and research. Deljanin contacted color-center diamond expert Dr. Alan Collins, who suggested the diamonds showed HTHP characteristics. The findings prompted Sherman and Deljanin to contact NovaDiamond, which confirmed their suspicions and invited the gemologists to see the process for themselves. Sherman and Deljanin were granted unprecedented access to the NovaDiamond facility to document the process and report their findings. “In less than 30 minutes, we witnessed the transformation of 10 unattractive brown diamonds into very appealing green-yellow ones,” Sherman says. EGL is currently providing certification of the NovaDiamond stones complete with laser inscribed information. The EGL gemologists have scheduled a series of lectures about the process beginning at the GIA alumni meeting in New York in January 2000 and the Accredited Gemologists Association meeting in Tucson in February.