

January / February / March 2009

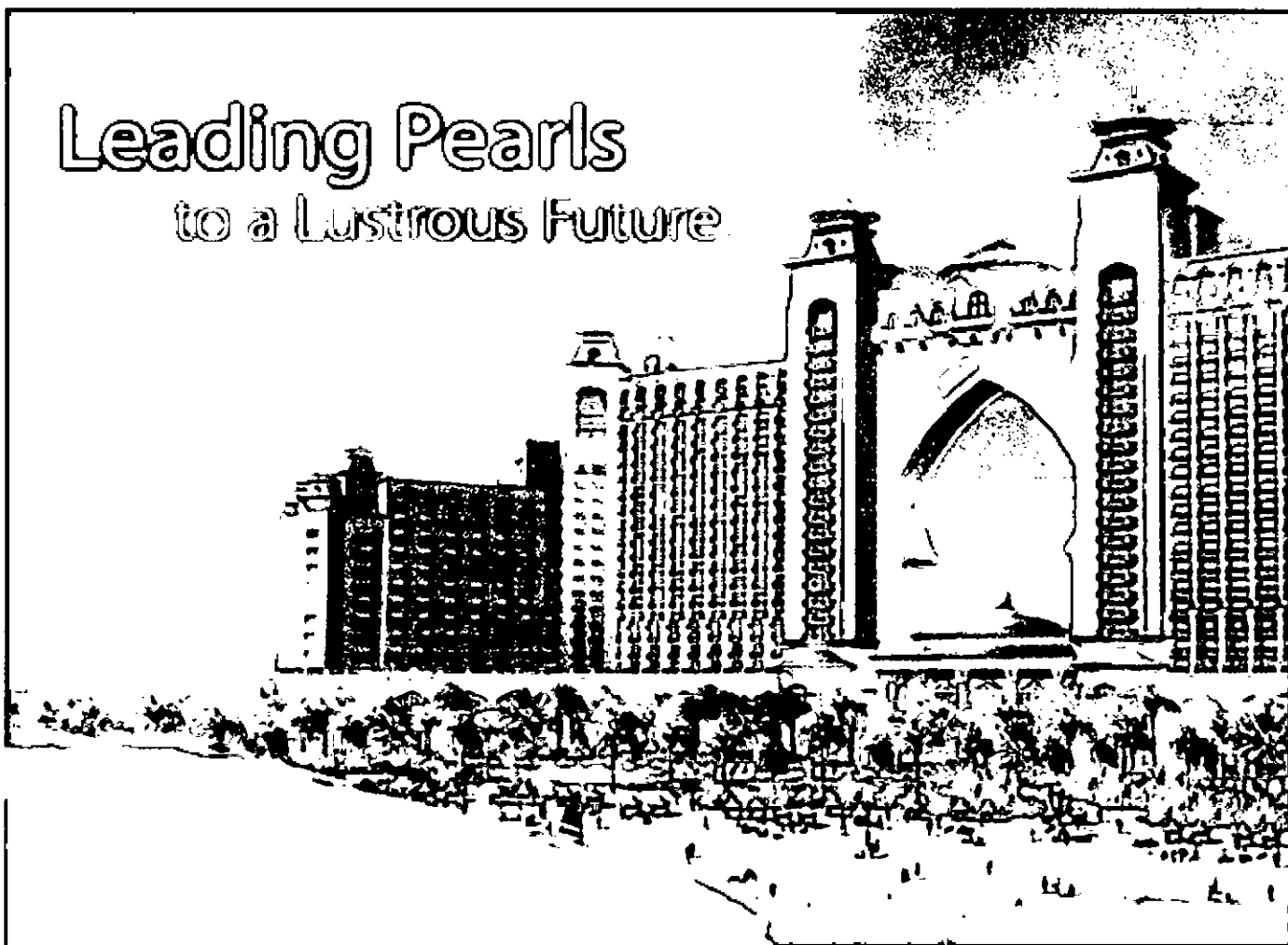
Volume 18, Number 1

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- A comprehensive pearl primer from Raw Pearls of Australia.
- Akoya pearl farming at Fraser Island, Australia.
- Pearl Autore's classification and authentication system.
- Terminology used in describing and grading pearls.
- The ever-changing market for freshwater pearls.
- A rare pearl find in Jerusalem.
- Answers to last issue's pearl crossword puzzle.



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EDITORIAL

This is a somewhat unusual issue, as it utilizes many materials from Australian sources, an important and geographical portion of the pearl world that we have historically covered only rather superficially over the years.

The two main people responsible for this influx of Aussie data are Dyann Smith of Adelaide, Australia, and Hylda Bracewell of Sydney, Australia... to whom we are greatly indebted.

Dyann's contribution—the Raw Pearls pearl appreciation booklet beginning on page 3—came about due to her love affair for pearls kindled by an old, dear, departed friend, Dr. Grahame Brown.

In her own words: *It started out as an assignment for Grahame and then I had it printed. The cross sections Grahame cut open for me and the jewellery are items made for the family. I use the booklet for free sessions with customers. The GAA have now asked me to take Grahame's*

Advanced Pearl course across Australia.

Grahame has and always will inspire me to question about the product. I have his words ringing in my ear... stand up for the truth and always question what stock you have to sell. I don't ever want to be just a broker who buys and only sells. I will only stock the better end of product and will inform customers even if they end up going elsewhere. It is funny when I buy stock I have my fibre optic light source and look at the stock under a loupe and then often request X-rays.... how it puts some wholesalers off!



Dr. Grahame Brown

May 25, 1936 - January 15, 2008

Her affection for her mentor (along with mine) and her love of pearls has produced a trove of useful data about pearls which we felt deserved to be reproduced (with her permission) in its entirety, a fitting overview and reference which can and ought to be passed on to others who may not be as knowledgeable about the subject as most of our readership, such as other workers in a dealership organization.

Hylda, too, is a friend that we have made through knowing Grahame. She is an integral part of his ongoing opus, *The Australian Gemmologist*, and a journal for appraisers, *The Valuer* (along with Kym Hughes, President) who okayed our use of the materials beginning on page 21 which appeared in the Grahame Brown Memorial Issue of the April/June 2008 issue put out by the National Council of Jewellery Valuers.

We also naturally thank Debra Haigh, Matthew Gray, Marianne Casimatis, Ric Carter and Jeremy Shepherd for the use of their expertise and reporting in this issue.



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The NCJV
Valuer



We hope you enjoy this issue of *Pearl World*.

A PEARL PRIMER FROM DOWN UNDER

You may recall our January/February/March 2008 issue when we introduced a relative newcomer to the pearl business, describing her start in her own words as:

I have had a "mid life crisis," nothing too bad just a change of career. Having taught for decades and more recently Maths at a university for the previous six years I sought and found a new passion, Pearls. I have invested some of my savings and opened a specialist pearl shop in Adelaide, Australia. Professor Grahame Brown from the Queensland University advised me on entering this place in the market and with his support and other GAA members I have ventured into unknown waters.

I have completed an Advanced Pearl course through the GAA and have just enrolled in a Grad Dip on Pearls through the London GIA. My main interest is pearls and, as an extension to that, valuing them. There is no pearl wholesaler in Adelaide and thus incorrect information as to their worth is rampant within an industry that is fairly insular on the whole. Any information that may be relevant is only guided by what I can chew through.

I have a theme on antiques in my shop, having produced a DVD showcasing my pearls with beautiful pictures and a divine piece of music: [www: rawpearls.com.au](http://www.rawpearls.com.au). We are upgrading the

web site and the DVD can be seen there. We have been open about a year now, so I have a great deal to learn.

Well, look what good sense, determination and the pursuit of quality with no shortcuts can achieve in a relatively short time by reading the following pages of her pearl appreciation booklet for customers.

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"Raw Pearls" to page 4



"Raw Pearls" from page 3*the first known gem*

Pearls have held a unique allure throughout history, transcending different cultures and religions for centuries. The natural pearl was the first known gem. The Ancient Romans so loved the natural pearl that they gave it the Latin name for 'beloved one' margarita.



The year was 41 BC... Mark Antony, one of the rulers of Rome, summoned Egyptian queen Cleopatra VII for an audience at Tarsus. Antony ostensibly wanted Cleopatra to answer charges that she had aided Cassius, who had conspired with Brutus to assassinate Julius Caesar – although it is also believed the real reason for the meeting was that Antony wanted Egyptian aid for an upcoming military campaign, and besides, he fancied Cleopatra hoping to make her a new conquest.

Cleopatra arrived on her legendary barge, and proceeded to throw elaborate banquets for Antony and his officials for several evenings straight – nothing like a bit of wining and dining to smooth over political misunderstandings.

So impressed was Antony at the lavish feasts Cleopatra had arranged that he accepted a friendly wager.

Cleopatra bet Antony a large sum of money that she could host the most expensive meal in history. The next day, as the meal in question was nearing its end, Antony said that it had been terrific, but no more impressive than her other banquets – and certainly not worth the sum of money she had specified. At this, Cleopatra removed one of her pearl earrings and dropped it in a goblet of wine vinegar. Each pearl was incredibly large, rare and extraordinarily valuable. The pearl dissolved in the vinegar, which Cleopatra then drank.

And as the story goes, Antony conceded defeat – the value of that single drink, let alone the banquet, had indeed been more than any meal in history.

Pearls in history.

There is something about these luminescent, naturally grown gems that captures the heart, the senses and the imagination.

According to some historians, humans collected pearls because they believed that the gems provided the wearer with mythical powers: health, vitality, eternal youth, and marital bliss. Buddhist, Christian, Hindu, Jewish, and Muslim faithful covered the walls of the churches, temples and shrines with pearls.

Hindu and Arab cultures thought pearls were drops of moisture that fell from the heavens. Ancient Hindus imagined pearls as dewdrops that fell at night and collected in open oyster shells, while some Middle Easterners believed pearls were the tears of God.

They believed that on warm summer days, mollusks would float to the surface, open up to absorb the sunlight and catch the Holy teardrops. The warm rays of sunlight and salty tears would combine to grow a beautiful pearl when the oyster descended to the ocean floor.

Types of pearls.

The pearl is unique among all other gemstones in the world. It is the only gem that is grown inside a living organism.

There are three main pearl types used in Jewellery; Freshwater, Akoya, and South Sea (White, Golden and Tahitian). Each type of pearl is produced by a different species of oyster, and each oyster lives in a different region of the world under very specific climatic conditions.

Prompted by the high value and scarcity of natural pearls, Japanese researchers developed methods that brought pearl production under the control of humans in the early twentieth century. These "cultured pearls" are generally larger and of a more consistent size and colour than natural pearls. Producing cultured pearls depends on a surgical procedure called grafting, which entails surgically implanting an artificial nucleus (shell bead) into the tissue of a pearl oyster. The oyster then secretes nacre around the nucleus. After several years of caring for the oysters, the cultured pearls are harvested.



• Freshwater, Saltwater Akoya & South Sea Pearls.

"Raw Pearls" to page 7

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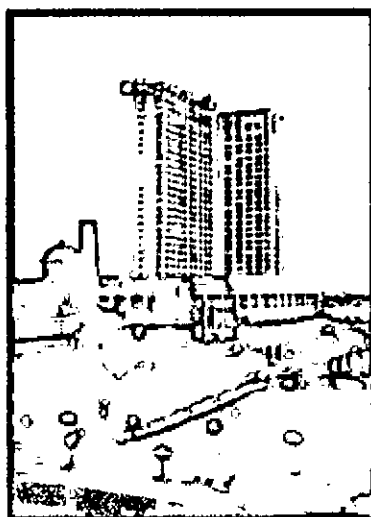
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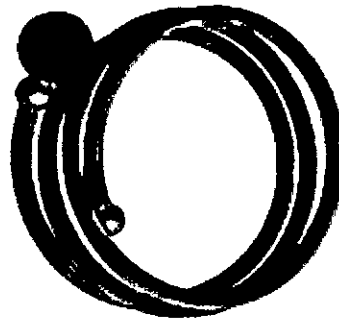
"Raw Pearls" from page 5

Types of pearls.

South Sea Pearls

The finest White South Sea cultured pearls, *Pinctada Maxima*, come from the tranquil waters of Australia, the Philippine islands and Indonesian seas. The majority of South Sea pearls are cultured along the northwest coast of Western Australia with the *Pinctada Maxima* mollusks collected in the wild and then introduced with hatchery-bred oysters to supplement the breeding program.

Wild oysters are mixed with the hatchery stock to keep the supply healthy and plentiful. The Western Australian government controls the natural oyster beds, issuing an annual catch quota, with divers only permitted to collect wild oyster stock that measure between 120mm and 170mm indicating they are approximately 2 years old.

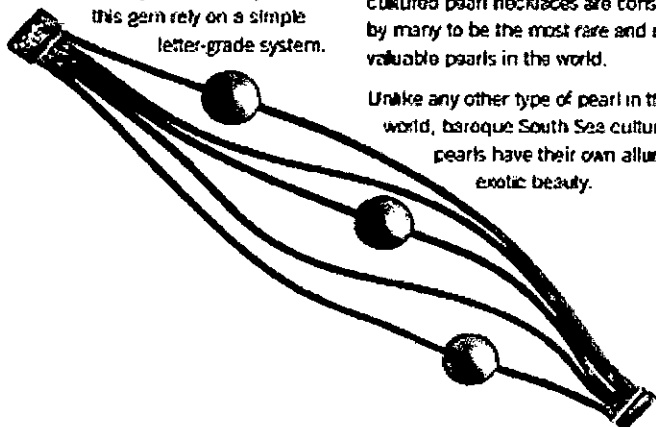


South Sea pearls are generally much larger than other pearl types and have a unique lustre quality. These factors make South Seas both distinctive and valuable. All things being equal, South Sea pearls have a higher value and command higher prices than all other types of pearls. As with other saltwater mollusks, the *Pinctada Maxima* is bead-nucleated. However, the growth period is approximately 3-5 years, unlike the Akoya pearls, which develop in less than half that time and sometime as little as 8 months. A *Pinctada Maxima* oyster may live for 30 years although the pearl producing years only span 6-8 of those years.

South Sea pearls can be found in the range of 8mm to 20mm, with the average being 13mm. Although extremely rare, some have been found between 20mm and 30mm. Only 10-30% of each harvest will be round or near-round, so those strands are truly a rare commodity. Silver-lipped oysters generally produce pearls in the white, silver, aqua and blue family of overtones. The gold-lipped oyster develops the cream, champagne, vanilla, and deeper golden variety. Since the natural colours of South Sea pearls are so rich and beautiful, after harvesting they are merely washed and buffed to remove any residue and bring out their natural glow.

Types of pearls.

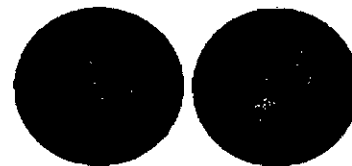
One of the characteristics that sets the South Sea cultured pearls apart is their large size. As pearls have many differing value factors such as colour, shape, lustre, size, and surface quality combined together to produce a unique gem, grading pearls is difficult. Although it is possible to grade each value factor individually, most purveyors of this gem rely on a simple letter-grade system.



The grading assigned will rarely be absolute, varying from one dealer to the next, but the grades should give the consumer a practical basis from which to judge the quality of the pearls.

The lustre of South Seas pearls, whether white or golden, is deep and velvety, rich and luxurious. Golden South Sea cultured pearl necklaces are considered by many to be the most rare and most valuable pearls in the world.

Unlike any other type of pearl in the world, baroque South Sea cultured pearls have their own allure and exotic beauty.



• A "Raw Pearl" South Sea cross section 12mm pearl with 4mm nacre.

The above picture shows a cross-section of a 12mm South Sea Pearl. The nacre is the slightly darker shaded ring on the outside. The border between the nacre and the inner circle, mother-of-pearl bead is the conchyo line. This is an example of extremely thick nacre coverage.

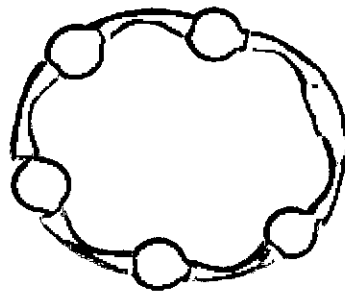
"Raw Pearls" from page 7

Types of pearls.

Tahitian Pearls

Black South Sea cultured pearls, are native to the French Polynesian area. Several species of pearl oysters are cultivated for pearl production. Most black pearls are produced in the sheltered waters of the atolls of French Polynesia and the Cook Islands, although Australia, Indonesia, the Philippines and the Western Pacific Islands have growing black pearl industries. Black-Lip pearl oysters are the most common species of pearl oyster found in the South Pacific Islands. Exotic South Sea pearls from the Black-Lipped Oyster, or *Pinctada Margaritiera*, are more commonly known as Tahitian pearls. These pearls are often referred to as black, but have a remarkable colour range that covers the spectrum - from light, creamy white and grey, to regal greens and deep black.

Tahitian pearls are relative newcomers to the pearl world. Unlike the more common pearl types, Tahitian pearls typically have a naturally dark body colour.



These pearls have become some of the most sought-after, expensive pearls in the world. Because of their vast colour range, matching these pearls into a finished strand is an enormous task requiring searching through thousands of loose pearls to create a single strand. Tahitian pearls are produced by the large Black-Lipped Oyster, the only mollusk to produce naturally black pearls. Unlike black freshwater and black Akoya pearls, which have been irradiated or dyed, Tahitians come by their dark colour naturally. Tahitian pearls are bead-nucleated, but unlike Akoya pearls the nacre is typically very thick. The thinnest nacre allowed by French Polynesian law for export is 0.8mm.

Tahitian pearls are the only pearls that have a full colour spectrum. Black Lipped oysters have a rainbow-like mantle which

exhibits many natural colours. Several factors influence the colour variation among Tahitian pearls as no two *Pinctada Margaritiera* animals are exactly alike. The quality and colour of the nacreous layers of the black lipped shells differ as does the implanted mantle tissue which forms the pearl-sac and then secretes the nacre that makes the pearl.

Tahitian pearls are bead nucleated hence why so many of them are round, or near round, with other shapes such as drops, baroques, and circled also commonly found in the harvest. These pearls have an average size of 9mm to 14mm, but some rare gems larger than 20mm have been found. Tahitian pearls are farmed in French Polynesia, the Cook Islands, the Micronesian Islands, and even to some extent, Japan, Thailand, and the Philippines. Although Tahitian pearls carry the name of the famous Tahiti Island they do not come from Tahiti which is the main trading post for islands that produce Tahitian pearls.

Types of pearls.

Freshwater Pearls

Freshwater pearls are produced by *Hyriopsis Cumingi* (triangle shell) and *Hyriopsis Schlegelii* (Biba shell) commercially in China, and other bivalve mollusks that live in lakes, riverbeds, and creek bottoms in Japan (Biba pearls and Lake Kasumigaura pearls), as well the United States (Mississippi River Basin). In addition to the traditional white body colour, these pearls come in a rainbow of natural colours as brilliant as lavender, tangerine, mauve, aqua-silver, peach, and every shade in between.



The freshwater pearls unique shapes range from baroque to almost round. The Chinese freshwater pearls are visually nearly indistinguishable from the Akoya pearl.

The varied shapes include potato-shaped and stick pearls, rice-shaped and button pearls, coin-shaped and drop pearls, off-round and round pearls. A perfectly round freshwater pearl is extremely rare.

Their sizes range from tiny seed pearls measuring 1mm or 2mm in diameter to 15mm and larger.

Over the last decade or so, Chinese pearl farmers have greatly improved processes for growing cultured freshwater pearls that are made up completely of nacre. They have also developed ways to reshape pearls by repositioning them during the growth process to result in more perfectly rounded ones. At these farms, each mussel is surgically

implanted with 24 to 32 tiny pieces of mantle tissue, on either side of the shell, a process known as nucleation (noo-klee-AY-shun). Once they have been nucleated, the mussels protect their flesh from the irritants by secreting nacre.

Freshwater pearls are nucleated in a different fashion to their counterparts. Freshwater mussel's life-cycle depends on the presence of fish in the lake either in the wild or farm raised.

The freshwater larvae - *Glochidia* can't live on their own like other larvae. They attach themselves to the gills or fins of a fish. When they are big enough they drop off and fall to the bottom of the lake where they are scooped up when they are big enough to be nucleated. In lieu of the mother-of-pearl bead the pearl farmers nucleate their mussels with only a piece of mantle tissue.

NEW PEARL BOOK OUT

Pearls have a very long history of being valued as beautiful gems but differ of course in that they are secreted by living animals.

Cultured pearls have been produced for almost a hundred years, but the methods for farming pearl oysters and inducing cultured pearl formation were kept secret for much of that time. This changed with the establishment of pearl oyster farms in various parts of the world and with the farming of a variety of pearl oyster species.

Reflecting this expanding and diversifying industry, there has been a surge of research on pearl oysters over recent decades and substantial developments in culture techniques. However, there has not been a comprehensive publication on pearl oysters and pearl production until now. This book fills the obvious gap.

It described the taxonomy and anatomy of pearls oysters and deals with all aspects of their biology – reproduction, genetics, diseases – and their ecology, including the effects of pollution.

The entire range of modern mariculture practises, from spawning and culturing larvae in hatcheries to farming adults in the ocean, are considered. The intricate details of pearl formation and modern techniques for producing cultured pearls are described. Histories of exploration, marketing and socio-economic aspects are discussed.

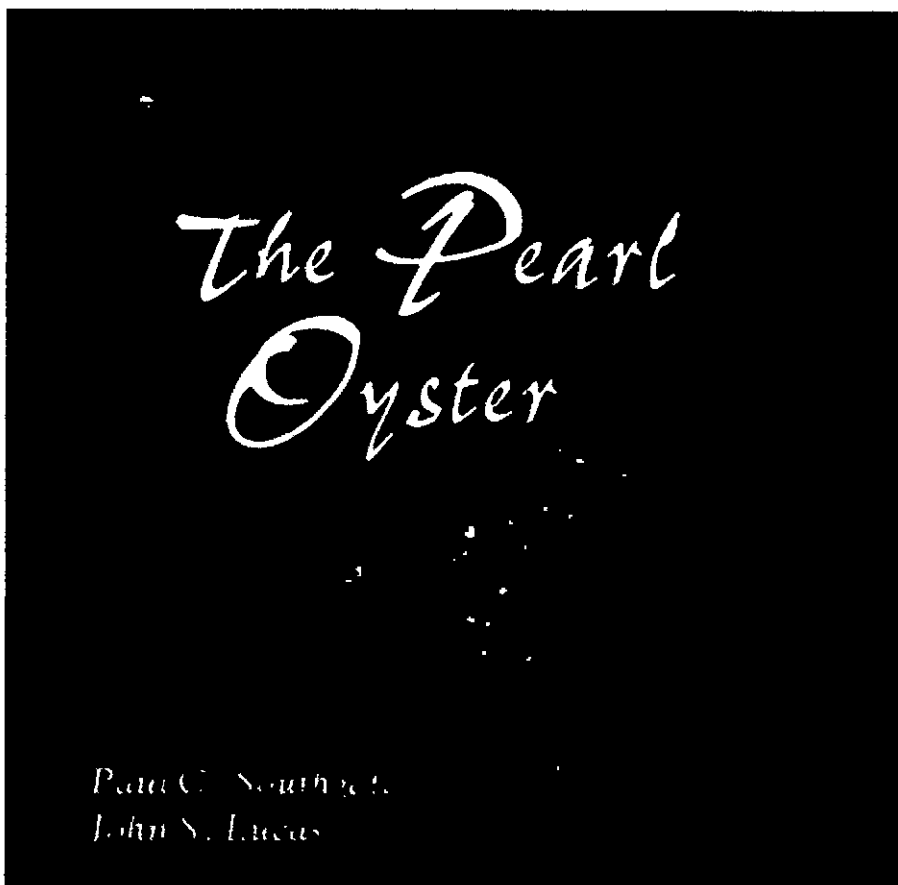
This is the ultimate reference source on pearl oysters and the culture of pearls, written and edited by scientists who are the world experts in their fields. It is invaluable reading

for professionals, academics, researchers, students, and anyone with a general interest in bivalve mariculture.

The research of PAUL SOUTHGATE (School of Marine and Tropical Biology, James Cook University, Queensland, Australia) has focused on pearl oysters for the past 15 years in Australia, East Africa, Southeast Asia, Mexico and the Pacific. He has published extensively on pearl oyster biology and culture, with a particular focus on larval culture and nutrition, and has a particular interest in the opportunities provided by pearl culture for the development of coastal communities.

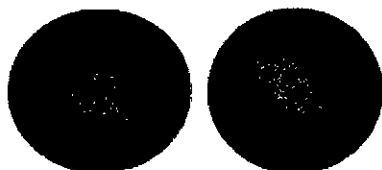
JOHN LUCAS (Centre for Marine Studies, University of Queensland, Australia) has researched on coral reef invertebrates for more than thirty years including international projects for developing the mariculture of giant clams and black-lip oysters in Pacific nations. As well as mariculture, his particular interests are environmental physiology, and the biology and ecology of early developmental stages.

This book (hardbound, 544 pages; published September, 2008; ISBN-13: 978-0-444-52976-3; ISBN-10: 0-444-52976-4) may be obtained from Elsevier at elsevierdirect.com. Prices: EUR 91.95; USD 111; GBP 63.99. ♦



"Raw Pearls" from page 8

Types of pearls.



► A Raw Pearl 8mm silver-white non-nucleated freshwater cross section.

This mantle tissue is not placed in the reproductive organ of the mussel, but in the fleshy mantle tissue. This is in comparison to the Akoya oysters that can only nurture 1 or 2 pearls at a time. While freshwater pearls are typically tissue-nucleated, meaning they are composed entirely of nacre; the fragment of mantle tissue disintegrates as the mollusk coats the tissue, resulting in a pearl made of solid nacre.

The Triangle Mussel

It is widely known that Chinese pearl farmers use the triangle mussel (*Hyriopsis Cumingi*) to culture freshwater pearls. This mussel replaced the cockscomb mussel (*Dreissena Plicata*) nearly a decade ago. The cockscomb mussel was responsible for the 'rice kuspale' freshwater pearls that China first became known for. The switch to the triangle mussel is significant in that it led to the higher-quality production seen today.

Chinese freshwater pearls grown in the mussel began only the last few years, it is already responsible for about 30% of China's production.

The scientific name for "pond butterfly mussel" is *Hyriopsis Schlegelii*. In Japanese, it's Ikecho. Its common name is Biwa pearl mussel.

They found that the mussel had greater vitality and produced better pearls overall if they cross-bred it with the triangle mussel, thereby creating a hybrid that is better than either pure species with respect to pearl culture. There is no scientific or common name for the hybrid. Loosely translated, the Chinese call it the "leisure mussel".

The Biwa pearl mussel and its triangle-mussel hybrid have undoubtedly changed the course of Chinese freshwater pearl culture.

Types of pearls.

An alternative term is CBSB, which is short for Coin-Bead/Spherical Bead. CBSB production involves a number of steps, each equally important. Spherical bead-nucleated freshwater pearls are not, as many assume, created by the insertion of a piece of mantle tissue and a spherical bead nucleus. That is the common method of culturing bead-nucleated pearls in the gonad of saltwater mollusks.

Freshwater mussels do not have the gonad anatomy nor the necessary space between the valves to bead nucleate in the mantle with a spherical bead when the mussel is young.

The Three-Step CBSB Process

Traditional tissue nucleation is done with mussels that are six months to one year old. For the first CBSB step, the pearl farmer uses three-year-old triangle mussels. He begins with an incision, a coin bead, and 1mm square piece of mantle tissue. The host mussel's mantle completely encloses the flat coin bead.

The first step in bead-nucleated pearl production is the creation of a one-year coin pearl. After that first year, there are two routes the farmer can take. He can remove the coin pearl and return the mussel to the water to create a keshi pearl in the existing pearl-sac, or he can leave the mussel in the water to add nacre to the coin pearl. Either way, this second step takes an additional year.

The third step is the production of freshwater pearls that have a spherical bead nucleus.



► Coin, Keshi & CBSB pearls.

When the mussel is five years old, the farmer removes either the keshi pearl or the coin pearl. He then inserts a spherical bead nucleus in the existing pearl-sac. Except that it's in the mantle rather than the gonad, the technique is similar to growing second-graft Tahitian or South Sea cultured pearls. Both techniques use the existing pearl-sac. The pearl-sac, which forms a bulge in the mantle, is a perfect nacre-producing pocket. The pearl growth period at this point can be one or two years.

Given that beads as large as 12.5mm are implanted, the resulting bead-nucleated pearls can be quite substantial in size.

Types of pearls.

Akoya Pearls

Akoya pearls are produced by small Japanese oysters. The oyster species name is *Pinctada Fucata*, with the sub-species known as *Martensii*, *Imbricate*, *Vulgans* or *Radiata*. Both are implanted with spherical beads carved out of natural shell, resulting in pearls that are characteristically rounder than traditional freshwater pearls.



Akoya pearls have both a higher perceived and actual value than the Chinese Freshwater pearl. Akoya pearls are valued many times more than freshwater pearls of comparable quality.

The Akoya oyster is the smallest commercially farmed, pearl producing oyster, fully grown 80mm to 130mm, therefore the pearls also tend to be small.

Akoya pearls are inherently round or near-round, although every harvest produces a percentage of baroque and keshi pearls. These pearls tend to have the bright lustre and shine common to the Akoya, but a shape and look reminiscent of a freshwater.

Akoya pearls, unless colour-treated, have soft, neutral colours and overtones. Most pearls are white to grey, with pink, green, or silver overtones. Akoya pearls are never naturally black - these pearls have undergone either a radiation treatment or dyeing.

While the Akoya pearl is undoubtedly a more rare and valuable pearl than its freshwater pearl cousin, it is only the third most valuable commercially produced pearl, falling behind South Sea and Tahitians. Akoya pearls however can be extremely valuable. Japan was once the undisputed Akoya pearl producing

centre of the world, but has recently lost that title to China, where in the last 5 years pearls of equivalent quality have been produced in a much greater abundance.



► A 'Raw Pearl' 80mm silver-white Akoya cross section.

The vast majority of the world's Akoya pearls which are 8mm and larger are still produced in Japan. However, the Japanese now import many of their smaller Akoya pearls from neighbouring China. These pearls are then worked into finished and semi-finished goods and sold as Japanese Akoya pearls.

Types of pearls.

Keshi Pearls

Keshi pearls are formed when the oyster rejects and spits out the implanted nucleus before the culturing process is complete, or the implanted mantle tissue fractures and forms separate pearl-sacs without nuclei.

These pearl-sacs eventually produce keshi pearls without a nucleus resulting in a solid-nacre composition.

Keshi pearls may form in either saltwater or freshwater mollusks. They are generally small in size and because there was no nucleus to guide the ultimate shaping of the pearl, their shapes vary widely. Keshi come in a wide variety of colours, and tend to have high lustre and even rare orient. This gives it an especially lustrous and shimmering surface quality. Most keshi, in fact, have a greater lustre than even the best-quality cultured pearls.

The fact that keshi pearls are solid nacre does not, however, give them the classification of natural pearls. This is because keshi are a by-product of the culturing process, not a natural occurrence.

Keshi pearls, especially Tahitian and South Sea, were once quite the bargain yet beautiful and unique pieces. Today Keshi pearls are much rarer. This is because Tahitian and South Sea pearl farmers are now x-raying oysters to determine whether or not the nucleus has been expelled.

When a nucleus-free oyster is found they are then re-nucleated before a keshi has time to form. This practice has made keshi pearls much more of a rare find than they once used to be.

The word keshi means "poppy seed" in Japanese, and these pearls are often also referred to as "poppy seed pearls."

"Raw Pearls" from page 11

Qualities to look for when buying.

Given that the pearl is a naturally occurring organic gemstone, created by living creatures, individual qualities can and do vary widely. Although all qualities affect the ultimate value of a given pearl, some qualities are more objective, while others are more a matter of taste or preference.

Seven factors determine the quality, value, and beauty of pearls: size, shape, colour, lustre, surface quality, nacre quality and matching. A pearl's ultimate size and quality can depend on several variables – the size and health of the mollusk that produced the pearl, the size of the nucleus, and the amount of time the mollusk spent underwater adding layers of nacre to build the pearl.

Pearl Size

Pearls are measured by their diameter in millimetres. Tiny seed pearls can be smaller than 1mm, while South Sea pearls as large as 20mm have been found.

If all other quality factors are equal, the size of a pearl will determine its value.

Only a 1 millimetre increase in pearl size is a substantial jump in both appearance and value.

The importance of a pearl's size to its ultimate value depends on the pearl type. If a high quality pearl is larger than usual for its type, it will be worth more than smaller pearls of the same type. The average pearl sold today is between 6.5mm and 11mm. An "average" pearl can take 2-3 years to develop. Significantly larger pearls can take twice as long. In addition, because it is difficult to maintain a perfectly spherical shape while the pearl develops, large round pearls are extremely rare and valuable. When shopping for pearls it is important to note that strands are rarely of uniform size.



Qualities to look for when buying.

Pearl Shape

As pearls are natural organic gemstones, they can occur in a wide variety of shapes, many of which are quite unique and interesting.

The round pearls you most commonly see are by no means the only shape in which pearls are found! Indeed, perfectly round pearls are actually quite rare. This is because the eventual shape of the pearl is determined by a number of highly variable factors which occur inside the oyster as the pearl is developing. For example, the pearl often assumes the same shape as its nucleus (the irritant which was placed inside the oyster to initiate the formation of the pearl which guides the process of the pearl shape). If the nucleus is not perfectly round, the resulting pearl is likely to reflect this irregularity.



► Ringed, baroque, drop, button, off-round & round pearls.

In addition, the pearl's positioning within the oyster also plays a role in determining its shape. If the pearl develops against the shell, for example, it will become more flattened on that side.

Some pearls, for example, develop with one or more grooves or rings encircling them. These pearls are known as ringed or circled. The primary shape of a pearl is therefore described as circled round, or ringed oval. These circles or rings may occur if a constant pressure is placed against the pearl as it is developing within the oyster.

Pearl experts generally divide pearl shapes into three broad categories, based on their overall characteristics:

- **Spherical shapes** are perfectly round or nearly round. They are the classic pearl shape that is most familiar.
- **Symmetrical shapes** are balanced and regular. If you sliced this pearl in half, each half would be a mirror-image of the other half.
- **Baroque shapes** are irregular or abstract. They are non-symmetrical in nature.

Qualities to look for when buying.

Within these three broad categories, pearls can be classified into seven basic shapes:

- **Round** pearls are perfectly spherical - the shape most people think of when they think of a pearl. Because of their relative rarity and "classic" nature, they are highly desirable. Round pearls fall into the spherical category.
- **Near-round/Semi-round** pearls are not perfectly round. Instead, they are slightly flattened or elongated, rather than being a perfect sphere. Nonetheless, they are so nearly perfect that they, too, are classified as spherical.
- **Oval** pearls are shaped like an oval - narrower at the ends than they are in the centre. Ovals are categorized as a symmetrical shape.
- **Button** pearls are flattened to some degree, making them resemble a button or perhaps a disk rather than a perfect sphere. These pearls are often used in earrings, where the flattened side can be attached to the setting. Buttons are also categorized as symmetrical.
- **Drop** shaped pearls are pear- or teardrop-shaped. The drop can either be "long" or "short," depending on its proportions. These pearls make attractive earrings or pendants. This is also a symmetrical shape.
- **Baroque** pearls are both non-symmetrical and irregular in shape. The baroque pearl can be purely abstract in its shape, or it can resemble a cross, stick, or some other shape. Baroque pearls fall into the baroque category. Within these basic categories and definitions, there can be many variations.
- **Semi-Baroque** pearls are slightly irregular in shape. For example, a pearl which might otherwise be considered an oval, button, or drop pearl, but which is not symmetrical in nature, would be considered semi-baroque. Semi-baroque pearls fall into the baroque category of shapes.

The shape of the pearl is one of several factors which goes into determining its quality and therefore also its value. In general, round and near-round pearls are the most valuable, because of their rarity. A perfectly round pearl is very rare.

Symmetrical shapes are generally considered to be more desirable than baroque shapes. Baroques, however, can be extremely unique, thus increasing their desirability more than might be expected based on their shape alone.

Qualities to look for when buying.

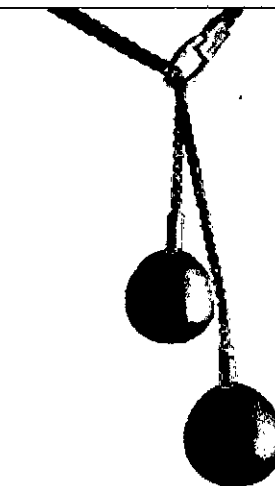
Pearl Colour

Different molluscs produce pearls of different colours. The colour of a pearl is usually similar to the colour of the shell nacre of the mollusk which produces it; this character is genetically controlled. This is very clearly shown by *Pinctada Margaritifera* (black or steel grey), *Pinctada Maxima* (silvery white), abalones (green) and freshwater mussels (pink). However, in the case of *Pinctada Fucata*, the colour of the pearls produced may be golden yellow, pink, white or cream, depending on slight differences in the site of nuclei implantation.

Pearls produced in the ventral region of the gonad are white or golden, while those produced in the dorsal region of the gonad, are usually gray or white.

Flawless pearls of regular form are frequently seen among the pearls developed in contact with internal organs, such as liver, byssal gland and intestine. Pearls produced close to the retractor muscle tend to be baroque in shape with irregular protrusions and with a distinct black colouration.

A pearl's colour contains three basic components - hue, the initial colour; tone, its lightness or darkness, and saturation, its strength or intensity. Pearl colours tend to be muted displaying a broad range of subtle hues.



A Pearl's colour can have three main characteristics:

- **Body-colour** is the most dominant overall colour of the pearl.
- **Overtone**, one or more translucent colours that appear over the body of the pearl.
- **Orient** - Iridescent, rainbow colours shimmering on or just below a pearl's surface.

"Raw Pearls" to page 14

"Raw Pearls" from page 13

Qualities to look for when buying.

Pearls come in a variety of colours, from white to black and every shade in between. All pearls display body-colour but not all pearls will display overtones or orient.

It is important to distinguish between colour and overtone. For example, some naturally occurring colours are white, champagne, aqua, green, golden, and black. Within each colour category, there are a number of common overtones, or subtle variations in the surface iridescence

Overtones are translucent colours which sometimes appear over top of the pearl's main body-colour. These overtones tend to alter the body-colour somewhat, as well as adding depth and glow. A pearl may be white with rose overtones, for example. Some pearls have no overtones at all, while some display an orient that shows a rainbow iridescence – which is an incredibly rare factor only seen in approximately 0.01% of pearls produced today.

The term orient refers to the shimmering, iridescent colours which appear to move and glitter when the pearl is turned. This phenomenon is caused by the way in which light is reflected through the various layers of nacre.



► Silver, cream, rose, champagne & silver-rose pearls.



► Silver, green, blue, subersine & peacock pearls.

Qualities to look for when buying.

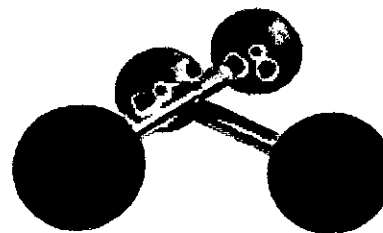
Pearl Lustre

Lustre is the most important of all the value factors when considering the beauty of a pearl. Lustre is more than a combination of surface brilliance and a deep glow. Lustre is essentially the reflective quality or brilliance of the surface of the pearl's nacre.

A high quality pearl with good lustre reflects light well, while a poor quality pearl is dull or chalky. Pearls with low lustre appear white or chalky, rather than brilliant and shiny. With a good quality pearl you should be able to feel the difference and see your reflection on the surface.

High lustre results at least in part from the amount of nacre deposited to form the pearl, which in turn is a function of how long the pearl has had to develop within the oyster. Pearls with a high lustre are generally valued much more highly than pearls with a lower lustre.

Pearl nacre is composed of microscopic crystals. The translucence and arrangement of the overlapping nacre plates are more important influences on whether a pearl will have high lustre. The health of the mollusk and the environmental factors the animal lives within play a major factor in how the nacreous deposits are formed which interplays with the manner in which light reflects and refracts within the thousands of layers of nacre deposited on the pearl



White light is made up of separate waves and each wave is a different colour. Some of the light waves are absorbed when light strikes an object.

The light waves that are not absorbed determine the colours that we see. As a light ray travels from the air into a pearl it slows down. If the ray enters at an angle it also bends. This bend is called refraction. If the nacreous deposits are not uniformly laid down the refractive index will be greater. This is one of the components that help create the depth of lustre visible on a pearl.

Qualities to look for when buying.



► Refraction & reflection.

Good quality lustre is shown when the reflection or the bounce of light after it strikes the surface when the angles of incidence and reflection are equal. This is caused by light travelling down through the translucent layers of nacre and reflecting back to the eye from deep within the pearl. The crystals are aligned perfectly so that light passing along the axis of one and is reflected and refracted by the others to produce a rainbow of light and colour.

There are four categories of lustre:

- **Excellent** – reflections are bright, sharp and distinct with high refraction and reflective qualities.
- **Good** – reflections are bright but not sharp, and they are slightly hazy around the edges with less refraction and reflection.
- **Fair** – reflections are weak, hazy and or blurred. This is common for commercial stock that has thin nacre. "Soapy" appearance caused by lower refraction and reflection.
- **Poor** – reflections are dim and diffused.

Pearl Surface Quality

Pearls are organic, so it isn't surprising that they should show surface qualities. The cleaner the surface of the pearl, the more valuable it is. There are four classifications:

- **Clean** – pearls are blemish free or contain minute surface characteristics.
- **Lightly Blemished** – minor blemishes or surface irregularities.
- **Moderately Blemished** – noticeable surface characteristics.
- **Heavily Blemished** – obvious surface irregularities.



► Surface quality: Subopt, A, AA, A+, AAA

Qualities to look for when buying.

Pearl Nacre Quality

Nacre is the very essence of the pearl itself. It is the natural substance that the mollusk secretes to protect its sensitive flesh from irritants such as shell fragments or implanted beads. Nacre is made up of thousands of layers of thin overlapping crystal plates with irregular edges. This is the same beautiful iridescent material that lines the inner surface of the oyster shells.

A pearls' appearance helps determine its quality, which has a lot to do with whether the nacre is thick or thin, although thick nacre does not always indicate a highly lustrous pearl.



Nacre quality can be classified in three ways:

- **Acceptable** – nucleus not noticeable, although slight blinking might be present. No chalky appearance.
- **Nucleus Visible** – the pearl shows evidence of its bead nucleus through the nacre.
- **Chalky Appearance** – the pearl has a dull chalky appearance.

Growth conditions can influence the lustre of a pearl, for example the quicker the nacre is produced, the less translucent it is likely to be. As a result the nacre may be thick but not lustrous. The lustrous outer surface, or nacre, of natural and cultured pearls is made up of the same nacreous material. Its chemical composition is about 90% calcium carbonate; the rest is water and organic materials.

The size and shape of a cultured pearl are determined by the size, shape, and position of the implanted nucleus. The size, shape, and colour of a natural pearl are determined by type of irritant, the water conditions, and food supply. The general health and well-being of the oyster will also determine how lustrous the nacre of the pearl will be when harvested.

Pearl Matching

Pearl matching is more important when considering a strand of pearls. Minor variations between pearls within a strand should be expected as no two pearls are identical. When considering pearl matching, uniformity of pearl factors such as size, shape, colour, and lustre should be taken into account. Earrings should also be well matched. Size, colour, lustre and surface quality should all be consistent to make a well matched pair of earrings.

"Raw Pearls" to page 17



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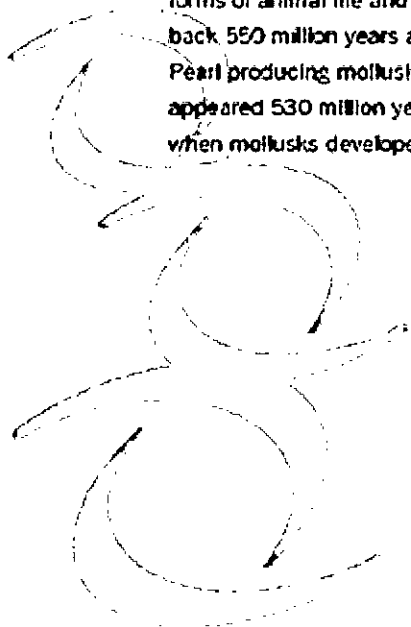


From history to science and fashion, Pearl-Guide.com is guaranteed to answer all your pearl questions - and much more!

"Raw Pearls" from page 15

What is a pearl producing mollusk?

Mollusks represent the earliest forms of animal life and date back 550 million years ago. Pearl producing mollusks first appeared 530 million years ago when mollusks developed shells.

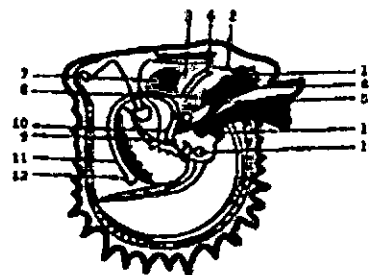


Mollusks are invertebrates with a soft body often protected by a shell such as clam, oyster and mussel. Pearls are organic gemstones which form inside a living pearl-producing mollusk.

A pearl is the result of a mollusk's reaction to an irritant. Pearls are formed when the mollusk, sensing an irritant, secretes thousands of very thin concentric layers of nacre in a matrix that eventually coats the irritant. Nacre is formed from iridescent layers or columns of flattened crystallized calcium carbonate in the form of the mineral aragonite (ah-RAG-uh-nite) secretions over the irritant. These microscopic aragonite crystal layers, called platelets, are held together by conchytin (kon-KY-uh-in) an organic binding agent. The thin circumferential lamellae of nacre intersect the external surface of the pearl to create a 'thumbprint pattern' that characterizes the surface of nacre.

Anatomy of a Pinctada Fucata mollusk

- 1) Mouth
- 2) oesophagus
- 3) stomach
- 4) left labial palp
- 5) left inner labial palp
- 6) crystalline style
- 7) liver
- 8) digestive diverticula
- 9) descending intestine
- 10) ascending intestine
- 11) rectum
- 12) anal papilla
- 13) byssal gland
- 14) nucleus implanted in the gonad



What is a pearl producing mollusk?

Natural Pearl Formation

The principal factor in natural pearl formation in a pearl oyster is the presence of a nucleus. It can be of organic or inorganic origin, such as parasites adults or larvae, decaying parts of plants, sand grains, epithelium or blood cells of the same animal etc.

These tiny particles or organisms enter the oyster when the shell valves are open for feeding and respiration. These foreign bodies may become embedded between the shell and mantle.

In response to this stimulus, the foreign body is invaginated by the outer epithelium of the mantle and a pearl-sac is formed around it.

Pearls are not produced without the formation of the pearl-sac. The epithelial cells of the pearl-sac secrete the nacre which becomes deposited over the foreign body, forming a pearl in due course of time.

These pearls are produced either within the mantle, in other soft tissues of the oyster, or between the mantle, and the interior surface of the shell. Such pearl production is accidental and occurs very rarely. They are generally small and irregular.

Large and spherical pearls are still rarer to find. When the extraneous matter becomes fixed to the shell, only the exposed portion becomes covered by the pearl-sac resulting in a blister pearl.

Shell Structure

The shell is composed of three layers. The very thin outer layer is uncalcified conchytin layer. The middle or prismatic layer shows a cellular structure formed of calcareous prisms or columns running vertically to the surface and appearing multifaceted in section. The prismatic layer is deposited by the mantle epithelium near the free edge just behind the margin which forms many such layers on fusion with each new one beneath the last, as the shell grows. The innermost nacreous or mother-of-pearl layer is composed of numerous fine lamellae of aragonite crystals.

"Raw Pearls" to page 18

"Raw Pearls" from page 17*What is a pearl producing mollusk?***Cultured Pearl Formation**

Cultured pearls are formed in a pearl mollusk, with the help of human interference. With any pearl formation, two things are required, the outer epithelium of the mantle lobe and core substance or nucleus. It was found that cut pieces of the mantle epithelium would provide the pearl secreting cells and that processed shell beads would be accepted by the oyster as the foreign body. Through careful surgery, the mantle piece graft tissue and the shell bead nucleus are implanted together, side by side, into the gonad of the oyster. The oysters are then returned to sea for further growth.

The outer epithelial cells of the graft tissue proliferate and rearrange themselves over the shell bead nucleus, forming a pearl-sac. The cells of the pearl-sac derive their nourishment

from the surrounding tissues and soon reassume their function of nacre (mother-of-pearl) secretion which is deposited over the nucleus in the form of concentric micro-layers. In cultured pearls the nacre quality and the process of pearl formation are the same as in the formation of natural pearls.

Pearl oysters are members of the phylum Mollusca and belong to the class Bivalvia. Most pearl producing mollusks are bivalves, meaning their shells have two halves connected by a hinge, like a clam, a soft body with a small foot, a byssal gland and paired gills. Most bivalves are also passive filter feeders – meaning they maintain an open relationship with the environment by constantly circulating water through their shell in order to support its food supply. The anatomy of a bivalve mollusk facilitates the production of pearls.

The mollusks open their shells slightly to allow water to enter their bodies as they extract microscopic food particles from the water. The open relationship of the bivalve structure increases the probability of foreign objects and creatures entering. This is critical for pearl production, since most natural pearls are formed as a reaction to a parasite or foreign object within the shell.

A pearl-producing mollusk can live in freshwater or salt water. Freshwater mollusks are mussels while the saltwater mollusks are referred to as oysters. While the name "pearl oyster" suggests a close relationship with other types of oysters, pearl oysters are actually a distinct species from the edible oysters, and have important anatomical and behavioural differences.

What is a pearl producing mollusk?

There are a small number of mollusks capable of producing a pearl and only those mollusks that have shells lined with nacre (NAY-kuir, the pearlescent substance inside the animals shell) produce the pearls used in the jewellery industry. Pearl oysters feed on small algae found in the water column. The gills in bivalves are large, and tiny hair-like cilia on the gills are used to remove small particles from the water. Both adults and larvae feed on algae and other small organisms.

Clear tropical waters contain limited amounts of algae. Therefore, a large amount of water must be filtered daily in order for the pearl oyster to obtain sufficient food. This is the reason that importance is placed on not crowding pearl oysters on the farm and for keeping the shells clean of organisms that compete for food.

Pearl oysters are protandric hermaphrodites, which means that most are male at first, then change into female. The male phase usually occurs during the first 2-3 years of life, with the change to the female phase in later years. Pearl oysters have been reported to live as long as 25 years.

Pearl oysters reproduce by releasing millions of eggs or sperm into the water column, where fertilization occurs randomly. In less than 24 hours, the fertilized egg develops into a trocophore larva, a free-swimming organism. The larvae remain suspended in the water column for 2-3 weeks before undergoing metamorphosis, changing into an attached juvenile "spat." Shortly before metamorphosis, the larva develops an enlarged foot and an eye-spot. The foot remains after metamorphosis, and the young spat retains the ability to move about for several months even after

it attaches itself to a hard substrate. Pearl oysters can attach and reattach themselves using the byssus.

Sometimes a natural pearl forms when an irritant, such as a fragment of shell becomes lodged inside the mollusk when it is feeding, or a parasite drills through the shell. To protect itself, the mollusk forms a sac around any irritant or invader that manages to get caught up inside its body. This sac secretes nacre to cover the irritant and over time, the growing pearls are completely covered with the beautiful iridescent substance we call nacre, or mother-of-pearl.

The nacre and sac materials are made by the mollusk's mantle, the layer of tissue cells that surrounds the body of the mollusk and lines the shell. The mantle tissue cells that make up the pearl-sac are called epithelial cells (ep-uh-THEE-jee-yuh).

What is a pearl producing mollusk?

Some nuclei of non-standard composition has been so quickly rejected in the past:

• Density of the nucleus must exactly match, or...
• Be extremely close to the density of the host mussel.

In order for the pearl to expand and contract in different environments, the nucleus must expand and contract in a compatible fashion. This is known as the thermal coefficient of expansion. The nuclei must also resist cracking, hold a high shine, and remain stable over long periods of time. The material that best fits these criteria is the shell of the Mississippi freshwater mussel, from the Unionidae family. This mussel has the added attribute of a thick shell, especially in the joint where the bivalve connects. This thick shell enables harvesters to create large nuclei to be used in culturing larger pearls.

Pearl Nucleus Composition

The nucleus of a pearl, although it is not typically visible in a harvested pearl, is extremely important in the culturing process. The nucleus is the seed that impregnates the oyster and produces the gem. Although the process is not complete unless a small piece of mantle tissue is inserted with the bead.

The bead material used to create the nucleus is almost exclusively derived from freshwater mussel shells found in the rivers of North America. The shell harvested from these rivers is typically first transported to Asia to be worked.

This process involves cutting the thick portion of the shells near the hinges into strips then into cubes. These cubes are then shaped into perfect spheres by grinding, tumbling, and polishing. These finished nuclei are then separated by size and quality. The finished product falls

into different quality ranges in a similar fashion as the actual pearl.

There are three grades of quality pearl beads commonly sold on the market today:

- **A grade** – a top-grade bead is one that is perfectly white.
- **B grade** – a slightly lower-grade bead will have some slight discoloration.
- **Low-grade** – beads will have dark bands of calcium carbonate buildup appearing as rings around the nucleus.

Low-grade nuclei are commonly used in the production of darker cultured pearls such as Tahitian pearls. Any visible banding on the nucleus, even if the pearl is medium grade and the banding is light, can be detected in a light-colour, medium to thin nacre pearl by the presence of blinking when examining and rotating the pearl.

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"Raw Pearls" from page 19

Pearl harvesting.

Cultured pearls are harvested from the pearl farms after a nucleation period of 8 months to 6 years. Akoya pearls are typically cultured from 8 months to 2 years, while freshwater, South Sea, and Tahitian pearls are cultured from 2-6 years.

Pearls are almost universally harvested in the winter. During these colder months the metabolism of the host oyster has decreased, slowing the nacre deposits around the pearl. While slower nacre deposits are reflected in less growth during these colder months, it also enhances the outer layers of the cultured pearls' nacre.

When the actual harvest begins the pearls are brought to shore from their mooring positions. The pearls are then opened individually and the pearl or pearls extracted. In the case of Akoya oysters and freshwater mussels the shell and meat is discarded or used for another purpose.

South Sea and Tahitian oysters, however, are harvested in much the same fashion as the nucleation. These oysters are opened very slightly, the pearl is extracted, and another nucleus is placed into the perforated pearl-sac.

This oyster then goes through another recovery period and is placed back into the sea to grow another pearl.

After all the pearls are harvested they are then cleaned of debris with a salt bath to bring out a higher lustre. After the pearls have been cleaned and polished they are then sorted by quality and size categories. Many of these pearls may then go through further treatment depending on the type of pearl and the factory preparing the finished goods.

A good harvest is determined by the number of marketable pearls produced in relation to the number of oysters which had been nucleated. Of these marketable pearls the more pearls that are considered high-quality have a direct influence on the success of the enterprise.

Pearl harvesting.

Generally speaking:

- Only half of the pearls will be marketable, and less than 10% of these will be considered top-quality.
- The top 5% percent of pearls will earn 95% of a farmer's income.
- Only 5-10% of pearls produced are considered high quality. This means that if you harvest 1,000 pearls, only 50-100 of those will fetch the highest prices.
- The rest may not sell for enough to produce a rating of "commercial" or "C+" which is awarded to the lowest quality marketable pearl.
- Pearls of average quality usually sell for only enough to recover the cost of producing them, while lowest quality pearls will bring such low prices that money will be lost in their production.

Producing top quality pearls is achieved by taking good care of the pearl oysters during all stages of farming and is also dependant on the skill of the grafting technician. It only takes one mistake to ruin a potentially good pearl, so attention to detail during all stages of farming is very important.

Dyann has recently opened a new, second location

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We compliment Dyann on the compilation of her pearl appreciation booklet and thank her for allowing us to reproduce it in this issue.

We also note that she has very recently opened a second Raw Pearls location, proof positive that her dedication to only the highest quality goods and unparalleled service to her customers has borne the unmistakable fruit of success.

As she says: "One thing that still astounds me is the number of people who sell pearls who don't know much about the product. Most people in this industry are just brokers who buy and sell regardless of knowledge of the quality of the goods they are hawking. I hate to think what other industries are like, probably much the same. Whenever a pearl peddler pops into my shop the best way to get them out is to bring out the fibre optic light source, pop my eye loupe on their pearls and ask if I can x-ray the pearls."

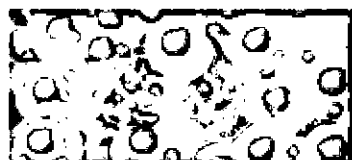
This is a pro at work! ♦



The following pages contain four articles from *The Valuer's* April-June 2008 issue, a special tribute to Dr. Grahame Brown whose special passion for pearls inspired legions of friends and fans over the years.

He was a contributor and dear friend to *Pearl World*, and we continue to sorely miss his curiosity, expertise and good humor to this very day... as do countless others.

FRASER ISLAND PEARLS



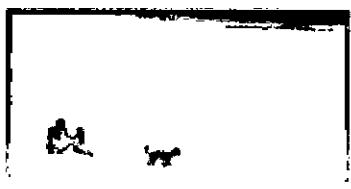
STUNNING JEWELLERY CREATING WITH FRASER ISLAND PEARLS



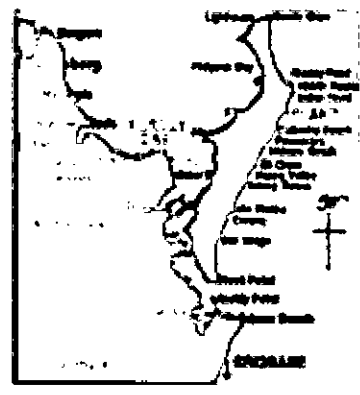
ROUTINE CHECK OF SHELL



NATIVE PEARLS FROM HERVEY BAY



THE BRILLIANT COLOURS OF FRASER ISLAND



The pearl oyster which produces the Akoya pearl, *Pinctada Fucata*, is native to Australian coastal waters. It was first identified more than 100 years ago and is found in waters from Victoria all the way around the northern coastline of the continent to Shark Bay in Western Australia. In the early 1990s the Australian Museum noted the location of several native populations of *Pinctada Fucata* in Hervey Bay.

Pearl oysters grown in Hervey Bay are of exceptional quality and the demand for the pearls from these animals is high. These pearls are "Fraser Island Pearls".

Akoya pearl oysters are grown on four leases inside Hervey Bay. Pearl oysters are grown from spat in bags and grown out on long lines from frames which provide optimal conditions for pearl production. The land based site utilised for the pearl operation is located at Urangan in Hervey Bay.

The high quality of the pearls is due to the excellent water quality and unique combination of marine and estuarine waters that exist in the middle part of the Great Sandy Straits and the water temperature range which is optimal for producing high quality pearls.

This farm has been progressively operational over the last 3 to 4 years. The shell bring

forward is '*Pinctada Fucata*' more commonly known as the 'Akoya' Shell. The akoya is growing much larger here than anywhere in the world. The goal is to produce between 10 - 12mm which has never been achieved anywhere in the world. All indications so far show that this is more than just a possibility, but a real probability.

These pearls are not treated in any way. The nacre is thick and the colour varies, with many hues including pink, silver & gold. Small pilae runs have been harvested in the last 2 years, with a larger harvest planned for approximately 2 years in the future. The first uniform strands will be strongly sought after, but needless to say it will not happen overnight.

Grahame was always extremely interested in this farming venture in Hervey Bay. He saw the pearls at the different stages and wrote the following reference for the owner of the Pearl Farm.

TO WHOM IT MAY CONCERN

10-12 mm diameter bead nucleated pearl cultured in the akoya pearl oyster (*Pinctada imbricata - muricata*) are very rare in world pearl markets. Indeed the authoritative Guide to wholesale pricing by Richard Drucker does not list akoya pearls in excess of 10 mm

diameter. The small number of pearls of this size that are produced in Japan are consumed in the local Japanese market. I am unaware of Chinese production of akoya pearls of 10-12 mm diameter, but would suppose it is rather small and absorbed by the Japanese market. It is important to remember that necklaces produced by Japanese akoya producers are routinely bleached and dyed to achieve a uniformly colour matched strand.

If the Hervey Bay pearl farmer can cultivate 10-12 mm akoyas, and most importantly if they are not processed (have natural colour/s), this ... in my opinion ... would create a market that would be very economic to develop for both the producer and this country.

**Grahame Brown, Editor
The Australian Gemmologist
The NCJV Valuer**

On a personal note; I had the honour of knowing Grahame as many of you did for many years. His passion for this trade was second to none, and I know that every time I loupe a pearl I will hear his voice. He has not gone - he lives within us all and we will carry him with us on our journeys through the years to come until we meet him again.

Debra Haigh FGAA CGO DT

"The Valuer" from page 21



The valuation of cultured pearls of all varieties has traditionally been a somewhat haphazard process due to the lack of a standardised grading system. Australia's South Sea cultured pearl industry continues to grow, and coupled with the resurgence in the popularity of pearls, a valuer is more likely than ever to call on their pearl valuation skills.

The Autore group is one of Australia's largest South Sea cultured pearl producers, responsible for the distribution of approximately 17% (in terms of value) of total global production of cultured pearls produced by the *Pinctada maxima* pearl oyster. It is a totally vertically integrated company, producing South Sea cultured pearls in both Western Australia and Indonesia. The group has worldwide distribution offices, for both loose pearls as well as the Autore branded line of jewellery.

The CEO of the Autore Group, Rozario Autore, has personally developed a much-needed classification system for South Sea Cultured Pearls. The grading system, while being specific to South Sea cultured pearls produced by the *Pinctada maxima* silver or golden lipped pearl oyster, can also be adapted for use with Tahitian-type cultured pearls produced in French Polynesia by the silver to greyish-black *Pinctada margaritifera* pearl oyster.

Each pearl is graded according to the trademarked Autore Five S's. The five specific pearl characteristics of this system are: Shine, Surface, Shade, Shape and Size. The details of the Autore Classification system were outlined in the previous edition of *The Valuer*. Autore have been collaborating directly with the Gubelin Gem Lab in Switzerland to further refine the grading system for international use, and will be working closely with Gubelin in the future. This article will focus on Autore branded jewellery.

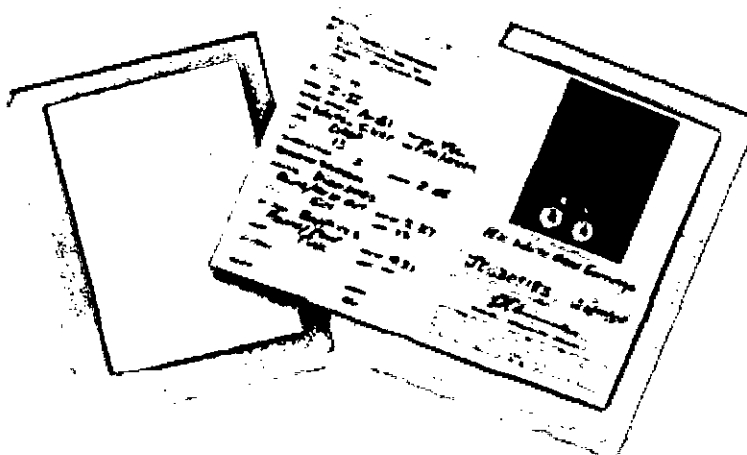
Five years ago Autore responded to the need to change the perception of pearl jewellery, and began the design and production of fullmarked Autore jewellery. It is now distributed in over 150 stores worldwide. The brand has a strong presence in the Australian market, which will soon be reinforced by the opening of a flagship Autore retail store in the Sydney CBD.

Each piece of Autore jewellery is accompanied by an Autore Authenticity Certificate. This important document not only guarantees that the pearls are genuine South Sea cultured pearls, it also details the specific pearl attributes according to the Autore Five S's classification system. Each item of jewellery is described and pictured, with an individual identification number, and gemstone details are also listed. Every customer who purchases Autore jewellery, whether in Australia or overseas, will receive this Authenticity Certificate at the point of sale. If you receive an Autore hallmarked piece of jewellery for valuation, you should ask your customer for this important document which will be of valuable assistance during the valuation process.

Autore jewellery varies from the most basic pieces, to intricate one-off designs specifically designed around unique-shaped pearls. The top range of the collection comprises many one-off pieces, such as the Harlequin Shrimp brooch pictured, or pieces where one design is produced once only in a particular colour scheme.

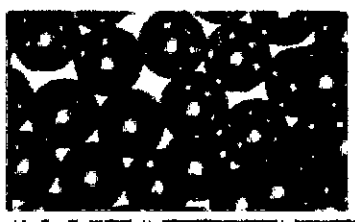
Also included in the design collections are unique tariat strands where the colours have been especially graduated according to the designer's specifications. These can vary from a complete range of graduated colour white-yellow-gold strands, or a graduated mixture of white through to the various colours of the Tahitian range of south sea cultured pearls.

A valuation for any of these pieces must take into account the design costs, as well as the unique nature of any pearls used. It is highly recommended that if you are asked to value any of these pieces, you contact Autore directly, where the recommended retail prices can be quoted to you.



PHENOMENAL PEARLS

R. C. M. S.



The pearls that are cultured in Northwest Australia are among the largest in the world, but the title "Phenomenal Pearls" does not mean "really, really, BIG ones"! This brings me to the point of this article, which is terminology. I would like to discuss terminology used in describing and grading pearls. I hope that rational descriptions of the terms, particularly those related to optical phenomena, help clarify some terms that are frequently misused.

I'll start by explaining how my perspective of using reductionism to understand optical phenomena began. A few decades ago I encountered a comment by Grahame Brown about an error in gemmology literature concerning the cause of the blue colour in fine moonstone. It was pointed out by Grahame¹ that if the cause of moonstone's blue colour was thin film interference we should expect to find specimens of moonstone showing interference colours of other spectral hues, but adularescence in moonstone is always either white or a light blue, never any interference colour. As I indicate² in my book on optics, the mechanism that produces the blue colour in fine moonstone is Mie scattering of red light by albite crystals³ that are about twice the size of the wavelengths of light. The residual light continuing forward, after sideways scattering of red wavelengths by objects of this size, appears blue in exactly the same way as the rare phenomenon from which the expression once in a blue moon is caused. Transmitted light, both white and residual blue, is reflected from the surface of the albite inclusions to form the adularescent sheen, and additional removal of

red wavelengths by Mie scattering intensifies the blue colour until the reflected light exits the stone.

Back to reductionism as an approach for describing pearls, I suggest that description of pearls should be reduced to the following categories of information:

- Kind,
- Size,
- Shape,
- Lustre,
- Colour,
- Overtones,
- Orient,
- Complexions,
- Matching, and
- Nacre thickness.

Kind indicates the source/type of pearl (such as freshwater cultured, South Sea cultured, Oriental, Queen conch, etcetera) as well as the kind of preservation (such as hank, choker, rope, torsade, etcetera) along with relevant lengths / strand counts.

Size should be measured in millimetres indicating the smallest and largest dimension of a single pearl to the nearest tenth, or the range of smallest to the largest sizes in the group to the nearest tenth (or at least half) millimetre.

The preferred shape is called round, although a completely regular sphere is the intended meaning. Most bead-nucleated cultured pearls, which are expected to be round, are described according to their deviation from this ideal, and terms suggested are: round, round in most, slightly off round, off round, and irregular. Other possibilities include baroque, drop, button, oval, and various other shapes.

Lustre is the brightness and appearance of reflected light that does not have phenomenal colour components. Most of the light considered for lustre is returned from the exterior surface, but transparent to translucent layers may also reflect light from interior

surfaces. Keep in mind the "pearly lustre" seen on some minerals because of their cleavage. The best light source for judging the quality of lustre is a straight-tube fluorescent light, so you can see how sharp and clear is the straight-line specular reflection of the bulb. Brightness of lustre on pearls may typically be described as dull, low, medium, bright, or very bright.

Colour is the overall background base-colour behind all the features of a pearl caused by selective absorption of light. In naming or describing a colour it is acceptable to describe a hue with modifiers, but it is an error to refer to such colour modifiers as "overtones"! The colours of pearl tend to be white to very pale pastel, although fancy colours do occur and when they do they should be described by the purity, tone and hue terminology used for coloured gemstones. Treatment or "colour enhancements" should (of course) be fully disclosed, and the description "natural colour" should be applied judiciously. A high colour temperature incandescent white light is the best light source for looking at colour, overtones, and orient.

Overtones are localized additional patches of colour with indistinct edges. They overlay the base colour of a pearl. In distinguishing colour from overtone it may be helpful to draw an analogy between the appearance of the surface of the pearl and the appearance of the skin of a lady's face. The colour of the pearl would then be analogous to the lady's general skin type, her basic skin colour. Overtones would be like other colour highlights on the skin of her face, such as blusher on her cheeks or powder on her nose; localized areas with additional overlaid colour.

Orient is a subtly illusive rainbow colour phenomenon seen in the finest pearls, cultured pearls, and in mother-of-pearl. It chases across the surface of the nacre as a pearl, the light, or the observer moves, and may differ at various locations on a pearl and/or may be somewhat directional.

"The Valuer" from page 23

PHENOMENAL PEARLS

Orient is not seen on every pearl because the microscopic crystals of calcium carbonate of which nacre is comprised may vary in thickness, size, and distribution pattern from one specimen to another. Orient used to be explained as an interference phenomenon caused by thickness of individual crystals. It was suggested that only crystals that happen to be of the appropriate thickness to cause thin-film interference would yield the iridescence. More recent investigations suggest that orient is much more of a diffraction phenomenon.

In one¹ case very directional colours are generated by a microgroove structure. The interference colours are produced across rows of edges of aragonite crystals and the colours cannot be seen looking along the microgrooves. In another² case with colours visible from all directions, the interference colours generated depend upon the size, pattern and distribution of aragonite "tiles" (each of which may be composed of many aragonite crystals) across the surface. In the second case the pattern generating the diffraction is statistical, not fixedly structural like a crystal lattice. The brightness of the colour produced in each case depends on relative uniformity of the two-dimensional surface microstructure, and thus its

effectiveness as a two-dimensional diffraction grating or diffraction lattice.

When orient is present it significantly adds to the appearance of any pearl, but it is not seen on all pearls and a necklace of cultured pearls can be of fine quality even though it does not show orient. Orient is more often seen on irregular shapes and on uneven surfaces, but improves the quality of any pearl on which it appears.

Complexion indicates the condition and appearance of the surface of pearls with respect to the extent of surface and sub-surface irregularities such as dimples, pimples, wrinkles, or distracting dark (or white) spots. It is a completely separate issue from lustre, overtones, or orient, and is somewhat similar to clarity in a transparent stone. This similarity is based on the idea that the fewer, smaller, and less obvious the features considered, the better the quality. Terms used to describe complexion may include spotless, very lightly spotted, lightly spotted, spotted, heavily spotted, and very heavily spotted.

Matching is the extent to which individual characteristics and overall appearance of each pearl is the same as every other pearl in a group. Variations among pearls in one necklace may add a distraction from the beauty of the pearls. An observer may notice the variations to such an extent that a significant portion of the beauty is overlooked. The more closely the pearls in an item match one another, the more an observer notices the beauty of the pearls rather than

the differences between them. Terms used to describe matching may include poor, fair, good, very good, and excellent. For a selection of pearls deliberately chosen to contrast and highlight the differences between them, matching may not be a relevant issue.

Nacre thickness in cultured pearls can significantly influence their value. Very thick nacre is unusual in modern cultured pearls, and most have a nacre thickness of about 0.15 to 0.50 mm, which may be referred to as "standard". Other terms used to describe nacre thickness may include below standard, medium (or standard+), medium-thick, thick, or very thick.

Clearly, in this article, it is the terms lustre, colour, overtones, and orient that particularly refer to optical phenomena. It is not the intention of the author to support or oppose any particular pearl grading or pricing system. It is more a rationalization of pearl description that is sought. I hope that these descriptions clear up some of the misunderstandings about the terminology.

Questions, comments, and criticism are welcomed; erichardcarrier@rogers.com.



¹ Penn from B.W. Sengler, who teaches gemology for the geology department of the College of Southern Nevada.

² G. Brotta, *Waboonaga News*, February 1984, pp 22-23

³ R. Carrier, *Seeing The Light*, ISBN 097158162-2, pp 197-198

⁴ These sub-microscopic albite crystals were precipitated throughout the host orthoclase during a cooling transition that is part of the natural formation process of moonstone. This is similar to precipitates formed in fluids except that there is no settling out because the bonding in the host material is much stronger than the difference between the force of gravity on the host and that on the precipitate. This mechanism, where metastable structures reorganize while the environment has sufficient energy to allow them to migrate over short distances, is used to produce the synthetic spiral imitation of moonstone. An annealing process allows excess aluminum to precipitate out of the host synthetic spinel, which was deliberately grown with too much aluminum. The sub-microscopic corundum crystals are able to perform the same scattering and reflecting functions in the synthetic spinel as the albite does within the orthoclase. This produces a fairly convincing moonstone imitation even if there is a greater tendency to inclusions because of the shape of the corundum micro-crystals.

⁵ Iridescence of a shell of mollusc *Haliotis* (Ruhm, T.J. Tan et al, 2004, *Optical Society of America*, Vol. 12, No. 20 / *Optics Express* 4847.

⁶ Iridescence of a shell of the abalone, Y.Liu et al, 2002, *Journal of Gemmology*, 28(1)

STAYING IN LOOP UNDERSTANDING THE EVER-CHANGING MARKET FOR CULTURED FRESHWATER PEARLS

Jeremy Shepherd PearlParadise.com Inc
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FRESHWATER PEARLS, THE LAST CENTURY

The cultured freshwater pearl industry has a history of nearly 100 years. Just after Mikimoto began culturing beaded akoya pearls and before the world even knew of the existence of black pearls from the *Pinetada margaritifera*, Dr. Masao Fujita was culturing freshwater pearls in the *Hyriopsis schlegelii* mussel in Lake Biwa, Japan.

Over the last century, cultured freshwater pearls have remained primarily in the shadow of their cultured marine pearl cousins, often misunderstood, frequently misrepresented and nearly always underappreciated. Still today, the term "cultured freshwater pearl" conjures up images of Rice Krispie shapes, and orange and yellow dye-saturated colors to many in the industry.

FRESHWATER PEARLS, THE LAST DECADE

Today, freshwater pearls are quickly disrupting earlier conceptions and opinions. Nearly all production has moved from Japan to China, and from the inferior *Ostrea plicata* Chinese mussel to the superior *Hyriopsis cumingi* Chinese, and the *Hyriopsis schlegelii* Japanese mussel in China. The Chinese, with their wealth of labor, land and new-found capitalistic drive, have brought freshwater pearls to a new level. Today's best freshwater pearls rival the beauty of a fine akoya or South Sea strand, yet they are sold more and more a mere fraction of their beaded rivals.

In 2006, China produced an estimated 1,500 metric tons of freshwater pearls. While much of the production is lower-end material—nearly half of the total is unsuitable for finished jewelry—there is that small volume—less than 1/10th of a percent—that's gem grade. How can such a small percentage have an effect on consumer and industry opinion? That tiny percentage is about 1.5 metric tons a year, or nearly 50,000 strands.

CONSTANT CHANGES

The cultured freshwater pearl industry, unlike the Tahitian, South Sea and akoya industries, operates in an environment with little to no constraint. China's vast size, combined with the strong drive for success, has created an environment where producers are free to set their own rules. They determine how long the mussel stay in the water, the cultivation methods, and the sizes and qualities presented as raw material to the processing factories.

Cultured freshwater pearl wholesale and retail buyers must be on top the constant changes in the Chinese industry to understand everyday business and accurately value their purchases. The most important changes, and the easiest to miss, involve material size and ratio at the processing factory level.

WHEN 0.9 MEANS 1 AND 16 MEANS 16.5

A little-known fact in China is that the size and length of a hank or the size range of a lot of loose pearls can often determine how long ago the pearls were harvested. That's an important consideration because freshwater pearls can lose luster if not stored and cared for properly, or if over-treated during processing. The pearls' age can be determined because material sizes are constantly declining. There was a time when a temporary strand of pearls graded as a 7.0-8.0 mm strand was sold as a 16.5-inch, 7.0-8.0 mm strand. That typical princess length would knot to an average of 18 inches. That time is long gone.

The first dip in material sizing happened at the turn of the century. As material pricing fluctuated, producers realized they could lower the sizes of their lots and strands by a mere tenth of a millimeter and increase their profit by a full 10 percent. Size of 7.0-8.0 mm strands became 6.9-7.9 mm. Buyers barely noticed that tiny difference. There was some confusion, but there was also quick acceptance.

A slight drop in strand length followed. By 2003, a temporary strand of freshwater pearls no longer knotted to 18 inches. The new standard was 17.5 inches. The processing factories were then able to pocket the pricing advantage.

Size declines have continued unabated for the past five years, with a drop of approximately 0.1 mm every other year. Eventually, the industry had no choice but to take notice.

TODAY

The biggest change in material size happened in the past year. Today, a factory-size material strand of 7.0-8.0 mm pearls actually measures 6.5-7.5 mm. But that's not the end of the story. Just over a year ago, that same strand would have measured 6.6-7.6 mm. About half of the pearls would have fallen in the upper 50 percent size range, with the other half in the lower 50 percent range. With current material sizing, the situation has changed dramatically. Now, only 25 percent of the pearls fall in the upper range, and 75 percent fall in the lower range.

WHAT DOES THIS MEAN FOR BUYERS AND SELLERS?

Knowledge is the first and most important tool a wholesale or retail buyer has. Understanding sizing is key to understanding pricing and value. By comparing a supplier's historical sizing and pricing, a buyer can determine how much negotiation is necessary to get an appropriate price. If a buyer is dealing directly with a factory, a discussion of hank sizing has to take place.

Many buyers now source cultured freshwater pearls in half-size increments similar to those in the wholesale akoya business. Instead of buying full millimeter sizes, buyers can now focus on sizes like 7.5-8.0 mm, or 8.5 to 9.0 mm.

STAYING IN LOOP UNDERSTANDING THE EVER-CHANGING MARKET FOR CULTURED FRESH WATER PEARLS

HOW THESE CHANGES AFFECT VALUE

Unfortunately, in many circumstances the sizing changes haven't reduced buyers' prices. This might be due to a lack of knowledge on the buyer's part or by misplacing trust in a supplier. Many buyers have been burned. But that doesn't change the fact that their recent purchases have a lower value. A strand of down-sized cultured freshwater pearls—both in the percentage ratio and size range—are as much as 20 percent lower in value.

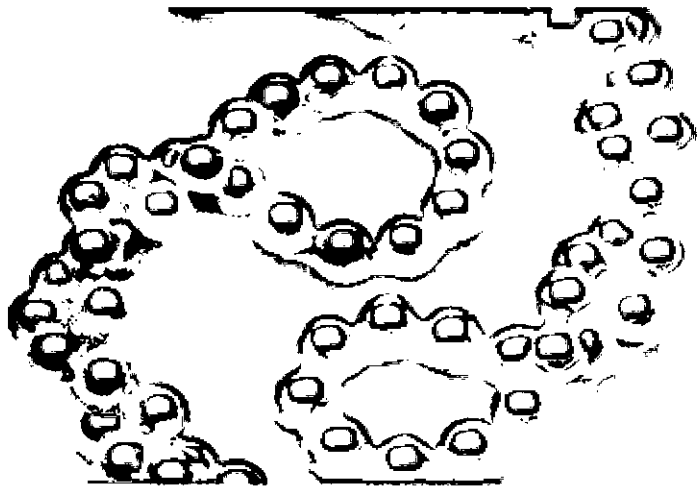
On the opposite side, those buyers who choose the more expensive half-millimeter sizing have dramatically increased the value of their purchases. For example, a strand of pearls that measures 7.0-7.5 mm is composed of the largest 25 percent of material-size 6.5-7.5 mm pearls, increasing the value by as much as 50 percent. Taken a step farther, if a strand is 7.5-8.0 mm pearls, it's now composed of material purchased as 8.0-9.0 mm, down-sized to 7.5-8.5 mm, of course. This dramatically increases the value over any full size 7.0-8.0 mm strand whether it's composed from real-size materials or down-sized.

CONCLUSION

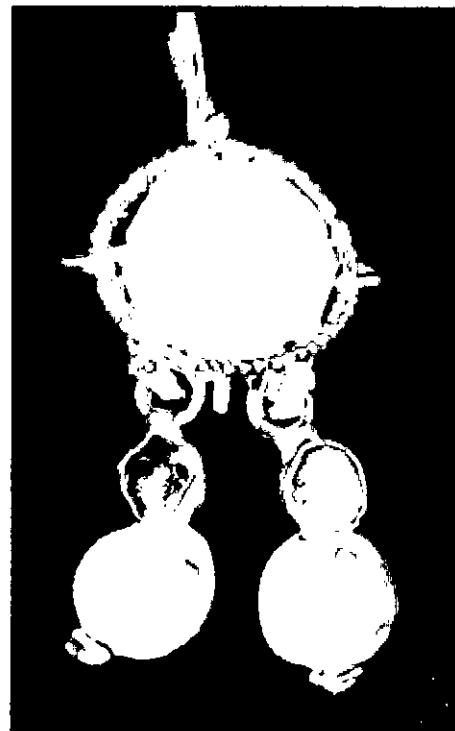
Every buyer, seller, or valuer has to staying abreast of the changes in the cultured pearl industry so he or she can provide the best possible product or service to the customer. Considering the lack of information available in so many parts of the industry, that can be a challenging prospect, especially when astute producers and suppliers benefit greatly from the confusion.

Cultured freshwater pearls are becoming increasingly popular with fine jewelry suppliers, designers and astute consumers. Aside from keshis, they are the only cultured pearls produced today that are close in composition to the natural pearls of the old days. While Chinese freshwater cultured pearls are by no means the only choice for consumers, they will undoubtedly soon become the first choice. The vast range of sizes, shapes, colors, qualities and prices provide unequalled consumer choice for an affordable gem.

For more information please see,
<http://www.pearl-guide.com>



FINE FRESHWATER PEARLS.



A RARE FIND

This stunningly intact 2,000-year-old gold, pearl, and emerald earring was discovered under a parking lot just outside Jerusalem's Old City. The earring was found in the remains of a fourth- or fifth-century A.D. Byzantine-era structure, which the parking lot had been built over. However, archaeological data indicate the earring was produced sometime from the second to the fourth century A.D., when the area was under Roman rule.

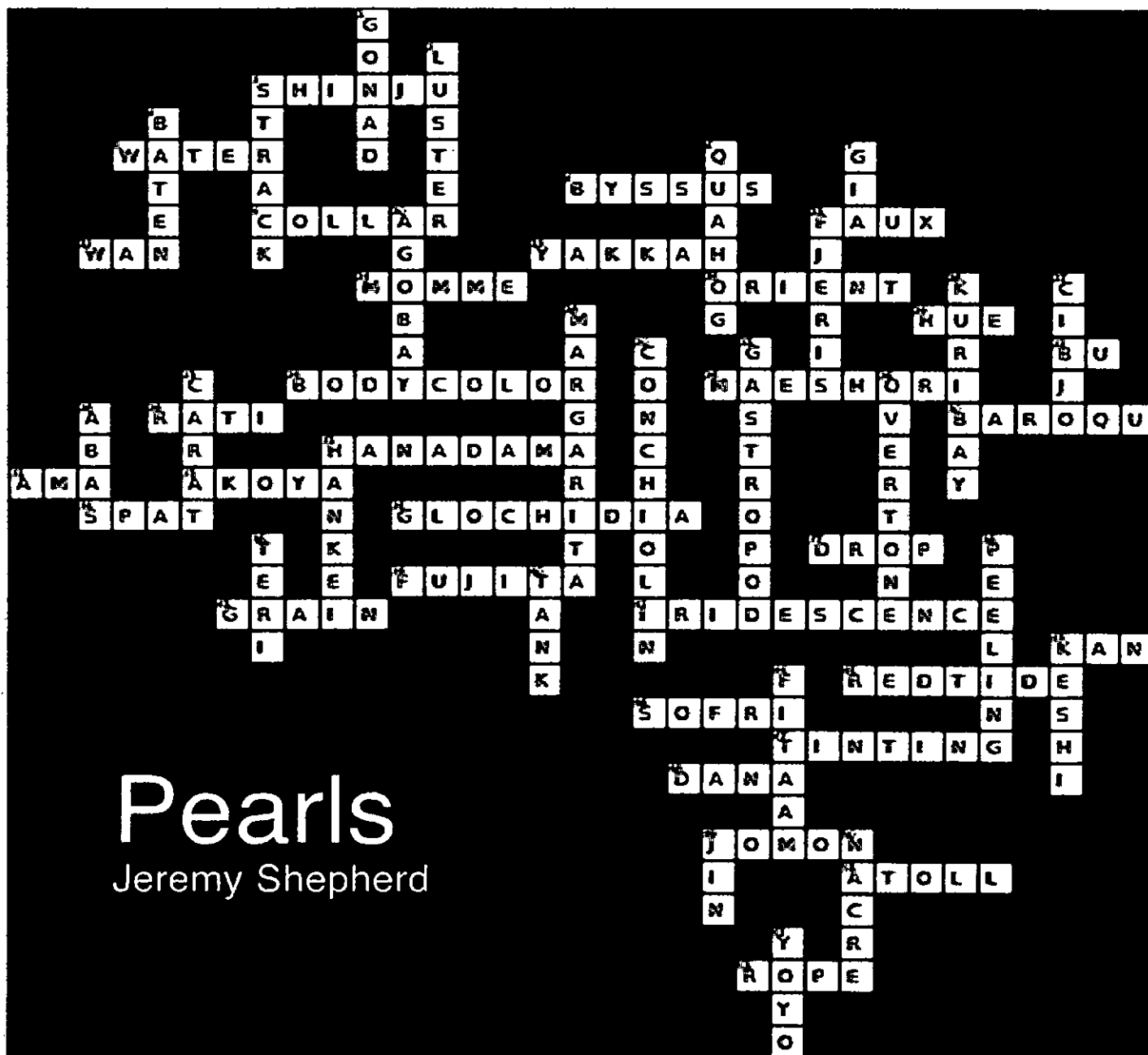
"Valuable objects such as these were handed down from one generation to the next," said Doron Ben-Ami of the Israel Antiquities Authority, who co-led the excavation. "The time gap [between the Roman and Byzantine periods] is not so big, just 200 or so years. The earring was astonishingly well preserved, so much so that it seems it was manufactured only yesterday," he said.

This style of jewelry was typical of the Roman Empire and was likely worn by a woman of high status. The bauble is similar to illustrations of jewelry found in tombs from Roman-era Fayum, Egypt, Ben-Ami said. The new find may have been produced locally or may have reached Israel from Egypt via a trader, merchant, or other traveler, he continued. ♦

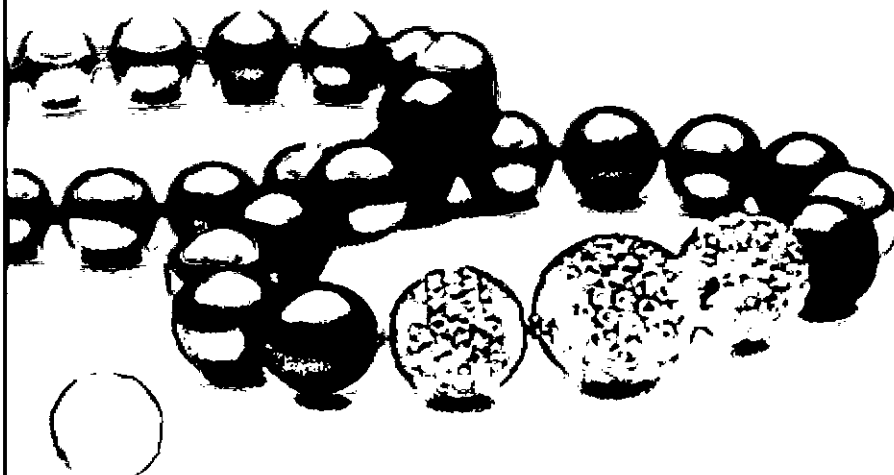
Sources: Eve Alfillé, *National Geographic News*, Mati Milstein in Tel Aviv, Israel. Photograph by Clara Amit, courtesy of the Israel Antiquities.

CROSSWORD PUZZLE ANSWERS (from last issue)

A puzzle of pearls harder to crack than nacre.

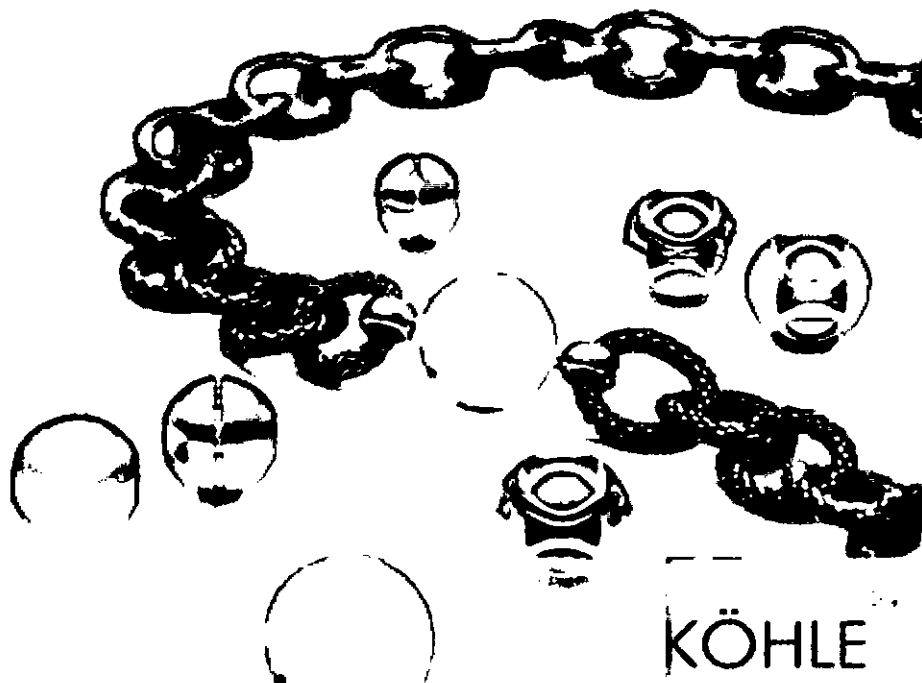


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