



# Pearls

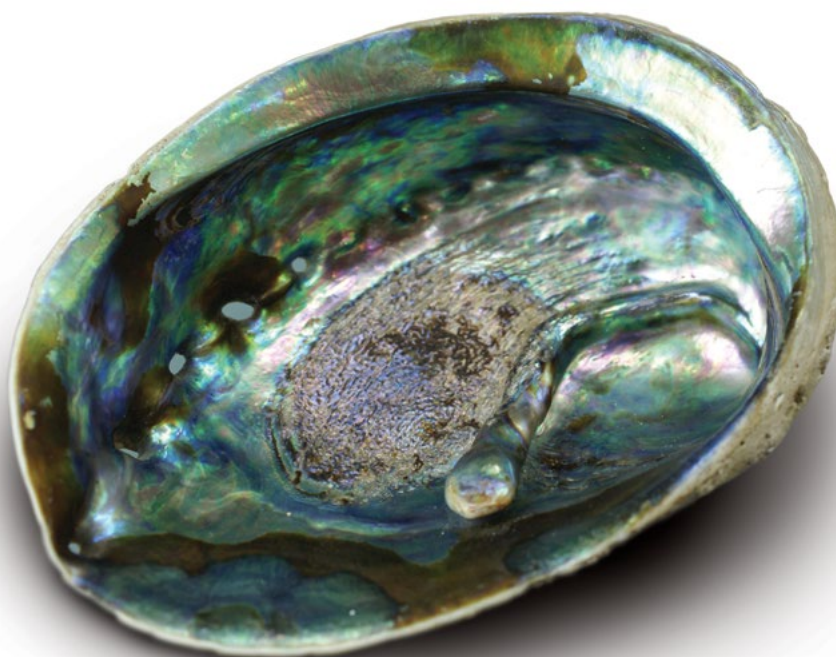
Retailers' Reference Guide



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# Introduction – types of pearls

## Types of pearls

Pearls may be natural (nacreous or non-nacreous) or cultured (nacreous or non-nacreous), come from either salt-water or freshwater molluscs. They may come in a variety of colours, shapes and sizes and may be suitable to be strung in the form of necklaces, set in rings and brooches etc. Other important pearls have had significant collector potential and have become the centrepiece of displays in museums and personal collections throughout the world.

## Natural pearls

Almost any mollusc can produce a natural pearl. Natural pearls form accidentally within naturally formed pearl sacs in the interior of molluscs without interference from man. Molluscs are invertebrates with a soft unsegmented body, usually protected by a shell in one, or two, pieces. Natural pearls occur in two basic forms; whole pearls and blister pearls. Natural Blisters also occur.

Natural pearls may be nacreous or non-nacreous and come from either salt-water or freshwater molluscs.

## Whole natural pearls

Pearls accidentally formed in a naturally formed pearl sac within molluscs without assistance from man. A naturally formed pearl-sac is derived from the internal or external layer of the epithelium of the mantle or of the gill plates. The epithelial cells of the pearl-sac secrete the nacre (or non-nacreous material) which becomes deposited over a foreign body (often too small to resolve), forming a pearl over time. Their entire surface is covered with nacre or non-nacreous material

## Natural blister pearls

Pearls found attached to the inner surface of mollusc's shell and formed without assistance from man. They first form as natural pearls in a naturally formed pearl sac, then break the sac to attach to the surface of the shell, where the host mollusc covers their surface with further layers of nacre or non-nacreous material.



Nacreous natural salt-water pearls of various shapes and sizes being traded in Dubai (left) and an important natural saltwater pearl necklace (right)



An 850ct natural blister pearl



Cross-sections of freshwater natural pearls showing the typical concentric growth structures of natural pearls

# Introduction – types of pearls

## Natural blister

Nacreous or non-nacreous protuberance accidentally formed on the inner surface of the mollusc shell without any assistance from man. They commonly originate from the intrusion of a foreign material into a space between mantle and inner surface of the nacreous or non-nacreous shell, or the repair of a hole in the shell bored by the intrusion of a sponge, parasite or similar.

## Cultured pearls

Cultured pearls are formed in molluscs with the assistance of man. This human intervention should only involve the insertion of a piece of mantle tissue from another mollusc (usually of the same species) on top of a shell bead placed in the gonad (most saltwater molluscs) or into the mantle (freshwater molluscs) from which a cultured pearl sac is produced and which in turn secretes nacre (the substance normally produced by a mollusc to form the shell or a natural pearl. Cultured pearls occur in three basic forms, the whole-round cultured pearl (which may be either beaded or non-beaded), cultured blister pearls and cultured blisters.

## Whole-round cultured pearl

Cultured pearls form in a cultured pearl sac within a mollusc with the assistance of man. Human intervention only gives rise to the formation of the cultured pearl sac and the introduction of a shell-bead (in the case of beaded cultured pearls). Whole round cultured pearls are classified into beaded cultured pearls and non-beaded cultured pearls.

## Bead cultured pearl

Cultured pearls formed in a cultured pearl sac within a mollusc by inserting a piece (or pieces) of epithelial (mantle) tissue and a bead (or beads) usually made from a freshwater shell. Bead (or beads) are entirely covered with nacre secreted by the cultured pearl sac.

## Non-beaded cultured pearls

Cultured pearls formed in a cultured pearl sac within a mollusc by inserting a piece (or pieces) of epithelial (mantle) tissue. They are entirely composed of nacre secreted by the cultured pearl sac.

## Cultured blister pearls

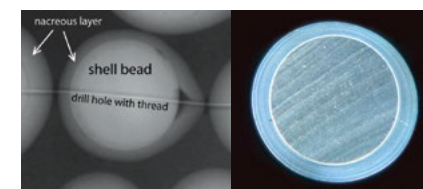
Cultured pearls formed on the inner surface of mollusc shell with the assistance of man. They form as whole cultured pearls in a cultured pearl sac; they then break from the cultured pearl sac to attach to the surface of the shell, where the host mollusc covers their surface further with nacre.

## Cultured blister (Hankei cultured pearls)

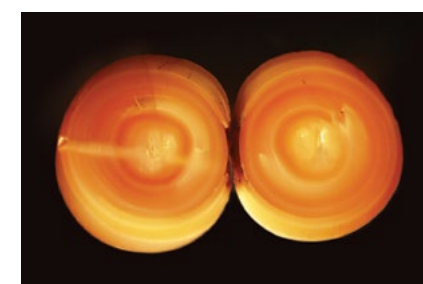
Pearls formed on the inner surface of the shell of molluscs by attaching an hemispherical (including three-quarter) object (or objects). The entire surface of the object (or objects) is covered with nacre secreted by molluscs.

## Imitation pearls

Imitation pearls are artificial products not formed within (natural or cultured) pearl sacs or in molluscs but manufactured by man to imitate the appearance, colour and other features of natural or cultured pearls.



A microradiograph (left) of a beaded cultured pearl strung as part of a necklace shows the bead inserted and the nacreous layers formed during the growth period. A cross-section of a beaded cultured pearl (right) showing the layered structure of the shell bead and the concentric nacreous overgrowth



Cross section of a non-beaded freshwater cultured pearl; showing that it has no bead at its centre and that it is composed entirely of nacre

# Natural pearls

## History

Many historical documents show that mankind has used natural pearls as ornaments since long before the beginning of the Christian era. In about 4,000 BC, the Indian Ocean, the Red Sea and the Gulf were famous for being a rich source of natural pearls. In addition, many European countries produced freshwater natural pearls.

In the New World, after the discovery of America by Columbus, numerous salt-water natural pearls were fished, especially in Venezuelan and Mexican waters. From the 1930s the nacreous natural pearl market contracted, largely related to a combination of the great depression, the discovery of oil in the Arabian Gulf and the appearance of cultured pearls.

## Natural pearls today

Currently, most pearls sold are cultured, but natural pearls are still available in the markets of the Gulf and India as well as south-east Asia in general, Australia and the USA. In addition, natural pearls can be viewed in sumptuous royal or museum collects and purchased in the higher end jewellers and certainly can regularly be found in major auction sales.

## Queen Conch pearl

Conch pearls are produced by a gastropod commonly known as the "Queen" or "Giant conch" (*Lobatus gigas* also known as *Strombus gigas*) that inhabits Caribbean waters. Conch pearls differ from ordinary nacreous pearls by having a tough crossed lamellar micro-architecture that manifests itself as a flame-like structure that appears to move as "watered-silk" when the pearl is moved under light. Queen conch pearls may also be cultured, but generally they are natural and come in a variety of colours. Some imitations are attempted by cutting the thick shell into beads.



The pearling fleet returns home after months at sea



Natural conch pearls of various colours



On the left a 111.59ct example of a natural pearl from *Cassis madagascarensis* (the Queen Helmet); the remainder are all natural pearls from *Triplofusus papillosus* (the Horse Conch) and weigh 198.26ct (top left) 112.03ct (top centre) 74.80ct (top right) and left to right in the bottom row 16.02ct, 11.16ct, 7.43ct, and 16.36ct

# Natural pearls

## Horse conch

The Horse conch pearl is a natural pearl produced by the Horse conch (*Triplofusus papillosus* also known as *Pleuroploca gigantea*), a very large gastropod inhabiting Caribbean and Indo-Pacific waters. It has an orange to reddish brown colour, and possesses a unique surface pattern.

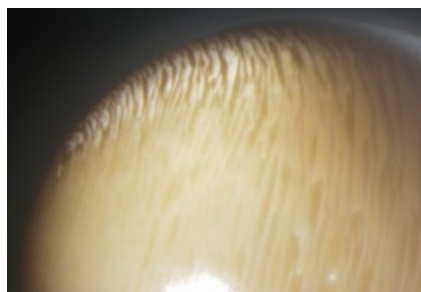


A group of Melo pearls

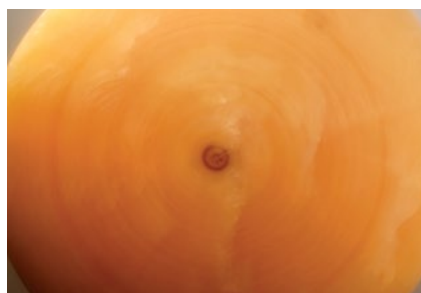
## Melo pearl

Melo pearls are produced by the large volute with the genus *Melo*, inhabiting the South China Sea, the waters around Australia, the Philippines, the eastern coast of Indonesia and the Andaman Sea. In Taiwan, Malaysia, Indonesia, China and Vietnam they are caught for food.

Melo pearls are usually spherical and quite large but can also be baroque, they have a yellowish brown to orange and orangeish-brown colour. Like the Conch pearl and Horse conch pearl, Melo pearls do not have a nacreous structure but instead a crossed lamellar micro-architecture. The species known to have produced natural pearls are *Melo broderipii*, *Melo Amphora* and *Melo melo*.



The appearance of "watered-silk" on the surface of a Melo pearl



The concentric growth structure of a sectioned Melo pearl



Melo pearls may be produced by any of the *Melo* volutes, illustrated here is the shell of *Melo melo*

# Natural pearls

## Natural freshwater pearls

Most of the natural freshwater pearls on sale today are from the United States, they are obtained as a by-product of mussels from Unionidae collected as material to make pearl culturing beads. (mostly used for saltwater pearl cultivation). Among pearls gathered, those with interesting shapes such as "Wing" and "Rose bud" and exceptional colours are preferred.

In addition, natural freshwater pearls are found in rivers throughout Europe, the UK and Ireland.

## Abalone pearl

Abalone is a gastropod of *Haliotis* spp widely inhabiting Pacific, Atlantic and Indian Oceans. The population is particularly rich along the coastal areas of Japan, North America and Australia. Though abalone pearls are popular, round examples are very rare, many are horn-shaped.



Fishing for natural freshwater pearls in a fast flowing river in Scotland



An important single white natural freshwater pearl and necklace from the United States (top) and a lilac coloured natural freshwater pearl in the mussel shell in which it was found (bottom)



A large horn-shaped natural abalone pearl along with a very rare near-round natural abalone pearl (top right) and the interior of an abalone shell (bottom right)



# Cultured pearls

## History

The modern cultured pearl industry started with Mikimoto's hemispherical cultured pearl in 1893. In 1907 the technique of spherical or whole pearl culturing was developed. Since then, the cultured pearl industry has grown significantly. Pearl culturing areas have been extended, and in addition to the Akoya pearl oyster other species such as Silver/Gold lipped pearl oyster, Black lipped pearl oyster, the abalone and (in freshwater) the Triangle mussel are used.

## Pearl culturing methods

At present three culturing techniques are used; bead pearl culturing, non-bead pearl culturing and the hemispherical or "Hankei" cultured blister.

### Beaded cultured saltwater pearl

Based on Nishikawa's "Piece method", a bead (or beads) and 'piece' (or pieces) of mantle tissue from a sacrificed mollusc usually of the same species (the 'piece' eventually forming the 'cultured pearl sac' which secretes nacre over the entire surface of the bead) are inserted into the gonad of the host mollusc. Most salt-water cultured pearls are beaded.

### Non-beaded cultured pearl

A piece (or pieces) of mantle tissue is inserted into a pocket (or pockets) in the mantle of a mussel (the 'piece' eventually forming the 'cultured pearl sac' which secretes nacre inwards on empty space). Most of freshwater cultured pearls are non-beaded.

## Cultured blister (Hankei)

A hemisphere or three-quarter object) is placed on the inner surface of the shell and over time this is covered with nacre from the mantle of the host mollusc. Cultured blisters of this type are usually produced by using the Mabé pearl oyster (*Pteria penguin*) and *Pteria sterna*), as a result cultured blisters are also called Mabé cultured blisters.

## Black-lipped pearl culturing

French Polynesia is the main country for producing black cultured pearls using the Black-lipped pearl oyster. However, culturing areas are expanding to Fiji, New Caledonia, and the Cook Islands. Recently smaller-sized black cultured pearls of below 10mm are on the increase.



# Pearl culturing and the molluscs

## Akoya cultured pearls

Cultured in Japan, China and Vietnam using Akoya oysters (*Pinctada fucata (martensii)*). Compared with other "pearl oysters", the Akoya oyster is rather small; hence the size of pearl produced is usually less than 10mm. The most popular sizes are 6 and 7mm. Most of them contain a bead cut from the inner shell of a freshwater mollusc, although non-beaded examples are becoming more available.



Akoya pearl culturing – inspecting the nets (left) and the Akoya shell (right)



The bead insertion operation

## Silver / Gold-lipped cultured pearls

Cultured in Australia, Indonesia, Philippines and Burma using Silver / Gold-lipped pearl oysters (*Pinctada maxima*). Generally, Australia produces large sized high-quality cultured pearls of over 10mm while in Indonesia smaller sized cultured pearls of below 10mm are also produced. The Philippines produce many golden cultured pearls using Gold-lipped oyster. Most of them contain a bead cut from the inner shell of a freshwater mollusc, although non-beaded examples are becoming more available.



The Silver-lipped (left) and the Gold-lipped (right) oyster shells

# Pearl culturing and the molluscs

## Black-lipped pearl culturing

French Polynesia is the main country for producing black cultured pearls using the Black-lipped pearl oyster. However, culturing areas are expanding to Fiji, New Caledonia, and the Cook Islands. Recently smaller-sized black cultured pearls of below 10mm are on the increase.

## Freshwater pearl culturing

Modern freshwater pearl culturing began in 1924 in Lake Biwa, Japan. Though pearl culturing was forced to stop because of World War II, the production volume increased thereafter. Production began to decrease from 1980, and today has reduced to almost zero.

Chinese freshwater pearl culturing, started in 1981 with the export of 600g pearls to Japan. At present, annual Chinese freshwater cultured pearl production exceeds 1,500 tons. By the improvement of culturing techniques, large, round and smooth-surfaced pearls are able to be produced. However, large volumes of middle to low quality pearls are appearing on the world markets.



Inspecting the nets (left),  
the black-lipped oyster shell (right)  
and the bead insertion operation (below)

# Quality of the cultured pearl

## Quality elements

### Size

Sizes of cultured pearls are measured in millimetres (mm).

Size range is largely dependent on the mollusc species used in the process.

- Akoya cultured pearl: 2-10mm
- Silver/Gold-lipped and Black-lipped cultured pearl: 8-16mm
- Freshwater cultured pearl: 2-13mm., although larger have become available.

### Shape

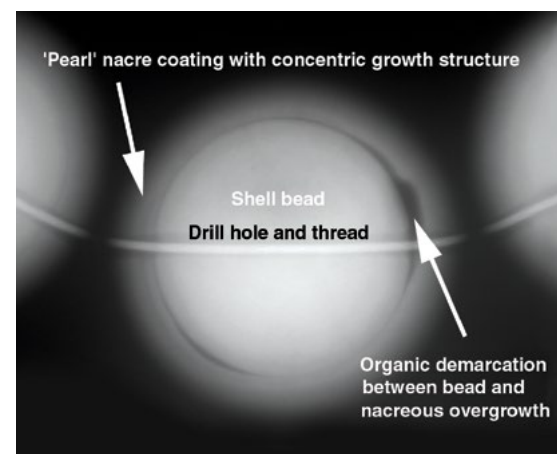
Perfectly round is highly valued. Shapes are divided into: round, oval, drop, button, and baroque with various asymmetrical circled versions.

### Nacre thickness

The depth of nacre coating on top of the bead in bead cultured pearls. It has some impact of their colour, lustre and durability. X-rays are used to measure nacre thickness and assist in observing nacre quality.

### Surface condition

The surface of a cultured pearl is examined in terms of the number, size, kind and location of the imperfections. In evaluating the surface of cultured pearls, imperfections are taken into account – whether the pearl has a clean surface, one spot or many spots.



A microradiograph indicating the measurement of nacre thickness

# Quality of the cultured pearl

## Lustre

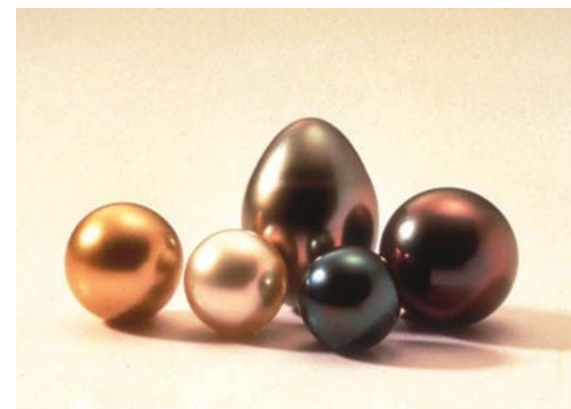
Lustre is defined by the quality of the reflected light. A lustrous pearl has a strong bright and sharp reflection. A low lustre pearl is not bright and its reflection is dull. Many cultured pearls are heavily polished.

## Colour

A pearl's colour contains three basic components, hue, tone and saturation. Colour characteristics differ according to the mollusc species. Overtones or "orient" may be present.



An illustration of high surface lustre in Akoya cultured pearls



An illustration of variously coloured cultured pearls

# Quality of the cultured pearl

## Akoya cultured pearl

*Size:* 2 -10mm. 6 and 7mm are the most popular.

*Shape:* Round, semi-round, oval, button, drop, semi-baroque, baroque and circlé.

*Nacre thickness:* Minimum is around 0.3mm.

*Colour:* Pink, green pink, silver pink, cream pink, white, green, cream, gold.

## Silver/Gold-lipped cultured pearl

*Size:* Over 10mm is the most popular but smaller sizes (8, 9mm) are available.

*Shape:* Same as Akoya cultured pearl.

*Nacre thickness:* Thick nacre

*Colour:* Silver, silver pink, pink, grey, cream, golden and yellow.

## Black-lipped cultured pearl

*Size:* Over 10mm is the most popular. Recently smaller sizes (8, 9mm) have appeared.

*Shape:* Same as Akoya cultured pearl.

*Nacre thickness:* Thick nacre

*Colour:* Black, green, brown, blue, grey, peacock, red.

## Freshwater cultured pearl

*Size:* 3 to over 10mm

*Shape:* Round, semi-round, oval, rice, button, drop, baroque.

*Colour:* Three basic colours (orange, purple and white).



Akoya cultured pearls (top left),  
Silver- and Gold-lipped cultured pearls (top right),  
Black-lipped cultured pearls (bottom left)  
and freshwater cultured pearls (bottom right)

# Treatment of a pearl or cultured pearl

Treatment is any action by man (other than polishing, cleaning, buffing and peeling) that alters the appearance of a pearl or cultured pearl. The following treatments must be declared at the point of sale.

**Bleaching:** to remove, lighten or alter colour by means of chemical and/or physical agents or light.

**Coating:** an artificial layer of any natural or artificial substance spread over the surface, of pearls for protection, colouration, increased lustre and other optical phenomena, decoration or to change appearance; a covering layer.

**Dyeing:** any colour caused artificially by the application of a dye to pearls.

**Filling:** a substance that occupies a whole or part of a void in a pearl.

**Irradiation:** exposing pearls or cultured pearls to radiation.

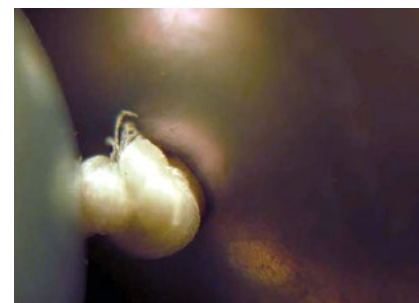
**Lustre enhancement:** Any treatment or process applied to enhance the lustre of a natural or cultured pearl.

**Oiling:** a process sometimes applied to natural and cultured pearls, whereby the surface of pearls are soaked in warm oil; to diminish the appearance of cracks.

**Tinting:** a treatment which causes a subtle change in colour and/or appearance.

**Waxing:** the application of a colourless wax or similar products to, or near, the surface of a pearl.

**Working:** significantly remove layers of nacreous or non-nacreous material from a pearl, usually to remove blemishes and/or to reshape a pearl, especially blister pearls.



Detail of a dyed pearl

For more information about CIBJO standards and rules regarding treatments, please download a free pdf copy of the CIBJO Pearl Bluebook: [www.cibjo.org](http://www.cibjo.org)

