

CIBJO Pearl Guide

Progress Report

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CIBJO Guides

**Describing and Classifying
Natural and Cultured Pearls,
the Producing Molluscs &
Responsible Pearling**

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The draft of the original version of this guide was produced by the Paspaley Team encouraged by Nick Paspaley and Peter Bracher. The natural pearl classification sections were conceptualised by the staff of the Gem and Pearl Testing Laboratory of Bahrain, in cooperation with the CIBJO Pearl Commission and completed by GPTLB's successor the Bahrain Institute for Pearls and Gemstones (DANAT).



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The "Palawan Strand" a high-quality necklace of South Sea Cultured Pearls created within the "gold lipped pearl oyster" Pinctada maxima by Jeweler in their Philippine farms.

A brief overview of progress

- All meetings have been via Zoom video conferencing with e-mail and other messaging applications in between.
- Currently at 268 educational pages of illustrated pearl information
- Hundreds of potential images
- Covers all natural and cultured pearl producing (present and historic) bodies of water and the pearls produced



ACKNOWLEDGEMENTS	3
LANGUAGE	3
FOREWORD	4
IMPORTANT FACTS	9
NACREOUS SALTWATER NATURAL PEARLS	10
NACREOUS FRESHWATER NATURAL PEARLS	11
NON-NACREOUS NATURAL PEARLS	12
NACREOUS SALTWATER CULTURED PEARLS	13
NACREOUS FRESHWATER CULTURED PEARLS	14
PEARL CATEGORIES EXPLAINED	15
BASRA PEARLS	16
ORIENTAL PEARLS	16
IMITATIONS OF PEARLS	16
SUSTAINABILITY	17
PREAMBLE	17
OPPORTUNITIES AND RISKS	17
MOLLUSCS DRIVEN IMPACT ON COMMUNITY AND ECOSYSTEMS	18
INFORMATION	18
FARMER/PEARLER IMPACT ON COMMUNITY AND ECOSYSTEMS	19
INFORMATION	19
TRANSPARENCY AND TRACEABILITY	20
QUESTIONS TO ASK	20
BUSINESS & PRODUCT CLAIMS	20
IMPACT CASE STUDIES	21
BIBLIOGRAPHY	41
SALTWATER NACREOUS AND NON-NACREOUS BIVALVES	42
ANADARA SPP. (J.E. GRAY, 1847)	43
ARGOPECTEN PURPURATUS (LAMARCK, 1819)	44
CHAMA SPP. (LINNAEUS, 1758)	45
CODAKIA TIGERINA (LINNAEUS, 1758)	47
CRASSOSTREA VIRGINICA (GMELIN, 1791)	48
HIPPOPUS SPP. (LAMARCK, 1799)	49
HYOTISSA HYOTIS (LINNAEUS, 1758)	50
ISOGNOMON ISOGNOMON (LINNAEUS, 1758)	51
ISOGNOMON SPATHULATUS (REEVE, 1858)	52
LIMA VULGARIS (LINK, 1807)	53
MAORICARDIUM PSEUDOLIMA (LAMARCK, 1819)	54
LOPHA CRISTAGALLI (LINNAEUS, 1758)	55
MAGALLANA BILINEATA (RÖDING, 1798)	56
MERCENARIA MERCENARIA (LINNAEUS, 1758)	57
MODIOLUS PHILIPPINARUM (HANLEY, 1843)	58
MYTILUS CALIFORNIANUS (CONRAD, 1837)	59
MYTILUS EDULIS (LINNAEUS, 1758)	60
NODIPECTEN NODOSUS AND N. SUBNODOSUS	61
PERINGLYPTA LISTERI (J. E. GRAY, 1838)	62
PERINGLYPTA MAGNIFICA (HANLEY, 1845)	63
PERNA VIRIDIS (LINNAEUS, 1758)	64
PINCTADA MAXIMA (JAMESON, 1901)	65
PINCTADA MARGARITIFERA CUMINGII, (LINNAEUS, 1758)	66

PINCTADA MARGARITIFERA TYPICA (JAMESON, 1901)	67
PINCTADA PERSICA (JAMESON, 1901)	68
PINCTADA RADIATA (LEACH, 1814)	69
PINCTADA IMBRICATA (RÖDING, 1798)	70
PINCTADA FUCATA (GOULD, 1857)	71
PINCTADA MAZATLANICA (HANLEY, 1856)	72
PINCTADA MACULATA (GOULD, 1850)	73
PINCTADA VULGARIS (SCHUMACHER, 1817)	74
PINNIDAE FAMILY	75
PISMO CLAM - TIVELA STULTORUM, (MAWE, 1823)	76
PLACOPECTEN MAGELLANICUS - (GMELIN, 1791)	77
PLACUNA PLACENTA (LINNAEUS, 1758)	78
PTERIA COLYMBUS (RÖDING, 1798)	79
PTERIA PENGUIN (RÖDING, 1798)	80
PTERIA STERNA (GOULD, 1851)	81
RUBITAPES DECUSSATUS (LINNAEUS, 1758)	82
SACCOSTREA CUCCULATA (BORN, 1778)	83
SPONDYLUS SPP. (LINNAEUS, 1758)	84
TRIDACNA SPP. (BRUGUIÈRE, 1797)	85
TRISIDIOS SEMITORTA (LAMARCK, 1819)	87
SALTWATER NACREOUS AND NON-NACREOUS UNIVALVES	88
ALIGER GIGAS (LINNAEUS, 1758) (ALSO KNOWN AS STROMBUS GIGAS)	89
CASSIS CORNUATA (LINNAEUS, 1758)	91
CASSIS MADAGASCARENENSIS (LAMARCK, 1822)	93
CHICOREUS RAMOSUS, (LINNAEUS 1758)	94
CONUS TEXTILE (LINNAEUS, 1758)	96
CYMATIUM (MONOPLEX) FILEARE (LINNAEUS, 1758)	97
CYPRAEA TIGRIS (LINNAEUS, 1758)	98
FUSINUS COLUS (LINNAEUS, 1758)	99
FUSINUS LONGISSIMUS (GMELIN, 1791)	100
FUSINUS NICOBARICUS (RÖDING, 1798)	101
HELCION PRUINOSUS (KRAUSS, 1848)	102
HALIOTIS SPP. (LINNAEUS, 1758)	103
LAMBIS LAMBIS (LINNAEUS, 1758)	105
LEPORICYPRAEA MAPPA (LINNAEUS, 1758)	106
LITTORINA LITTORAE (LINNAEUS, 1758)	107
MELO SPP. (BRODERIP, 1826)	108
MONETARIA ANNULUS (LINNAEUS, 1758)	109
NAUTILUS POMPILIUS, (LINNAEUS, 1758)	110
PLEUROPLECA TRAPEZIUM (LINNAEUS 1778)	111
TELESCOPIUM TELESCOPIUM (LINNAEUS, 1758)	112
TRIPLOFUSUS SPP. (OLSSON & HARBISON, 1953)	113
TURBO MARMORATUS (LINNAEUS, 1758)	115
FRESHWATER BIVALVES	116
AMBLEMA PUCATA (SAY, 1817)	117
CRISTARIA PUCATA (LEACH, 1814)	119
CUMBERLANDIA MONODONTA (SAY, 1829)	120
CYCLONAIAS TUBERCULATA (RAFINESQUE, 1820)	121
CYRTONAIAS TAMPICENSIS (LEA, 1838)	122
DIPLODON CHILENSIS (GRAY, 1828)	123
DROMUS DROMAS (LEA, 1834)	124
ELLIPSARIA LINEOLATA (RAFINESQUE, 1820)	125
ELLIPTIO CRASSIDENS (LAMARCK, 1819)	126
FUSCONAIA FLAVA (RAFINESQUE, 1820)	127

<i>HYRIOPSIS CUMINGII</i> (LEA, 1852).....	128
<i>HYRIOPSIS SCHLEGELII</i> (MARTENS, 1861).....	129
<i>LASMIGONA COMPLANATA</i> (BARNES, 1823).....	130
<i>LIGUMIA RECTA</i> (LAMARCK, 1819).....	131
<i>MARGARITIFERA MARGARITIFERA</i> (LINNAEUS, 1758).....	132
<i>MEGALONAIAS NERVOSA</i> (RAFINESQUE, 1820).....	134
<i>OBLIQUARIA REFLEXA</i> (RAFINESQUE, 1820).....	135
<i>LAMPSIDIS PECTOROSA</i> (CONRAD, 1834).....	136
<i>PUSTULOSA NODULATA</i> (RAFINESQUE, 1820).....	137
<i>QUADRULA QUADRULA</i> (RAFINESQUE, 1820).....	138
<i>QUADRULA VERRUCOSA</i> (RAFINESQUE, 1820).....	139
<i>REGINAIA EBENUS</i> (LEA, 1831).....	140
<i>SINANODONTA CALUPYGOS</i> (KOBELT, 1879).....	141
<i>SINANODONTA WOODIANA</i> (LEA, 1834).....	142
<i>THELIDERMA METANEVRA</i> (RAFINESQUE, 1820).....	143
<i>THELIDERMA SPARSA</i> (LEA, 1841).....	144
THE CLASSIFICATION OF PEARLS	145
IMPORTANT NOTICE	145
GENERAL INFORMATION	146
FIVE EXAMPLE CLASSIFICATION SYSTEMS	147
CLASSIFYING NATURAL PEARLS FROM AKOYA COMPLEX	148
THE CHARACTERISTICS OF NATURAL PEARLS	148
LUSTRE	150
UNTREATED NATURAL COLOUR	151
SURFACE APPEARANCE	153
SHAPE	154
WEIGHT AND SIZE	158
WEIGHT / PRICE CALCULATION	158
MEASUREMENTS	158
THE GIA 7 PEARL VALUE FACTORS CLASSIFICATION SYSTEM	159
SIZE	160
SHAPE	161
COLOUR	162
LUSTRE	163
SURFACE	163
NACRE	164
MATCHING	165
CLASSIFYING <i>PINCTADA MAXIMA</i> CULTURED PEARLS	166
THE CHARACTERISTICS OF PEARL QUALITY	167
LUSTRE	168
COLOUR	169
SURFACE APPEARANCE	170
SHAPE	171
SIZE	172
NOTE ON UNITS OF MEASUREMENT	172
CLASSIFYING JAPANESE AKOYA CULTURED PEARLS.....	173
QUALITY OF CULTURED PEARLS AS GEMS.....	173
HISTORICAL BACKGROUND.....	175
QUALITY ELEMENTS.....	178
CLASSIFYING CHINESE FRESHWATER CULTURED PEARLS	186
THE CHARACTERISTICS OF PEARL QUALITY	186
LUSTRE	191
COLOUR.....	191
SURFACE APPEARANCE.....	192
PEARL BLEMISHES:	193
SHAPE	193
NACRE THICKNESS GRADE	194
WEIGHT.....	194
SIZE	195
A GENERAL OVERVIEW OF SALTWATER AND FRESHWATER CULTURED PEARL TYPES	196
SALTWATER AND FRESHWATER CULTURED PEARLS - A TABULATED OVERVIEW	197
AUSTRALIAN SOUTH SEA PEARL OYSTER & AUSTRALIAN SOUTH SEA CULTURED PEARL	198
PHILIPPINE SOUTH SEA PEARL OYSTER & PHILIPPINE SOUTH SEA CULTURED PEARL	200
ASIAN SOUTH SEA PEARL OYSTER & ASIAN SOUTH SEA CULTURED PEARL	202
TAHITIAN BLACK-LIPPED PEARL OYSTER & TAHITIAN BLACK CULTURED PEARL	204
FRESHWATER PEARL MUSSEL & FRESHWATER CULTURED PEARL	206
PEARL CHARACTERISTICS	207
FUJIAN PEARL OYSTER & FUJI CULTURED PEARL	209
MEXICAN BLACK-LIPPED / LA PAZ PEARL OYSTER & NEW WORLD CULTURED BLACK PEARL	211
RAINBOW LIPPED PEARL OYSTER & CORTEZ CULTURED PEARL (CORTEZ PEARL).....	213
<i>PINCTADA FUCATA</i> PEARL OYSTER & AKOYA CULTURED PEARL	215
<i>PINCTADA RADIATA</i> PEARL OYSTER & CULTURED PEARL	217
KESHI (ヶシ) CULTURED PEARLS	219
ARTISTIC IMPRESSIONS USING ATYPICAL BEADED CULTURED PEARLS.....	223
PROCESSES & TREATMENTS APPLIED TO NATURAL AND CULTURED PEARLS.	228
PEARL PROCESSING VS TREATMENT	228
PEARL PROCESSING & TREATMENT REFERENCE TABLE	229
UNTREATED PEARLS.....	231
TREATED PEARLS	231
BLEACHING OF NATURAL PEARLS	232
BLEACHING, MAESHORI AND OPTICAL BRIGHTENING APPLIED TO CULTURED PEARLS	233
COATING	235
DYED	235
FILLED AND PLUGGED	237
HEATED	238
IRRADIATION	239
OILING.....	239
HEAVILY WORKED	240
ELECTRONIC TAGGING	241
MOLLUSC FISHING, RESTRICTIONS, PROTECTION AND CONSERVATION	242
THE BERN CONVENTION, INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE (UCN), & THE HABITATS DIRECTIVE	242
THE WASHINGTON CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES (CITES)	242
ADDENDUM.....	244
OPERCULUM.....	244
TERMS AND DEFINITIONS	247
REFERENCES	258

The guide describes and illustrates 43 pearl-producing saltwater nacreous and non-nacreous bivalves in alphabetical order, many of which will be new to even those involved professionally in the pearl industry. It also describes 23 pearl-producing saltwater nacreous and non-nacreous univalves, followed by 27 freshwater bivalves that are producers of nacreous (sometimes non-nacreous) natural and cultured pearls, as well as natural blisters, blister pearls and cultured blisters.



Important Facts

NACREOUS SALTWATER NATURAL PEARLS

NACREOUS FRESHWATER NATURAL PEARLS

NON-NACROUS NATURAL PEARLS

NACREOUS SALTWATER CULTURED PEARLS

NACREOUS FRESHWATER CULTURED PEARLS



NATURAL PEARLS

Produced naturally, and without human intervention, by various species of saltwater and freshwater molluscs

SALTWATER PEARLS

Produced by various species of marine molluscs including bivalves, (e.g., pearl oysters, clams and scallops), and gastropods, (e.g., sea snails' abalone).

FRESHWATER PEARLS

Produced by various species of freshwater molluscs (bivalves) in rivers and lakes

CULTURED PEARLS

Produced within many and various species of wild-caught or hatchery produced saltwater and freshwater molluscs in a pearl farm environment as the result of the creations of a cultured pearl sac, developed from the tissue of a donor mollusc, within which the cultured pearls are formed. Cultured pearls being instigated by man can be beaded (where a bead is used as the substrate for nacre growth) or non- beaded

SALTWATER CULTURED PEARLS

Produced predominantly by three species of pearl oysters

FRESHWATER CULTURED PEARLS

Produced by mussels in freshwater lakes

BASRA PEARLS

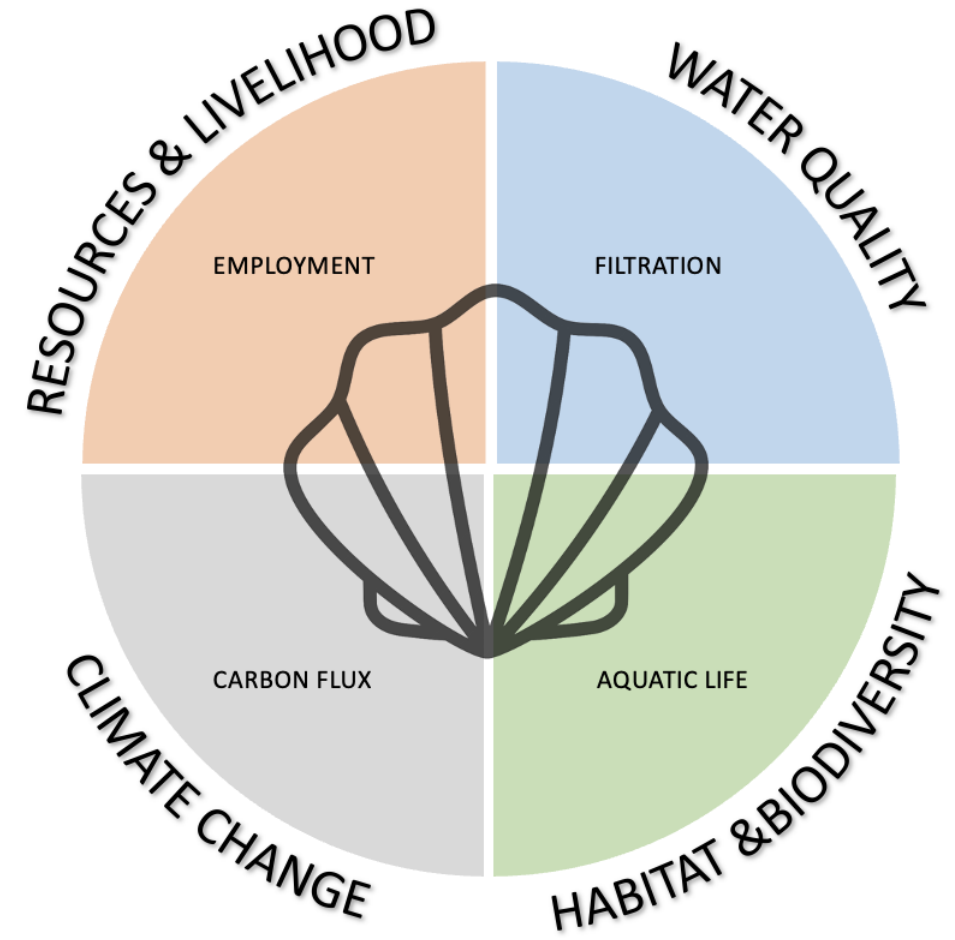
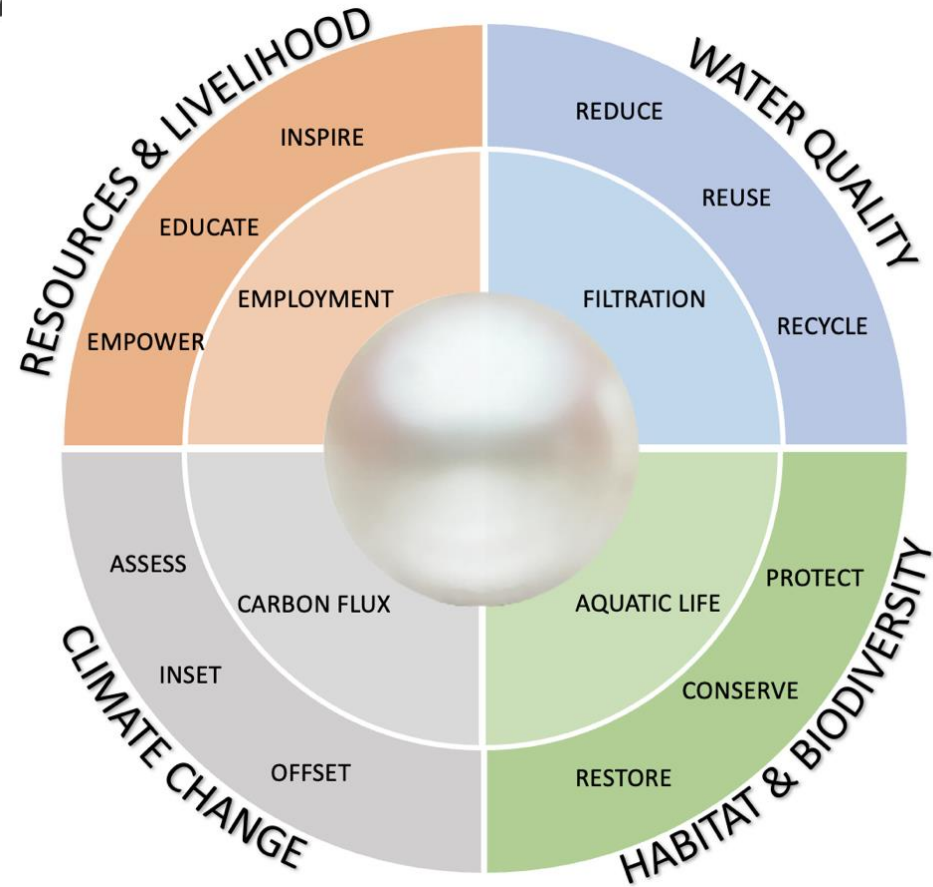
Historically, mostly among Indian traders, saltwater natural pearls sourced from the Persian Gulf have been referred to as "Basra pearls". The majority of these pearls were fished from the waters of Bahrain, Qatar, Kuwait, UAE, and Oman and were renowned for their exceptional beauty and high lustre. These pearls were transported via the port of Basrah, a town in southern Iraq, by sea on dhows and other vessels to India, where they were processed, sorted, drilled and strung before being sold in Europe and other markets worldwide. This practice established the trade name "Basra Pearls", one which remains in use to this day.

ORIENTAL PEARLS

"Oriental Pearl" is the name traditionally used for saltwater natural pearls from the Orient (broadly including Asia and the Far-East). These pearls were considered the most beautiful of all pearls, and had the most desirable shapes and sizes. They had a unique appearance which combined a deep lustre and subtle colours that were visible through their translucent "skins" – this feature being described as a pearl's "Orient".

IMITATIONS OF PEARLS

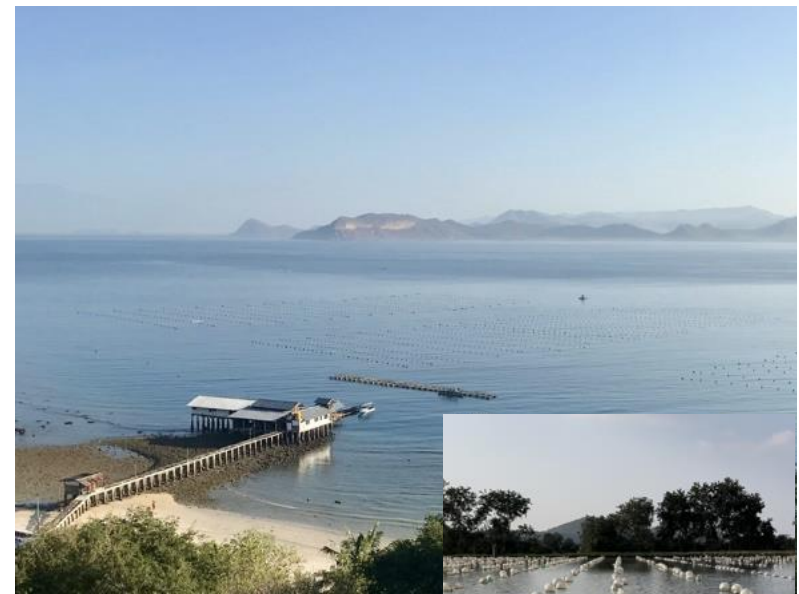
Imitations of pearl are products that only simulate the appearance of natural or cultured pearls. They are not produced within the body of molluscs but are manufactured products made in factories.



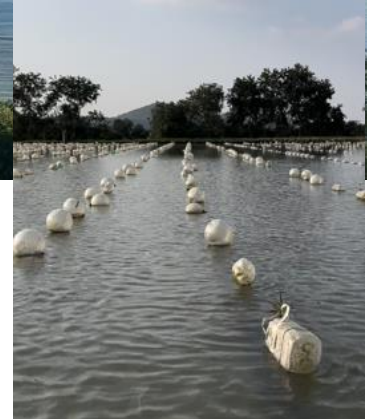
IMPACT CASE STUDIES



BAHRAIN



AUSTRALIA



MEXICO

PHILIPPINES

INDONESIA

FIJI

JAPAN

CHINA

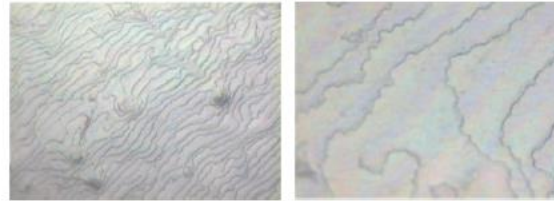
FRENCH POLYNESIA



Saltwater Nacreous and Non-nacreous Bivalves

Saltwater bivalves may be composed of nacre or be non-nacreous and this is often expressed through surface observations

Nacre (nacreous)



The appearance of nacre at low (left) and high (right) magnifications

Nacre is the biogenic material of nacreous natural and cultured pearls. Nacre is composed of layers of microscopic platelets of aragonite (calcium carbonate), bound together by a fine network of a complex organic molecules that have been described as a scleroprotein named conchiolin. This characteristic structure produces optical effects (orient, overtone) from within the natural pearl or cultured pearl. Nacre is secreted from the mantle of pearl oysters, some other bivalves, e.g., freshwater mussels, and some gastropods

Non-nacreous



Three examples of non-nacreous surfaces on non-nacreous natural and cultured pearls

Non-nacreous natural and cultured pearls do not reveal the microscopic and overlapping platelets of aragonite and / or calcite observed at the surface of nacreous natural and cultured pearls, rather they either display a featureless porcelainous surface or have a variety of interesting structures that often produce remarkable optical effects.

Codakia tigerina (Linnaeus, 1758)

Codakia tigerina is otherwise known as the Pacific tiger lucine. *Codakia* is a genus of saltwater clams, marine bivalve molluscs in the family Lucinidae (Anonymous 2024h) commonly known as the hatchet shells. The members of this family have a worldwide distribution being found in muddy sand or gravel at or below low tide mark. But they can also be found at bathyal depths. They have characteristically rounded shells with forward-facing projections. The shell is predominantly white and buff and is often thin. The shells are equivalve with unequal sides.

Non-nacreous pearls are rare but when found may have spectacular colours, two example being those shown below, (Anonymous 2013; G. T. Poppe, Poppe, P. 2018)



Shell of *Codakia tigerina*. Muséum national d'histoire naturelle, CC BY 4.0
<<https://creativecommons.org/licenses/by/4.0/>>, via Wikimedia Commons



A natural pearl (10.35mm) attached to the shell of *Codakia tigerina* with variable colouring. Collected by local fishermen in 2006 off Mactan Island, Philippines. (K. Scarratt image).

Codakia tigerina with a natural pearl of a similar colour to the shell. (K. Scarratt image).

Argopecten purpuratus (Lamarck, 1819)

The pectinid bivalve *Argopecten purpuratus* (Lamarck, 1819) commonly known as "Peruvian scallop" or "Peruvian calico scallop" or the "Chilean scallop", inhabits the Pacific Ocean, between the northern coast of Peru and central Chile, and is an important commercial species having been in the local diet for more than 3000 years (Mendo 2016). It lives in sheltered sedimentary grounds and produces natural pearls that have a unique surface appearance which is comprised of a patchwork of cells with each cell being formed from three sub-cells each with a fibrous appearance that produces a particular surface sheen. These scallop pearls are similar in appearance to those from the Lion's Paw, *Nodipecten Nodosus* (K. Scarratt and Hanni 2004).



Two natural pearls from *Argopecten purpuratus* (K. Scarratt image)



The shell of *Argopecten purpuratus* (Lamarck, 1819) commonly known as "Peruvian scallop"- source Naturalis Biodiversity Center, CC0, via Wikimedia Commons

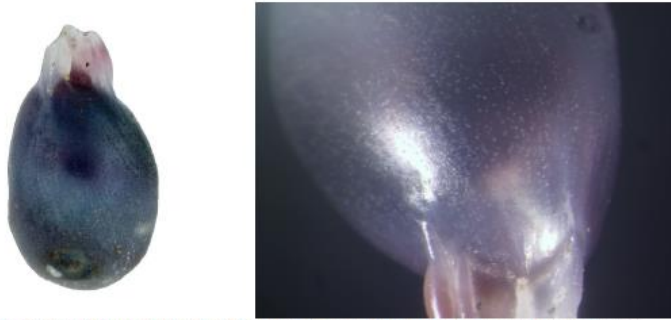
Isognomon isognomon (Linnaeus, 1758).

Isognomon isognomon (Linnaeus, 1758) of the Isognomonidae family, sometimes referred to as *Isognomon attenuata* this has an unaccepted status in the Worms register (World Register of Marine Species), the original name was *Perna attenuata* (Reeve, 1858) which is also unaccepted, the accepted name being *Isognomon isognomon* (Linnaeus, 1758) or the "wader tree oyster".

The habitat of this species runs throughout the Indo-Pacific. The shell has a moderately high and narrow outline and the shape mostly irregular. The outer surface is often encrusted with marine growths and corroded. The inner side of shell is nacreous. The colour of the outside and the rim of the shell is bluish purple to almost black with the nacreous area having a paler bluish purple hue that reflects the colour and appearance of the natural pearls, natural blister pearls and natural blisters it produces, which may be nacreous (Mane 2023) or non-nacreous.



The shell from *Isognomon isognomon* (Image by Joop Trausel and Frans Sliker background edited WORMS images) WoRMS Editorial Board (2023). World Register of Marine Species. Available from <https://www.marinespecies.org> at VLIZ. Accessed 2023-08-31. doi:10.14284/170



A natural pearl from *Isognomon isognomon* collected by local fishermen in 2006 off Bohol, Pandanon Island Philippines., ID by Conchology Inc. (K. Scarratt images)

Lima vulgaris (Link, 1807)

Lima vulgaris (Link, 1807) is a natural pearl producing bivalve from the order *Limoida*, family *Limidae*. Its common name is the File or Spiny File Clam. It has wide distribution in tropical waters. Originally the shell was named *Lima lima* (Linnaeus, 1758) and Philippine dealers used the name *Lima lima vulgaris* (Link, 1807) to differentiate the populations with a pink interior from those with a white interior. Today *Lima lima* is reserved for Caribbean and Mediterranean shells while *Lima vulgaris* to those from the Indo-Pacific. There is no difference in the shells and not all *vulgaris* have pink interiors. The naturally occurring non-nacreous pearls while rare tend to be pink to purple in colour.



Lima vulgaris with a blister pearl attached. Philippines. The shell measures approx., 90.60 x 69.08mm and for both valves weighs approx., 253.213ct. It was collected by a local fisherman off Olango Island (Philippines) at approx. 20 - 25 metre depth. The pearl (right hand image) measures approx. 3.63 x 5.75 x 6.24mm (K. Scarratt image)

Mercenaria mercenaria (Linnaeus, 1758)

Mercenaria mercenaria (Linnaeus, 1758) a natural saltwater pearl producing bivalve mollusc of the Veneridae family, ranging from Eastern Canada to Florida with abundance between Cape Cod and New Jersey, otherwise known as hard shell clam, or quahog clam shell, pronounced "KO-hog". It is a thick and heavy mollusc, generally oval in shape with varying degrees of purple, lilac and white margins. The natural pearls produced are non-nacreous with a porcelain-like surface. Another "phenomenon" is the "eye effect" which is produced by a lighter colour in the center and darker colour on the circumference of the pearl. The colours of the mollusc range from white, lilac to deep purple. Adult shell size range: 5 cm – 12 cm. Source of natural pearls only. Natural Quahog or clam pearl, typical size range: 3 mm – 8 mm.



Mercenaria mercenaria Image, Ken Hammond - <http://www.usda.gov/oc/photo/96cs1862.htm>, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=137234>



A natural clam pearl from *Mercenaria mercenaria* showing the differing colour appearance when viewed from different angles. (K. Scarratt image)

Nodipecten nodosus and *N. subnodosus*

Of the many scallops, there are three bearing the common name Lion's Paw, one of these is the exceedingly rare *Nodipecten magnificus* (Sowerby, 1835) which is largely restricted to the Galapagos Islands. The other two are *Nodipecten nodosus* (Linnaeus, 1758) (Atlantic Lion's Paw) and *Nodipecten subnodosus* (Sowerby, 1835) (Pacific Lion's Paw also known as Mano de Leon), the largest pectinid in tropical waters (Barrios-Ruiz et al. 2003; Maldonado-Amparo et al. 2004; Mendo 2016).

N. nodosus is found in the seas of South-eastern USA to Brazil and *N. subnodosus* in the seas of Western Central America at depths that vary from 25 to 150 meters. Together the shell colours are exceptional in both their variety and depth. The outer surface of the shell may be several shades of brown, sometimes described as chocolate brown and yellow to orange while the interior varies from pearly white to shades of purple and brown. The outer surface of the *N. nodosus* shell most often displays several rows of rounded nodular protuberances running down about eight rounded ribs (although many from the southern Caribbean are smooth, potentially differentiating it from *N. subnodosus* which have no such protuberances). Both the Atlantic and Pacific Lion's Paws have fan-shaped (typical of scallops in general) equal valves with unequal ears. Lion's Paw scallops may produce distinctive natural non-nacreous pearls (Federman 2004; Hurwit 1998, 1999; Norris 2003; K. Scarratt and Hanni 2004; Wight 2004a, 2004b, 2005). Adult shell size range: 7 cm – 18 cm. Source of natural pearls only. Natural scallop pearl typical size range: seed – 11 mm with rare examples exceeding this.



The Lion's paw scallop (*Nodipecten subnodosus*) (left) and a natural scallop pearl (right)

Periglypta magnifica (Hanley, 1845)

Periglypta is a genus of bivalves in the subfamily Venerinae of the family Veneridae (the Venus clams). *Periglypta Magnifica* (Hanley, 1845) goes by the common name of the Chocolate Venus Clam. Its habitat is subtidal and the origin is the Philippines and occasionally produces nice non-nacreous naturel pearls. The average shell size is 15 cm.

The *Veneridae* or *venerids* are a very large family of saltwater clams that come under the common name of the Venus clams. Over 500 living species of *venerid* bivalves are known, most of which are edible. Many of the most important edible species are commonly known simply as "clams". The family includes some species that are important commercially, such as the quahog, *Mercenaria mercenaria*.



A *Periglypta magnifica* shell (K. Scarratt image)



A *Periglypta magnifica* with a blister pearl (K. Scarratt image)

Modiolus philippinarum (Hanley, 1843)

Modiolus philippinarum (Hanley, 1843) is a marine brown mussel, also known as Philippine horse mussel, of the Mytilidae family that is fished as seafood in the Philippines, Mozambique and Madagascar that produces the occasional cream, purple or black nacreous natural pearls (up to approximately 9 mm in diameter), blisters and blister pearls. Shells can reach a maximum length of about 130 millimetres (Napata 2011).



Shell of *Modiolus philippinarum*. Images adapted from By H. Zell - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=124630287>



Modiolus philippinarum (Hanley, 1844) with long worm-like natural pearl (K. Scarratt image)

Modiolus philippinarum with a blister (blister pearl?)!. Specimen was taken at 10-25 metres deep off Olango Island (Philippines) by local fisherman in 2008. The shell measures approximately 29.55 x 17.02mm and the pearl 8.37 x 5.61mm. The shell and pearl together weigh 5.760ct. (Author's image)

Pinctada margaritifera typica (Jameson, 1901)

Pinctada margaritifera typica (Jameson 1901) commonly known as the Fijian Pearl Oyster is found in islands located in the West Pacific Ocean and has a broad distribution. Found in Fiji, Australia and as far as Southern Japan. Whilst the *cumingii* sub species is known as “the black-lipped pearl oyster” the same cannot be said for the *typica* sub species, which exhibit unique body and shell coloration. Unlike the thriving populations of the *cumingii* in atolls the *typica* pearl oyster exist in much smaller populations and are therefore have always largely been considered unsuitable for commercial pearling. Research in the 1990’s revealed that pearl oysters found around the main islands of Fiji group showed an interesting mix in genetics combining both *cumingii* and *typica* traits. Cultured pearls of natural colours are being produced in Fiji and are known as Fiji Cultured Pearls.

Adult size range for *P. margaritifera typica* is from 10 to 20 cm. Natural habitats are coral reefs surrounding larger mountainous islands of the Western Pacific Ocean. Requires a pristine and nutrient rich environment, typical of tropical climates that experience seasons of consistent rainfall, and display a high tolerance to suspended particle matter. Majority of Fijian cultured pearl production is from wild spat collection supplemented by hatchery production. This production is based around large sheltered bays on the larger mountainous islands, not atoll environments

Bead Cultured *P. margaritifera typica* pearls have a typical size range averaging 10 to 13 mm with sizes exceeding 16mm being rare. The pearls predominantly have “earthy” tones with body colours such as gold, copper, burgundy, pistachio, pastel blue and chocolate.



Half valve of *Pinctada margaritifera typica*

Pinctada margaritifera cumingii, (Linnaeus, 1758)

Pinctada margaritifera cumingii (Linnaeus, 1758) commonly known as the Tahitian black-lipped pearl oyster of the Pteridae family, a large pearl oyster that has equal compressed valves with a rich silver grey nacreous interior edged with greyish black. The exterior is formed from concentric layers of flaky green and grey lamellae. The source of natural and cultured, naturally coloured, grey and black pearls from French Polynesia the Cook Islands, Okinawa and other South-Sea Islands (Acosta-Salmon and Southgate 2005; Acosta-Salmon et al. 2005; Arnaud-Haond et al. 2008; Baronnet et al. 2008; Benzie and Bailment 1994; Caseiro and Gauthier 1997, 1998; Che et al. 1996; Culf and Dauphin 1996; Culf et al. 2008; Dauphin and Culf 1995; Dauphin et al. 2008; Doroudi et al. 1999; Doroudi and Southgate 2002; Durand et al. 1993; S. Elen 2002b; Ellis and Haws 1999; Friedman et al. 1998; Friedman and Southgate 1999; Iwahashi and Akamatsu 1994; S. Karampelas et al. 2011; Kurihara et al. 2005; Y. Liu et al. 1999; W. D. Liu 2003b, 2003a; Miyoshi et al. 1987; Miyoshi et al. 1988; O’Sullivan 1999; Pit and Southgate 2000; Pouvreau et al. 1999; Pouvreau et al. 2000; Rousseau and Rollier-Bard 2012; Sims 1994; P. C. Southgate and Beer 1997; P. C. Southgate and Ito 1998; P. C. Southgate and Beer 2000; Yukihiro et al. 1998; Yukihiro et al. 2000). Adult size range: 10 cm – 20 cm. Source of black mother-of-pearl. Natural habitat includes coral reefs and atolls in the Central Pacific Ocean. Many found and known in French Polynesia. All *Pinctada margaritifera cumingii* pearl oysters used for pearl culture are cultivated from spat in lagoons.

“Tahitian” bead-cultured black pearls have a typical size range of 8 to 15 mm, with 15 to 20 mm. considered large and only produced in small quantities, rare examples exceeding 20 mm, one bead cultured pearl per shell/operation. For the “Tahitian” non-bead cultured (keshi) black pearls the typical size range is from seed pearl size with rare examples exceeding 10 mm. Natural Black pearls have a typical size range from seed pearl size upwards but very rarely exceeding 10 mm.



Half valve of *Pinctada margaritifera cumingii*

Pinctada maxima (Jameson, 1901)

Pinctada maxima (Jameson, 1901) the silver or golden lipped pearl oyster of the Pteridae family is the largest of the pearl oysters and may be commonly known as the Australian South-Sea pearl oyster, the Philippine South-sea pearl oyster, the Indonesian South-sea pearl oyster, and the Asian South-sea pearl oyster.

Traditional South-sea pearling fleets dived for this pearl oyster in the quest for its valuable large natural pearls (Alatawi 2019; Anonymous 1969; Dodd 2011; Hänni 2007; A. Homkrajae, Manustrong, A., Nilpetploy, N., Sturman, N., Lawanwong, K., Kessrapong, P. 2021; M. S. Johnson and Joll 1993; Moran 2024; K. Scarratt, Bracher, P., Bracher, M., Attawi, A., Safar, A., Saeseaw, S., Homkrajae, A., Sturman, N. 2012), and for its valuable high quality Mother-of-Pearl which was sought after worldwide for the mother-of-pearl industry. Today it is used extensively to produce South-sea cultured pearls and mother-of-pearl in Australia, Indonesia, Myanmar, Philippines and elsewhere in the South-seas.

Adult size range for *P. maxima* shell is from 20 to 30 cm. Australian *P. maxima* pearl oysters are predominantly of the silver-lipped variety, but also include some gold-lipped variety. The Philippine *P. maxima* pearl oysters are the source of some of the finest golden pearls. *P. Maxima* is the source of 75% of the world’s mother-of-pearl shell supply and the source of both natural and cultured pearls.

North Australia has the world’s last remaining commercial quantities of wild South-sea pearl oysters. The typical size range for natural pearls are from seed pearl sizes (less than 2mm) and upwards, with rare examples exceeding 20 mm. Typical size range for bead cultured pearls are from 11 to 16 mm, with rare examples exceeding 20 mm. The Cultivation period for a bead cultured pearl takes 2-3 years one bead cultured pearl per shell/operation.



Two half valves of *Pinctada maxima* shell showing the inner nacre, silver lipped (left) and gold lipped (right)

Pinctada radiata (Leach, 1814)

Pinctada radiata (Leach, 1814), or the Ceylon or Gulf Pearl Oyster is sometimes considered a variety of *Pinctada imbricata*, indeed *P. fucata*, *martensii*, *radiata* and *imbricata* are considered as a species complex, generally termed the Akoya complex. The *P. radiata* habitat ranges through the eastern Mediterranean, Red Sea, Persian Gulf and the Indian Ocean and the Gulf of Mannar (Al-Alawi, 2019; K. Scarratt 2019). Most famously natural pearls from *P. radiata* have been associated with the Bahrain and indeed Qatar (Al-Maslami 2018; Mohammed 2003), Kuwait, and the UAE coastal regions as well as some Iranian waters since at least the Dilmun era of ca. 3000 BCE, through to the present time (Carter 2012). Their relative importance has varied throughout this time frame; however, they were probably most prized between the 1870's to the early 1920's. It was at this time that Bahrain and Qatar enjoyed a significant positioning and were the centre of the natural pearl trade. However, during the same period Sri Lanka (Ceylon) (Anonymous 1881, 1905b, 1905a; Geare 1915; Herdman 1903; Major 1913) also produced significant numbers of natural pearls from *P. radiata*. Although today the population is depleted in the Gulf of Mannar.

Native to the Gulf of Mannar, the Persian Gulf, and the Red Sea. Today the mollusc is also used for culturing pearls in the UAE's Abu Dhabi and Ras Al-Khaimah waters (Al-Alawi 2019).



Opening *P. radiata* shell in Ceylon at the turn of the last century (left) and 5 natural pearls still in their sac within *P. radiata* (right).

The adult size for the mollusc ranges from 5 -7 cm and rarely over 10 cm. The typical size range for the natural pearls is between 1 mm to 5 mm, with rare instances of sizes exceeding 8 mm. Cultured pearls, including both bead and atypical-bead varieties, have a typical size range of 4 mm to 8 mm and are produced in relatively small quantities (Al-Alawi A 2023)). Non-bead-cultured (keshi) pearls, are also produced in limited numbers, usually ranging in size from seed pearl size up to 5 mm.

Pinctada persica (Jameson, 1901)

The "pearl oyster" *Pinctada persica* (Jameson, 1901) is currently only known from the Persian Gulf waters (Ranjbar 2015). A 2023 paper by Parvizi et al., in *Frontiers in marine Science* details the species well and describes two morphotypes, orange and black (the orange being more dominant morphotype in the Persian Gulf) from the area of Larak Island in the Persian Gulf (Parvizi 2021, 2023). The authors attempt to link these variations with nacre quality and colour both for the shell and the pearls produced. While thought of as a part of the *Pinctada margaritifera* complex, Ranjbar et al, (Ranjbar 2015) suggest that this should be revised and *P. persica* named as a separate species. It has been used as a source of mother-of-pearl, known in the trade as Bombay shell (P. C. Southgate, Lucas, L. 2008)

Interestingly, the Swiss Gemmological Institute (SSEF) reported in their on-line journal, Facette, in June 2021 the "first identification" of a pearl from *Pinctada persica* (L. Cartier, Krzemnicki, M.S., Lendvay, B. 2021) from within a rather nice strand of natural pearls that included also a natural pearl identified as coming from *Pinctada radiata*. Both conclusions were confirmed by DNA analysis.



Two common morphotypes of *Pinctada persica* found in Persian Gulf, image from the study by Parvizi F, Akbarzadeh A, Farhadi A, Arnaud-Haond S and Ranjbar MS published in 2023. (left) Orange morphotype, (right) Black morphotype. (C) Sampling site on Larak Island, Persian Gulf, Iran.

Pinctada imbricata (Röding, 1798)

Pinctada imbricata (Röding, 1798) or the Atlantic Pearl Oyster belongs to the family Pteridae and ranges naturally in the western Atlantic from Bermuda and Florida to Brazil. It is the source of Venezuelan pearls and was exploited by Spanish pearl gatherers in the 16th and 17th centuries it is certainly the source of Columbus's pearls. *P. fucata*, *martensii*, *radiata* and *imbricata* are considered a species complex, generally termed the Akoya complex

The adult shell size for the mollusc ranges from 5 -7 cm and is a source of natural pearls only. According to Romero et al., "Christopher Columbus traded pearls for hawk's bells, beads and sugar with the local natives in 1498 who approached his ship while exploring eastern coast of Venezuela. He obtained more than about 1.4 kilograms of pearls. These natives told Columbus where he could find the oysters' beds, but due to the pressing problems in Hispaniola he elected to continue to Hispaniola. He planned to send his brother Bartolomé El Adelantado to continue the exploration of the coast later but he had to abandon any plans to further explore the oyster beds when he and his brother were arrested as a result of "political intrigues" (Romero 1999; C. O. Sauer 1971; C. Sauer 2009). "The richest pearl-oyster beds areas were east to Cubagua and Coche, east and southeast of Margarita, and northwest of the Araya peninsula. This section of the coastline was soon to become known as the Pearls' Coast ("Costa de las Perlas"), so named by Luis Guerra in a letter to Alvaro de Portugal dated September 28, 1500 (Morón 1954). At the end of the expedition, Niño and Guerra had accumulated at least 44.16 kg of pearls "some as large as hazelnuts, very clear and beautiful, though poorly strung". This was the first truly profitable voyage to the West Indies. Natural Venezuelan pearl, typical size range: 2 mm – 6 mm with rare examples of up to 9 mm.



Shell of *Pinctada imbricata*. Naturalis Biodiversity Center, CC0, via Wikimedia Commons

Pinctada maculata (Gould, 1850)

Pinctada maculata (Gould, 1850) is a small pearl oyster or pipi (meaning small in Polynesian). The adult size range of the shell is from 2 to 6 cm. It is a source primarily of natural pearls. The Species ranges naturally in the Pacific Ocean particularly near French Polynesia and the Cook Islands but has a wide range throughout the Indo-Pacific and Northern Australia: from Cocos (Keeling) Islands to eastern Polynesia; north to Japan and south to northern New South Wales, Kermadec, Norfolk and Lord Howe Islands. Poe Pipi, or simply Pipi, natural pearls may be found as blister or free (cyst) pearls and generally range in size from 1 to 6 mm, with exceptionally rare examples reaching 9 mm., (Nilpetpoy 2018; SSEF 2014). The colour range for the pearls ranges from near white to yellow and brown. Some bead cultured blisters in the Pipi pearl oyster have been reported resulting from unsuccessful experimentation in the 1990's where the nacre coating did not cover the substrate in its entirety.



Pinctada maculata from the Philippines, Central Visayas, Cebu, off Cabilan, collected 28th December 2007, ex coll. F.J.A. Sliker Jr., Image by Joop Trausel and Frans Sliker. WoRMS Editorial Board (2023). World Register of Marine Species. Available from <https://www.marinespecies.org> at VLIZ. Accessed 2023-09-02. doi:10.14284/170



A selection of *Pinctada maculata* or Pipi natural pearls showing the diversity in colour.

Pinctada fucata (Gould, 1857)

Pinctada fucata (Gould, 1857) known in Japan as *Pinctada martensii*. It is sometimes considered a subspecies of *Pinctada imbricata*, indeed *P. fucata*, *martensii*, *radiata* and *imbricata* are considered a species complex, generally termed the Akoya complex. The shell is of a medium size and is rather inflated and fragile. The exterior is rough and is covered with layers of greyish purple lamellae which extend over the margins. The byssal notch lies below a small winged projection of the hinge line.

Its habitat ranges from Japan to China and Vietnam. Originally the species was famous for producing natural pearls in Japanese waters but since the early 20th century century became more well known for the production of cultured pearls in Japan (Wada 1986).

Akoya is the Japanese name for this pearl oyster. Adult size range is about 7 to 10 cm. Its natural habitat is Japan to the Pacific Ocean across to China and Vietnam. For most of the 20th century Akoya cultured pearls were produced only in Japan, but now they are also produced in Australia, China, India, and Vietnam (CIBJO 2024; He et al. 2000; Hwang et al. 2007; Kripa et al. 2007; Kurokawa et al. 1999; Numaguchi 1994; Uchimura and Abe 1995; Uchimura et al. 1995). Akoya bead-cultured pearl, typical size range: 5 mm – 8 mm, with rare examples exceeding 9 mm. Akoya non-bead-cultured (keshi) pearl, typical size range: seed sized. Akoya natural pearl typical size range: seed sized and up to 8mm.



A shell from *Pinctada fucata*, left the exterior and right the nacreous interior (K. Scarnatt collection and images.)

Pinctada mazatlanica (Hanley, 1856)

Pinctada mazatlanica (Hanley, 1856) otherwise known as the Panamic Black-lip, the Mexican black Lip and the La Paz pearl oyster. *Pinctada mazatlanica* is distributed in the eastern Pacific Ocean from Baja California Sur to Peru including the Gulf of California. They habitat shallow water from up to 30 meters in depth on coral reefs and rocky bottoms. The adult size range in between 10 and 20 cm. The mollusc is a source of both natural and cultured (very limited production) pearls (A. Homkrajae 2016; McLaurin et al. 1997; McLaurin 2002, 2014; Nava 2000). The typical size range for natural pearls is between 4 and -14 mm., with exceptional specimens up to 20 mm. The mollusc is also used for pearl culture where the typical size range for the cultured pearls produced is between 4 and -12 mm with exceptional examples of up to 20 mm. In 2019, pearls as adomments were reported by archologists in Baja California Sur and radiocarbon dated to 8,500 years old which makes them the oldest reported thus far.

This mollusc along with the *Pteria sterna* were fished for pearls in the Gulf of California before the arrival of the Spaniards in 1535. Who in 1586 declared the gathering of oysters to be a right of the Spanish Crown. By the 1840s, the export of the shells was as valuable as the pearls themselves as the nacreous shells were used to make buttons for clothing. By the early 1900s, some 200,000 to 500,000 oysters were being harvested annually. This over-exploitation caused populations of both species to become depleted and in 1940 the fishery was closed by the Mexican Government (Strack 2005).

The famous drop shaped, 293.84 grain, Peregrina, is presumed to have been found in *P. mazatlanica* in the waters surrounding one of the small islands in the Gulf of Panama.. It was presented to the Spanish king Ferdinand V and eventually became part of the Spanish Crown Jewels. The pearl passed to Maria Theresa the daughter of Phillip IV. After 1837, the pearl passed on to her son, Emperor Napoleon III and he sold it to the Duke of Abercorn. In 1969, Richard Burton bought it at an auction. The pearl, later set by Cartier in the drop pendant of a lavish necklace, was given to Elizabeth Taylor (Strack 2005).



Pinctada mazatlanica or the "Panamic Black-lip". Image by Jordandroerick - Own work, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=8425895>

Cassis madagascarensis (Lamarck, 1822)

Cassis madagascarensis (Lamarck, 1822) of the family Cassidae, also known as the Emperor Helmet, is a large species with an almost flat spire, the body whorl has three rows of spiral blunted knobs and fine rounded axial ridges. The underside is peachy orange – reflecting the colour of some pearls produced by this mollusc (A. Homkrajae, Stephan, M., Steen, A. 2022; Kunz and Stevenson 1908). The lip bears about 10 strong denticles and the columella bears strong white spiral ribs and folds, tinged between the dark brown or black. The species may be found on sand bottoms near seagrass beds, at shallow subtidal depths and distributed in the waters from North Carolina to Florida, Greater Antilles, and Bermuda (Leal 2002). Due to its white and brown layered structure the shell has been widely used for shell cameos.



A shell from *Cassis madagascarensis* (Author's collection and image).



Examples of the type of flame structure seen on pearls from *Cassis madagascarensis*

Conus textile (Linnaeus, 1758)

Conidae are one of the most popular families for collectors, that are tropical mainly living in shallow waters down to several hundred metres, the shells are cone shaped and often richly coloured. They are predators feeding on fish, worms and other molluscs. They are highly venomous and a conus attack usually results in the instant death of its prey. *Conus textile*, also known as the textile cone or the cloth of gold cone is a natural pearl producing mollusc but has been reported to be lethal to humans if not handled carefully. "There are about 90 recorded instances of people being killed by cone snails – the molluscs are aggressive if provoked and can penetrate wetsuits with their sharp poison loaded harpoons, which look like transparent needles" (Anonymous 2004) .



Shells of *Conus textile* (K. Scarratt collection and image)



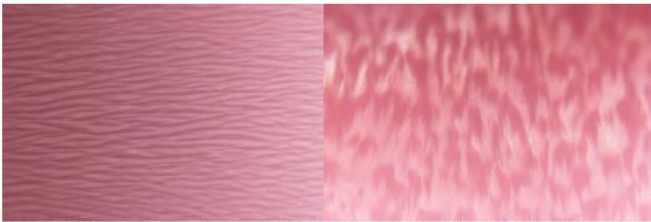
A natural pearl from *Conus textile* collected off the northern part of Cebu by local fisherman in 2008. (K. Scarratt image)



The shell of *Aliger gigas* (K. Scarratt collection and image)



A variety of natural colours in natural conch pearls produced by *Aliger gigas*. (K. Scarratt image)



Typical flame patterns observed in queen conch shell and pearls; slender flames (left) and short stubby flames with spiky end (right). Photomicrographs by Kwanreun Lawanwong (GIA).

Fusinus longissimus (Gmelin, 1791)

Fusinus longissimus (Gmelin, 1791) is a species of sea snail, a marine gastropod mollusc in the family Fasciolaridae, the spindle snails, the tulip snails and their allies. Distributed in Japanese waters, *F. longissimus* has been recorded from off the Ogasawara Islands, the Kii Peninsula in central Honshu and off Iejima, Okinawa. Outside Japan, *F. longissimus* is known from the Philippines, Taiwan, Vietnam and New Caledonia. It is taken on sandy substrates at between 0 and 10 m, and is apparently scarce throughout its range (Callomon 2008).



A shell from *Fusinus longissimus* Author's collection and image).



The surface and near surface flame-like structures seen on a natural pearl from *Fusinus longissimus* (K. Scarratt image).

Fusinus nicobaricus (Röding, 1798)

Fusinus nicobaricus (Röding, 1798), or *Marmorofusus nicobaricus*, common name is the Nicobar spindle, is a species of sea snail, a marine gastropod mollusc in the family Fasciolaridae, the spindle snails, the tulip snails and their allies (Wikipedia). This relatively small but solid spindle has coarsely sculptured whorls with strong rounded spiral ridges and blunt nodules. The aperture is white, and the white external background is decorated with brown flame markings. Non-nacreous natural pearls from this mollusc are a rare find see below.



Fusinus nicobaricus pearl collected off Olango Island, the Philippines at 15 - 25 metres deep by local fisherman in 2008 (K. Scarratt image)



Fusinus nicobaricus shell dredged off Madras in 20-40 fathoms by shrimp fisherman in 1904. (K. Scarratt collection and image)

Fusinus colus (Linnaeus, 1758)

Fusinus colus, common name the Distaff spindle or Long-tailed Spindle, is a species of sea snail, a marine gastropod mollusc in the family Fasciolaridae, the spindle snails, the tulip snails and their allies (Brenchley 1873). This species is present in the Indian Ocean and in the western and central Pacific Ocean, from East Africa to Melanesia, southern Japan, and southern Queensland (Anonymous 2023a). The size of an adult shell can reach 75–200 millimetre; These shells are thick, long, spindle-shaped, with many spiral ribs, grooves and nodules. The spire is elongated. The siphonal canal is very long. The outer surface is usually whitish, but may be yellowish, brown or reddish in colour (Linnaeus 1758).



A shell from *Fusinus colus*, (Photo adapted from image by H Zell . <https://commons.wikimedia.org/wiki/User:Lizc>).



A non-nacreous natural pearl from *Fusinus colus*.

Leporicypraea mappa (Linnaeus, 1758)

Leporicypraea mappa (Linnaeus, 1758) was previously subordinated into the genus *Cypraea*. In the currently most accepted taxonomy of the Cypraeidae this species is considered to be within the genus *Leporicypraea*, with several subspecies. Recently, the division of this taxon in two or even three nominal species based on morphological and molecular characters has been suggested.

The shell of *Leporicypraea mappa* is globose, with a near elliptical, slightly elongate outline. In affinity to other Cypraeidae, the aperture of the shell is very narrow, and relatively long. Both the inner and outer lips are ornamented with arrays of small teeth, though the teeth of the outer lip are shorter and stronger in comparison to the "teeth" of the inner lip, which are thinner and more numerous. Its dorsal side is normally inflated, while the ventral side of the shell is slightly concave.

An excellent example of a natural non-nacreous pearl from this mollusc is featured below



The exterior appearance of the shell of *Leporicypraea mappa* above, a natural non-nacreous pearl held within the shell below left and an Xray microradiograph showing the pearl below right .

Lambis lambis (Linnaeus, 1758)

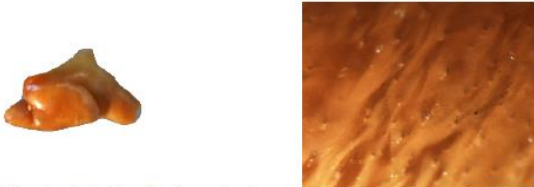
Lambis lambis, (Linnaeus, 1758) common name the spider conch, is a species of large sea snail a marine gastropod in the family Strombidae, known as the "true conchs"(Anonymous 2024c; Linnaeus 1758).

This species is widespread in the Indo-West Pacific. The maximum shell length for this species is up to 29 cm, and average length stands for 18 cm. *Lambis lambis* has a very large, robust and heavy shell. One of its most striking characteristics is its flared outer lip, ornamented by six hollow peripheral 'fingers'. The colour of the shell varies, being white or cream externally and often presenting brown, purplish or bluish black patches. The interior is glazed and may be pink, orange, purple or stiped as in the example below.

This sea snail lives in shallow waters and mangrove areas. Pearls occur but are uncommon.



The interior of a shell from *Lambis lambis* or the spider conch. (K. Scarratt collection and image)



A natural pearl (left) from *Lambis lambis* and its microscopic surface structure (right) collected in the waters off the northern part of Cebu by a local fisherman in 2008. (K. Scarratt image)

meat is edible and regarded as a deliciously in many parts of the world. A horn or cusp-shaped natural pearl unique to and sometimes found in abalones with a shape similar to that of the gonad is often referred to as a gonad pearl. However, this natural pearl is often hollow and therefore fragile (Karipearis 2024c).



The 239.7 grain Vaughn Scott Abalone Pearl next to a comparative abalone shell.

An impressive example of a natural cyst pearl produced by the abalone is the pearl that was known as (at the time of sale) the Vaughn Scott Pearl Pendant (Christies 2007). This impressive 239.7 pearl grain (59.93ct) pearl formed part of the collection of Valda Virginia Vaughn Scott, the daughter of an English diplomat and a member of the Alessi family. The pearl was sold at Christies in Dubai in April 2011 for an remarkable \$254,500. Natural abalone pearls may range in size from seed to exceptionally large horn-shaped examples that can reach 70 mm or more. Abalone cultured blister pearls may range from 9 to 20 mm. Near spherical abalone cultured pearls range from less than 5 mm to approximately 8.6 mm.



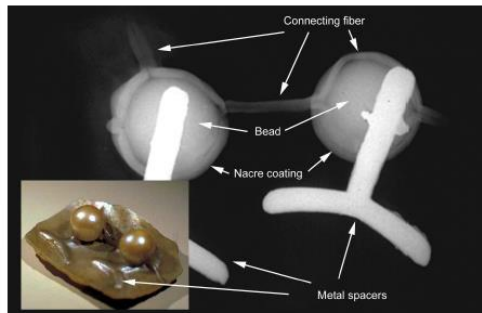
Near-spherical bead cultured abalone pearls shown here within an abalone shell, are being produced in Japan by a new (2024) method that is commercially viable. Photo S. Akamatsu.

Anodonta anatina (Linnaeus, 1758)

Freshwater mussel of the Unionidae family, commonly known as duck mussel. Inspired by the Chinese the mussel was used by Carl Linnaeus in the 18th Century to experiment on pearl culturing in the Fyrisån river near Uppsala, Sweden (Asplund 2018). Linnaeus secretly developed processes including that which involved drilling the host mussel shell and inserting a limestone or gypsum bead, secured by a silver wire under the mussel's mantle and the insertion of several beads, strung together with a fibre, through the shell opening, each bead being held away from the inner shell surface by a metal spacer. Existing examples of these cultured blisters grown after several years of culturing are historical curiosities, as no commercial production was ever attempted.



A shell of *Anodonta anatina* image by H. Zell, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons



Carl Linnaeus: 18th century freshwater cultured blisters (inset) and the X-ray micro-radiograph of the same. The metal spacers were used in an attempt at providing a gap between the inserted beads and the inner wall of the shell and hence a situation where nacre could grow over the entire surface of the beads – resulting in whole cultured pearls. The attempt did not quite make it in these examples; hence they should be termed cultured blisters (images K. Scamatt)

Page 119 of 268

Amblema plicata (Say, 1817)

Amblema plicata is a natural pearl producing freshwater bivalve mollusc from the Unionidae family found in the USA, otherwise known as the three ridge mussel, blue-point, purple-tip, or fluter. A commercially valuable mussel which has been used in the manufacture of beads used in the pearl culturing process. The three ridge can be identified by thick to heavy valves and any number of ridges of folds. The shell is elongated or rounded. The nacre is pearly white, frequently with iridescence. Some individuals have a purple tint. *Amblema plicata* live in small to large rivers and impoundments in mud, sand, or gravel. It was widely distributed in both small and large streams in Minnesota and can still be found in abundance in some places. In the Pomme de Terre River, it was rarely found in abundance but it is common in the Chippewa River (Bright 1995). The species was recently rediscovered in Florida's Choctawhatchee River (Patterson 2021). The natural nacreous pearls that they produce can be quite spectacular both from the size and the quality and colour of their nacre, being a lustrous pink.



Threeridge Mussel from Tennessee, *Amblema plicata*, and its natural pearl (known as the "Venus" pearl) that is part white and part pink with iridescence. Specimen from the American Pearl Company Collection, courtesy of Gina Latendresse, (right). *Amblema plicata*, By Dick Higgins, U.S. Fish and Wildlife Service - Image Library, Mollusk. &t;http://www.fws.gov/ashville/html/image_library/mollusk_thumbnails.html&t;http://www.fws.gov/ashville/photos/Threeridge_large.jpg accessed 6 November 2008., Public Domain, <https://commons.wikimedia.org/w/index.php?curid=5144371> (left)

Page 117 of 268

Hyriopsis cumingii (Lea, 1852)

Hyriopsis cumingii is a freshwater mussel in the Unionidae family and is of major commercial importance for pearl culture in China (S. Akamatsu et al. 2001), indeed China is the world's largest producer of freshwater cultured pearls and today this production is done with *Hyriopsis cumingii*. According to a report by Yu et, al., funded by the Chongqing Natural Science foundation and China Agricultural Research System, *Hyriopsis cumingii* also has a very important role to play in the aquatic ecosystems and fishery economy due to its potential value for water purification, if managed efficiently; the pollution issue being a stain on Chinese freshwater pearl production for several years.

China's freshwater pearl cultivation areas are concentrated in southeast along the Yangtze River, Zhejiang, Jiangsu, Jiangxi, Hunan, Hubei, and Anhui. Most employ traditional cultivation techniques, which has caused significant water pollution. According to a report by Ci and Geng of the China University of Geosciences, Beijing, in order to achieve sustainable development, the Chinese government issued "ten water pollution prevention and control measures and the implemented the most stringent environmental protection system".

Adult size range: 15 cm – 20 cm Freshwater mussel. Source of cultured pearls only. Ranges naturally in China and Vietnam, was imported into Japan and hybridized with the native *Hyriopsis schlegelii* currently used in Lake Kasumigaura. Freshwater non-bead cultured pearl, typical size range: 3 mm – 15 mm. Freshwater bead cultured pearl, typical size range: 10 mm – 20 mm



All the Chinese freshwater cultured pearls in this photo are non-beaded and harvested from both valves of one mussel after 4.5 years. Even though the culturing conditions were the same, the resulting freshwater cultured pearls range from 5 to 9 mm in size. Photo by Shigeru Akamatsu (background edited)

The Classification of Pearls

Important notice

****Currently the World Jewellery Confederation (CIBJO) does not have its own classification system for natural or cultured pearls and it does not specifically endorse one industry system over another**.**

Pearl grading is used to categorize a given harvest within its intrinsic parameters, which can and will vary from one harvest to the next. Each harvest produces its own parameters, and categorizing a harvest is important for the farms, in terms of both data and sales. Grading often amalgamates different quality factors to create homogenous groups of pearls for commercialization purposes.

Pearl classification is more objective and depends on fixed parameters for each separate value factor (regardless of harvests), ensuring that a Very good from two years ago will be a Very good today and two years from now. Importantly, the fixed parameters should be (pearl) type-specific, reflecting each type's inherent ranges for a given value factor, as they do differ from one to the next.

Five Example Classification Systems

1 - Classifying Natural Pearls from Akoya complex

A system provided here by the Bahrain Institute for Pearls and Gemstones (DANAT)

2 - The GIA 7 Pearl Value Factors Classification System

A system provided here by the Gemological Institute of America

3 - Classifying Pinctada Maxima Cultured Pearls

A system provided here by Paspaley Pearling

4 - Classifying Japanese Akoya Cultured Pearls

A system provided here by Mikimoto

5 - Classifying Chinese Freshwater Cultured Pearls

A system provided here by the National Gemstone Testing Center (NGYC)

Shape - examples



Untreated Natural Colour

Natural pearls from the akoya complex have a wide selection of colours that may have other traditional and distinctive local names. All colours may be with or without overtone and / or orient.
May not be assessed for classification if the pearls have been treated.

Golden to White with Cream Variations

other body colour or tone variations exist within this palette and will be added when appropriate



Surface Appearance

Clean: pearls are blemish-free containing minute surface characteristics that are very difficult to see by trained observers with the naked eye.

Lightly blemished (Slightly spotted): pearl show minor surface irregularities when examined by a trained observer.

Moderately blemished (Moderately spotted): pearl show noticeable surface characteristics.

Heavily blemished (Heavily spotted): pearls show obvious surface irregularities that might affect durability.

Note: Visible flaws away from drill holes affect surface appearance grades more than those near the holes.

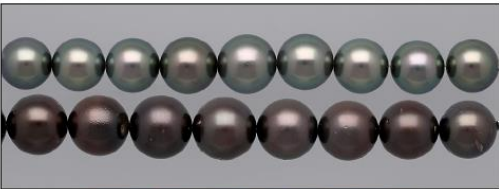
Pearl Blemishes:

- o Bumps and welts.
- o Discolorations - spotty areas often caused from concentrations of organic matter.
- o Chips, holes and patches of missing nacre.
- o Wrinkles - an irregular ridge of crease on the surface.
- o Pits and pinpoints.
- o Dimples.
- o Dull spot - area of very low lustre due to variations in nacre quality or contact with chemicals.
- o Cracks.
- o Scratches.
- o Indentations.



Lustre – The light reflected from or near the pearl's surface, evaluated by the intensity and sharpness of reflections.

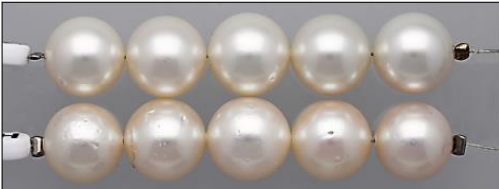
- Excellent: Reflections appear bright and sharp
- Very Good: Reflections appear bright and near sharp
- Good: Reflections are bright but not sharp
- Fair: Reflections are weak and blurred
- Poor: Reflections are dim and diffused



Varying lustre intensity in Tahitian cultured pearls. Image credit: GIA

Surface – Natural characteristics or irregularities confined to the pearl's surface, considering the size, number, nature, location, and visibility of surface characteristics, as well as position within a jewelry item. These features can affect the appearance and, in some cases, the durability of pearls.

- Clean: Blemish-free or minute surface characteristics that are difficult to see
- Lightly Spotted: Only minor surface irregularities visible
- Moderately Spotted: Noticeable surface characteristics
- Heavily Spotted: Obvious surface irregularities, some that might affect durability



Varying degrees of surface imperfections in South Sea cultured pearls. Image credit: GIA

The GIA 7 Pearl Value Factors Classification System

At the Gemological Institute of America (GIA), cultured nacreous pearls are described in detail by classifying their Size, Shape, Colour, Lustre, Surface, Nacre, and Matching (for two or more pearls). These are the characteristics that comprise the GIA 7 Pearl Value Factors pearl classification system.

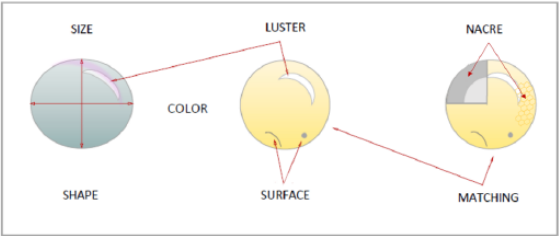


Diagram illustrating the GIA 7 Pearl Value Factors. Illustration credit: GIA.

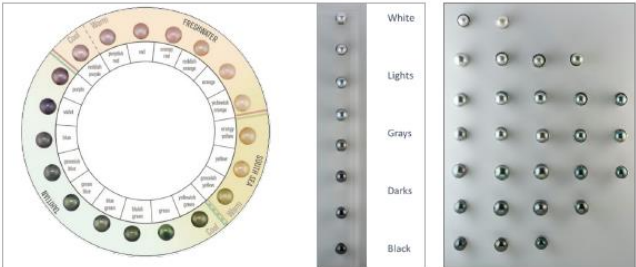
GIA's comprehensive standard was developed over decades of research on cultured pearls and their classification, working with many of the top pearl producers in the industry, worldwide. The system provides a neutral and methodical way to evaluate cultured pearls of all types, and to reliably and consistently describe their appearance and quality in a way that everyone can understand.

Colour – A combination of a pearl's or group's dominant bodycolor, overtone, and orient.

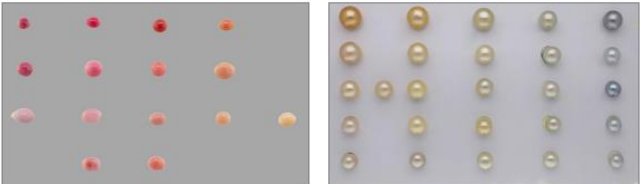
Bodycolor takes hue, tone, and saturation into account.

Overtone is any noticeable single translucent colour that appears to overlie the bodycolor.

Orient is an iridescent rainbow, or any combination of multiple colors, shimmering on or just below the pearl's surface.



GIA Hue circle, Neutral tonal scale, and Cool colour grid. Images credit: GIA.



Hue chart for Conch pearl types and hue references for South Sea cultured pearls. Images credit: GIA.

Shape

The same shape classifications apply to both treated and untreated cultured pearls.

Symmetrical shapes

Round
Drop
Oval
Button
Baroque

Asymmetrical shapes

Partially Round
Partial Drop
Partial Oval
Partial Button
Partially Baroque
Baroque

Circlé shapes

Circlé Round
Circlé Drop
Circlé Oval
Circlé Button
Circlé Baroque



CIRCLÉ



Circlé cultured pearls have one or more grooved rings that can give the pearl an appealing individuality, although non-circlé cultured pearls are generally more valuable.

Surface Appearance

The same surface classifications apply to both treated and untreated cultured pearls.



Clean

Slightly spotted

Moderately spotted

Heavily spotted

Flawless surface

Slight imperfections

Obvious imperfections

Imperfections that significantly detract from the beauty of a cultured pearl

Lustre

UNTREATED CULTURED PEARLS¹⁰

Excellent
Good
Fair
Dull



Excellent

Good

Fair

Dull

Reflections are bright, sharp and distinct

Reflections are bright, but not sharp

Reflections are weak, hazy and blurred

Reflections are dim and diffused, or no reflection is apparent

Nacre thickness



Thick



Medium



Thin



Very thin

"Nacre thickness" is the depth of the nacreous layer. It is closely related to the pearl's unique colour and lustre. The thickness and quality of the nacre are also closely related to durability, the gemmological factor of the pearl, which is the most important of the quality factors. Nacre thickness is also related to the duration of the culturing period. Though it is influenced by the characteristics of the mother oyster and the culturing environment, the longer the culturing period, the thicker the nacre.

Generally, the nacre thickness of Akoya cultured pearls is said to be thinner than that of silver lip and black lip (*Pinctada maxima*, *Pinctada margaritifera*) pearls, but they are characterized by a fine, transparent layer, which produce the unique lustre and interference colors of Akoya pearls.

Visually it is difficult to accurately determine nacre thickness, but it may be measured by using digital and ultrasonic thickness gauges, micro X-radiography, Optical Coherence Tomography (OCT), and other instruments. However, not only its thickness, but also its quality is an important factor of a pearl's quality, so the nacre thickness value alone cannot represent the quality of a pearl.

The quality of the nacre directly relates to its so-called crystallinity, which is the component that contributes to beautiful interference colours, lustre, and smoothness of the pearl surface, it should be dense and homogeneous at a certain thickness.

Shape



Round



Semi-Round / Oval



Semi-Baroque



Baroque

The reason why cultured pearls are deformed even when a perfectly round bead is inserted is because the cultured pearl sac may not evenly secrete nacre on the surface of the bead, or because organic matter is contained in the nacre.

The longer culturing continues and the thicker the nacre becomes, the more the incidence of off-round pearls. Perfect round pearls roll in the same direction if there was even the slightest inclination, the so-called "Happo Korogashi (rolling in every direction)", and were highly valued.

There is agreement that round pearls with sufficient nacre thickness are most highly valued. Recently, however, round pearls are no longer necessarily of high quality, as the culturing period is shorter and the proportion of pearls with round shapes but thin nacre has increased. It can be said that a slightly distorted pearl is more attractive as a pearl than a round pearl with a thin nacre, and some consumers choose an off-round pearl.

Akoya Cultured pearls are produced by surgical operation of inserting a piece of mantle and a bead into the oyster's body to create a pearl sac around the bead. If the damage caused by the bead insertion operation is severe, if the wound repair is delayed because of the violent movement of the oyster after operation, or if the condition of the operated site allows cell debris such as blood cells to enter between the bead and the pearl sac, or if the pearl sac is constricted along the wound site caused by the operation, the pearl sac surrounding the nucleus will be distorted. Blood cells (or pus¹⁾) stay in the pearl as organic matter that later turns blackish brown. These instances have a great deal to do with the shape of the pearls that are formed, causing protrusions and distortions, and thin nacre often results in baroque pearls with blue or grey tints. Also, the secretion of the epithelial cells of the pearl sac often become abnormal, which may sometimes deform the shape of the pearl by the formation of a dark brown organic layer, a heterogeneous layer of non-nacreous material.

Lustre



Good



Medium



Poor

"Lustre" of a pearl is comprehensive in terms of brilliance, transparency. It is a unique optical characteristic involving not only reflection from the surface but also reflection from the interior of the pearl, with diffuse reflection interference inside the pearl. The quality of the lustre is determined by the properties of the nacre, such as thickness, uniform arrangement, and light transmission of the crystals. The quality of the lustre is closely related to the thickness of the nacre. If the nacre is not thick enough, a deep and good lustre will never be produced.

In recent years, with the development of polishing technology, pearls with improved lustre are now available by polishing the pearl surface like a mirror, but this only improves the surface reflection, not the deep and soft lustre that pearls originally have.

When the aragonite crystals that make up the nacre are large, dense, and stacked regularly in many layers in a clean plate-like shape, the optical action of light produces the deep lustre characteristic of pearls. On the other hand, even though the nacre is thick enough, if its quality is poor, it will not produce a pearl with good lustre. Examples include thick aragonite crystals showing no lustre and small and unevenly aligned crystals resulting in large light diffusion.

These qualities of the nacre have a great deal to do with culturing management. In the case of Japanese Akoya cultured pearls, when the water temperature drops in winter, dense, large, well-ordered aragonite crystals are formed and the pearls have good lustre. Pearl farmers call this phenomenon "make-up coating of the nacre". The reason for harvesting Akoya pearls in winter is that the nacre has a so-called crystallinity that exhibits the finest lustre and most beautiful interference colors unique to this time of the year.

Lustre

Lustre is the appearance or the brilliance of the pearl in reflected light. It is judged by the sharpness of the reflection of a light source seen on the surface of the pearl. The Lustre of freshwater cultured pearl is classified as very strong, strong, medium and weak.

A very strong	B strong	C medium	D weak
			
Reflections are extremely bright, sharp and Distinct	Reflections are bright, sharp and distinct	Reflections are bright, but not sharp	Reflections are weak, hazy and blurred

Colour

A freshwater cultured pearl's body colour, overtone, and halo characteristics. The body colour of the freshwater cultured pearls is divided into several series: white, red, purple and others. Pearls may have overtones such as yellow, red, pink, fuchsia, silvery-white, cyan, or green. Pearls may have halos, which are divided into strong halos, obvious halos, and general halos.

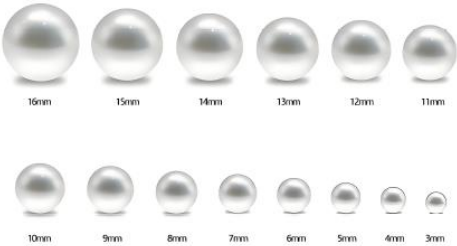


Size

The size of a single pearl; perfectly round, round, and near round pearls are represented by the smallest diameter only, and other pearl shapes, e.g., drop shapes, are expressed by both the maximum and the minimum dimensions. It might be noted that given the large productions that occur with Chinese freshwater cultured pearls, significant automation is developing in this arena.



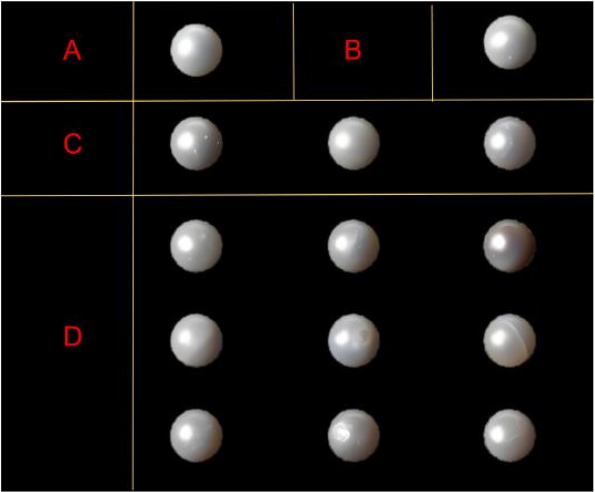
Figure 1An automated cultured pearl sorting instrument in China



Surface appearance

The overall smoothness and cleanliness of the freshwater cultured pearl's surface is determined by the size, number, colour and location of any blemishes. The surface appearance of the cultured freshwater pearl is classified as follows:

- Extremely Clean (A) : pearls are blemish-free containing minute surface characteristics that are extremely difficult to see by trained observers with the naked eye.
- Clean(B): pearls contain minute surface characteristics that are very difficult to see by trained observers with the naked eye.
- Lightly blemished (C) : pearl show minor surface irregularities when examined by a trained observer.
- Moderately blemished (D): pearl show noticeable surface characteristics.
- Heavily blemished (E) : pearls show obvious surface irregularities that might affect durability.



Australian South Sea pearl oyster & Australian South Sea cultured pearl



Species

Pinctada maxima – Primarily white, silver with some gold-lipped pearl oyster varieties.

Origin

Wild *Pinctada maxima* oysters are found in abundance only in an isolated region off northern Australia.

Shell Characteristics

- o Largest and most valuable of all pearl oysters.
- o Typical adult size range: 20 cm – 30 cm.
- o Australian pearl oysters are predominantly of the silver-lipped variety but also include some of the gold-lipped variety.
- o Require pristine marine conditions and abundant plankton to thrive.
- o Live mainly in deep water, and do not thrive on coral reefs.
- o The majority of Australian South Sea cultured pearl production comes from wild pearl oysters caught by divers. Some oysters are now produced in hatcheries to supplement and protect the wild stocks.
- o The mother-of-pearl from this species is the finest quality, thickest and most valuable of any pearl oyster and supplies the majority of the world's demand for the manufacture of high value mother-of-pearl products such as watch faces and jewellery.

Cultured (beaded and non-beaded) Pearl Characteristics

- o Largest and most valuable of all white cultured pearls.
- o Comparably (usually) very thick nacre for any bead-cultured oceanic (saltwater) pearl.
- o Natural lustre includes high transparency and colour overtone known as 'orient'.
- o Wide variety of shapes such as drop, oval, round, baroque, and button.
- o Predominantly produces white and silver cultured pearls but natural colours range from white to gold with pink, blue, and green overtones.
- o No treatment required for fine quality Australian South Sea Cultured Pearls but for lower qualities *maeshori* treatments are applied.
- o Typically, 11 mm-16 mm in diameter with rare examples exceeding 20 mm.

Production

- o 1 bead cultured pearl per pearl oyster every 2-3 years with occasional non-bead cultured pearl. The re-use of a cultured pearl sac following harvest occurs selectively.
- o Estimated production is approximately 800,000 cultured pearls per annum.
- o Wild oysters account for approximately 70% of the production.
- o Retail value of world production: Approximately US\$300million per annum

Tahitian Black-lipped pearl oyster & Tahitian Black Cultured Pearl



Species

Pinctada margaritifera cumingii

Origin

Tahiti, French Polynesia, but also reported in Okinawa (Japan), Cook Islands and other Pacific islands.

Shell Characteristics

- Typical adult size range: 10 cm – 20 cm.
- Require pristine marine conditions to survive and thrive.
- Natural habitat includes coral reefs in the Central Pacific Ocean. Mainly found in French Polynesia. All *Pinctada margaritifera* oysters used for pearl culture are cultivated from spat in lagoons.
- Thrives in coral reef and atoll environments.
- This species of pearl oyster has valuable fine quality black mother-of-pearl in a wide range of colour and overtones including black, green, silver, blue and rosé.
- Mother-of-Pearl from this species is valuable for inlay and button manufacturing.

Cultured (beaded and non-beaded) Pearl Characteristics

- Predominant variety of saltwater black pearl.
- Natural colours may range from white to black including peacock, green, cherry, aubergine, blue, pistachio, gold, silver and red overtones.
- No treatment is required for fine quality Tahitian black cultured pearls.
- Typically, 4 mm -15 mm in diameter 15-20 mm is considered an important range but production is low, with rare example exceeding 20 mm.
- Produces the largest of all black cultured pearls. Wide variety of shapes such as drop, oval, round, baroque, button and circé.

Production

- 1 bead cultured pearl per oyster every 2 years, with occasional non-bead cultured pearls. The re-use of a cultured pearl sac following harvest occurs selectively.
- Oysters are grown from spat collected in spat-collectors in a natural environment.
- Estimated production is approximately 8 million cultured pearls per annum.
- Retail value of world production: Approximately US\$ 230 million per annum.

Species

Pinctada margaritifera typica

Origin

Islands of Western Pacific Ocean

Shell Characteristics

- o Adult size range: 10 cm – 20 cm.
- o Natural habitat is coral reefs surrounding larger mountainous islands of the Western Pacific Ocean.
- o Require a pristine and nutrient rich environment, typical of tropical climates that experience seasons of consistent rainfall, and display a high tolerance to suspended particle matter.
- o Majority of Fiji cultured pearl production is from wild spat collection and hatchery production. This production is based around large sheltered bays on the larger mountainous islands, not atoll environments.
- o Oyster exhibits a unique soft body colour with its predominantly bright orange mantle³.
- o The mother-of-pearl from this species display a range of rare "earth tones". Not always sought after by commercial mother-of-pearl processors.

Cultured (beaded and non-beaded) Pearl Characteristics

- o Predominantly rare "earthy" tones with body colours such as gold, copper, burgundy, pistachio, pastel blue and chocolate.
- o Fiji cultured pearls also display strong to subtle overtones of pink, gold, copper, bright green, blue and violet colours. Also, common to find cultured pearls with more than 2-3 overtones, particularly with circled cultured pearls and baroque-shaped cultured pearls.
- o The high lustre and iridescence of the Fiji cultured pearls testament to the thickness and quality of its nacre.
- o Bead cultured pearls are produced in a wide variety of shapes such as round, semi-baroque (drop, oval, button), circled, and baroque. Non-beaded keshi culture pearls are produced in various shapes.
- o Size from first seeding averages 10 – 11 mm with reseed average size from 11.5 – 13 mm. Size exceeding 16 mm are rare.
- o No colour treatment performed on any Fiji cultured pearls.

Production

- o 1 cultured pearl per oyster produced every 1-2 years with an average result of 1 saleable pearl out of every 4 oysters seeded.
- o Limited production due to rarity of oysters with a maximum of 50,000 cultured pearls per annum.

Fijian pearl oyster & Fiji cultured pearl





Hyriopsis schlegelii used in Japan for culturing

Pearl Characteristics

Cristaria plicata

- Non-beaded ("Rice Krispie" cultured pearls in the late 60's through the 80's) or beaded freshwater cultured pearls.
- Most are Buddha-shaped or blister pearls, with a few in other shapes.
- Typical nature colours are white, cream and light pink.
- Each individual shell is capable of producing up to 50 pearls from 25 grafts. (unverified)

Hyriopsis cumingii

- Non-beaded or beaded freshwater cultured pearl.
- Shapes are mainly round, partial-round, and baroque, with high-quality round beaded pearls accounting for a relatively high proportion
- Typical sizes of non-beaded pearls range from 3mm to 15 mm, while beaded pearls usually range from 5 mm to 15 mm, with some extremes reaching from 3 mm to 25 mm.
- Typical natural colours include white, pink, orange, cream, dark purple, violet, and mauve while yellow and green are rare. Darker natural colours often display a natural metallic lustre.
- Trade names for beaded pearls include Coin, Fireball, Nuclear, Edison, Ming, Mini Ming and Soufflé. (Soufflé contain non-solid nuclei, which are removed after drilling, leaving a hollow cavity inside the pearls).

Freshwater pearl mussel & Freshwater cultured pearl



Chinese *Cristaria plicata* (above) and *Hyriopsis cumingii* (below).



Original keshi cultured pearl sizes were “seed pearl sizes” and could be found close to the gonad; they occurred as a consequence of the culturing operation in the Akoya pearl oyster (below – multitude of seed sized keshi cultured pearls in an Akoya pearl oyster partially in the gonad).



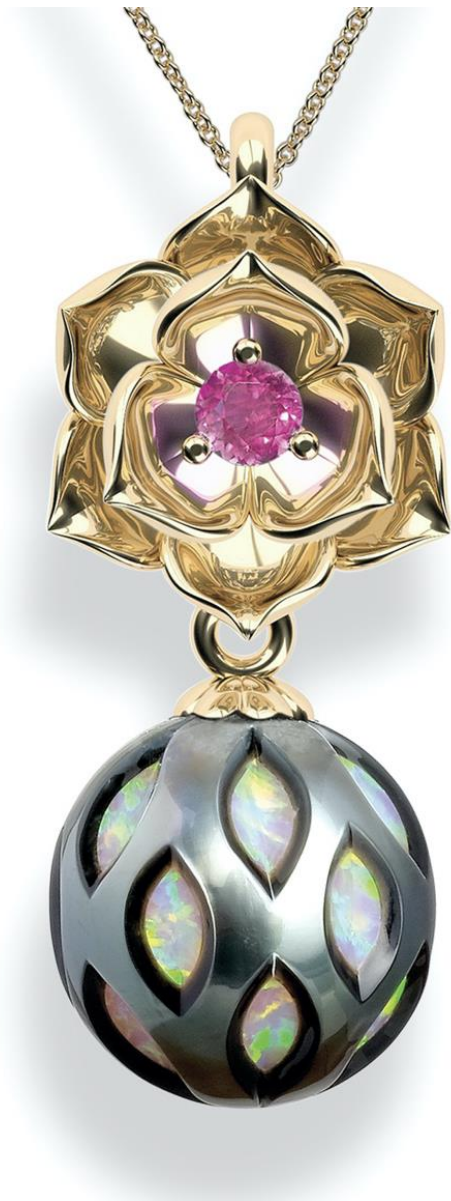
Accidentally or unintentionally produced saltwater cultured pearls without a solid bead at their centre are called non-bead cultured pearls. Some are commonly known as “keshi cultured pearls” from the Japanese word for “poppy seed” that indicated their sizes as originally conceived. However larger non-bead cultured pearls are today also referred to as “keshi cultured pearls”.

Today keshi cultured pearls generally range in size from sometimes <1 mm – 16 mm but are occasionally found in larger sizes which are considered to be very rare.



Lately keshi cultured pearl sizes are larger as they occur in *Pinctada maxima* pearl oysters but are still found close to the gonad; they occurred as a consequence of the culturing operation (above – large keshi cultured pearl in *P. maxima* partially in the gonad)





omento Pearl US patent awarded 2016

Pearl Processing & Treatment Reference Table

Procedure	Objective	Natural Pearl	Cultured Pearl
Drilling	Part or full to set in jewellery and/or strands	Processing	Processing
Faceting	Creates multiple flat polished surfaces	Processing	Processing
Carving	Carving nacre to create artwork	Processing	Processing
Cutting	Trim part of the pearl to remove an imperfection	Processing	Processing
Light working	The removal of shell nacre from a natural blister pearl	Processing	N/A
Peeling	Remove outer layer of nacre to improve surface	Processing	Processing
Polishing	Use a polishing wheel with a fine abrasive to improve lustre	Processing	Processing
Buffing	Use a polishing wheel with a coarse abrasive to improve surface/ lustre	Processing	Processing
Cleaning	Tumbling with fibre or salt-based solutions to remove organic matter	Processing	Processing
Not visible drilling	Applies to pearls set in jewellery only	Processing	Processing
Not visible working	Applies to pearls set in jewellery only	Processing	Processing
Not visible out	Applies to pearls set in jewellery only	Processing	Processing
Chinese drilled	Two partial drill holes meeting internally at a single point	Processing	N/A
Plugged	A plug inserted to narrow a worn/widened drill hole	Processing	Processing
Worked	Ground, polish and or remove blemished to improve shape	Treatment	Treatment
Bleaching	Chemical alteration to reduce or alter colour	Treatment	Treatment
Coating	Application of a coating	Treatment	Treatment
Dyeing	Application of a dye to alter colour	Treatment	Treatment
Filling	Filling of cavities	Treatment	Treatment
Heating	Heating to improve colour	N/A	Treatment
Irradiation	Artificial radiation to change colour	Treatment	Treatment
Lustre enhancement	The application of chemicals to improve lustre	Treatment	Treatment
Oil / resin	Application of oil or resins to hide fissures, fractures	Treatment	Treatment
Tinting or "pinking"	Application of a light coloured dye	Treatment	Treatment
OB / FW ¹⁷	Absorb UV to re-emit blue light to improve colour and lustre	Treatment	Treatment
Waxing	Application of wax to disguise fractures	Treatment	Treatment
Chemical alteration	Application of chemicals to produce various effects,	Treatment	Treatment

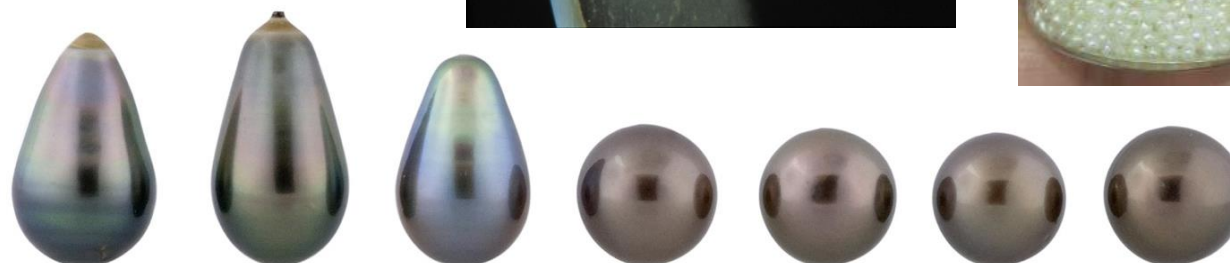
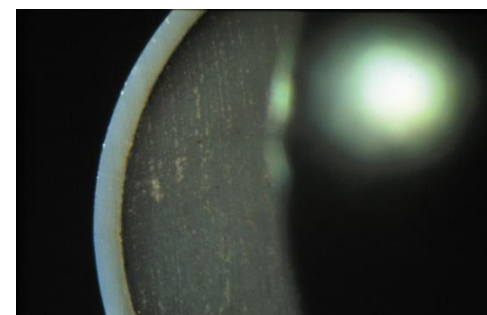
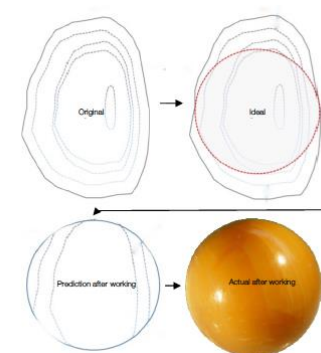
Disclosure requirements

N/A – not applicable

None

Processing scenarios that require disclosure for natural pearls

Treatments that requires disclosure (treatment information)



Cleaned

a natural or cultured pearl that has had loose extraneous material removed from the surface by employing only water and sometimes mild detergents and /or soft powders.

Cleaning

following its removal from a mollusc, a pearl may be cleaned of debris by immersion in water that contains various detergents. This process does not include any bleaching chemicals and is known as 'cleaning'.

Coating

an artificial layer of any natural or artificial substance spread over the surface, or part of the surface, of natural pearls and cultured pearls for protection, colouration, increased lustre and other optical phenomena (orient and overtone), decoration or to alter their appearance, a covering layer.

Collar

a strand of pearls, cultured pearls or imitation pearls measuring 25-33 cm (10 to 13 inches) in length.

Colour

colour has three attributes: hue, tone, and saturation. Hue is the basic impression of colour—yellow, green, blue, etc. Tone is the relative impression of lightness or darkness of the colour. Saturation is the strength or intensity of the colour. In general the colour of nacreous natural and cultured pearls may be described in terms of a combination of 'body colour' 'overtone' and 'orient'

Commercial document

Any writing or electronic transmission that evidences, anticipates or concludes a Commercial Transaction, including any agreement, memorandum of agreement, purchase order, blanket purchase order, blanket purchase agreement, purchase order acknowledgment, request for proposal, quote, warranty, representation certification, guaranty, import documentation, packing list, bill of sale, memorandum of consignment, receipt and in advertising. Commercial documents include mandatory information of the seller, and when necessary the purchaser.

Conch Pearl

a non-nacreous natural pearl consisting of calcium carbonate arranged concentrically in a crossed lamellar microarchitecture. This structural characteristic usually produces a flame-like surface pattern and porcelaneous sheen. Such pearls are produced by various gastropods including the Queen Conch (*Aliger gigas*, also known as *Lobatus gigas* and *Strombus gigas*) Horse Conch (*Triplofusus giganteus* formally known as *Pleuroploca gigantea*) and the Emperor Helmet (*Cassia madagascariensis*). Also, known as pink pearls. See also conch.

Conchiolin

A mixture of beta-chitin and glycoproteins constituting the organic portion of nacre (C₂H₄N₂O₁₁).

Coque de perle

a shell section, cut from the curved nacreous surface of a polished Chambered nautilus then finished like an assembled pearl. Coques de perles are often assembled into jewellery, to resemble large oval half-pearls. They are imitations of pearls. Also known in the trade as Osmena, 'Osmena pearl' and 'nautilus pearl'.

Cortez cultured pearl

trade name for the beaded cultured pearl produced in *Pteria Sterna*, the rainbow lipped pearl oyster, in the Gulf of California, Mexico, in an area also known as Sea of Cortez.

Culture

the growth of biological material, microorganisms, animal tissue or pearls with human intervention, in specially controlled conditions.

Cultured blister pearl

a cultured pearl that has perforated the mantle (freshwater) or the gonad cavity of the mollusc and has adhered, through layers of nacreous or non-nacreous secretions applied by the mollusc, to the inner wall of the shell. The subsequently formed layers of nacreous or non-nacreous material are continuous with those of the inner wall of the shell. They are round or irregular in shape and the base of the blister cultured pearl may be worked. Not to be confused with cultured blister.

Cultured pearl sac

a pearl sac produced / grown from a graft of mantle tissue artificially inserted into the body of a host mollusc or created from mantle damage due to human handling.

Cultured pearls

cultured pearls are formed in the interior of productive living molluscs within a cultured pearl sac with human intervention and a variety of conditions depending upon the mollusc and the goals.

Cultured conch pearls

cultured pearls formed in the interior of *Aliger gigas* commonly known as *Strombus gigas* and sometimes *Lobatus gigas*, with human intervention and within a cultured pearl sac

Cut cultured pearls

cultured pearls that have been cut in half or three quarters to produce a flat base.

Cut natural pearls

natural pearls that have been cut to produce a flat base.

cultured pearl sac around the bead which is in turn responsible for the secretion of nacreous layers. The outer layers of beaded nacreous cultured pearls are concentric and composed of a complex organic substances collectively known as conchiolin and of calcium carbonate (usually in the form of aragonite). See nacreous cultured pearls

Biogenic substances

a substance produced by life processes. It may be either constituents, or secretions, of plants or animals, e.g., nacre.

Bivalve

a member of the molluscan class Bivalvia, having a two-part shell, e.g., clam, oyster, mussel, and scallop.

Biwa cultured pearl

a freshwater beaded or non-beaded cultured pearl produced in Lake Biwa, Japan, using the freshwater bivalve mollusc *Hyriopsis schlegelii*.

Black cultured pearl

naturally coloured, cultured black pearl produced using either *Pinctada margaritifera cumingi* the Tahitian cultured pearl *Pinctada margaritifera typica*, the Fijian cultured pearl, *Pinctada mazatlanica* or *Pteria sterna* or other pearl oysters. The colour is not caused by any subsequent processing.

Black natural pearl

naturally coloured, natural black pearl produced by *Pinctada margaritifera*, *Pinctada mazatlanica* or *Pteria sterna*. Colour not caused by any subsequent processing.

Bleaching

to remove or change a colour by means of chemical and/or physical agents or light.

Body colour

the dominant, overall colour of the natural or cultured pearl.

Bombay bunches

strands of round saltwater natural seed pearls (ranging from less than 1 mm to 3 mm) mostly with medium to high lustre and well-matching colour. These bunches are known by the trade as Bombay Bunches and are mostly marketed in Europe.

Bombay pearls

commercial name for natural pearls chiefly from *Pinctada radiata*, fished from the Arabian/Persian Gulf and Red Sea and exported through Bombay, (now known as Mumbai) India.

Bonding

the cohesion of two or more parts or layers. See composite pearl or cultured pearl definition.

Bonus cultured pearl

See Lagnappe cultured pearl and Keshi cultured pearl

Buffing

removing organic residues from the surfaces of natural and cultured pearls following harvest (see also polishing)

Button, or bouton-shaped

a symmetrical domed-shape with or without a flattish bottom.

Carat (ct)

a unit of weight one carat being equivalent to 200 milligrams (1/5 gram).

Carved

cultured pearl that has been engraved on the surface.

Cercle or circled

see circled.

Chaw

system of converting weight into volume. Pearls in the Arabian/Persian Gulf and India are often sold by chaw. The formula for calculating the weight in Chaw is; multiply the carat weight by itself and then multiply by 0.6618.

Chinese drilling

Two drill-holes that penetrate a pearl or cultured pearl from two different points on the same side, in general the flat or less round side, and meet at a point within the pearl. This drilling was designed to facilitate the use of pearls as buttons.

Chemically altered

a treatment that changes the colour of a pearl or cultured pearl without the use of a dye.

Choker

a strand of uniform sized natural pearls, cultured pearls or imitations of pearls measuring 35-40 cm (14 to 16 inches) in length.

Circled

a pearl also known as cercle with one or more concentric rings or indented grooves around it.

Clam pearl

natural pearl from the hard-shell and giant clams, e.g., *Mercenaria mercenaria* (quahog) *Tridacna gigas* (giant clam)

Terms and definitions

For the purposes of this CIBJO Guide, the following terms and definitions may be useful;

Abalone Cultured Blister

a cultured blister from an abalone (*Haliotis* spp.)

Abalone Pearl

a natural pearl, usually multi-coloured blue or green hue, found in gastropod molluscs of the *Haliotis* genus in the Pacific, Atlantic and Indian Ocean.

Adductor muscle

the muscle attached to both valves of a bivalve that causes the shell to close when it contracts.

Advertisement

the activity of attracting public attention to a product or business, as by announcements in the print, broadcast, or electronic media.

Akoya cultured pearl

a beaded cultured pearl produced in *Pinctada fucata* (*martensii*) the Akoya pearl oyster.

Akoya Keshi cultured pearl

a trade term for a keshi cultured pearl grown in *Pinctada fucata* (*martensii*). An Akoya keshi cultured pearl or an Akoya non-beaded cultured pearl, formed accidentally in *Pinctada fucata* (*martensii*), it is a by-product of the culturing process. The creation results from the formation of a cultured pearl sac either following injury of the mantle rim upon handling, or from a partial piece of the inserted (transplanted) mantle tissue or the whole inserted piece following the rejection of a bead

Alteration

any change made to a pearl, cultured pearl or artificial products.

Arabian Gulf

an area in Southwest Asia that is an extension of the Indian Ocean located between Iran and the Arabian Peninsula, also known as the Persian Gulf.

Arabian Gulf pearls

natural pearls produced from the *Pinctada radiata*

Artificial products

products which are partially or completely made by man.

Artificially produced composite pearl or cultured pearl

product composed of two or more previously separate parts or layers, assembled by bonding or other artificial methods of which at least one is a natural pearl or a cultured pearl.

Assembled

see composite cultured pearl and assembled cultured pearl blister

Assembled cultured blister

Assemblages of a purpose-grown cultured blisters which have been cut from their shell, the original bead upon which they grew being removed and the cavity filled with various types of man-made materials, and backed by a layer of shell, the assemblages being held together by an adhesive, commonly known as Maibe or Hankai and occur in both fresh and saltwater environments. Not to be confused with cut cultured pearl

Bahraini pearl

a natural pearl from Bahraini waters in the Persian/Arabian gulf produced from the *Pinctada radiata*

Baroque

an irregularly shaped natural or cultured pearl. Baroque was originally a Portuguese adjective used to describe objects or pearls that were not symmetrical in shape.

Basra pearl

a natural pearl from the Arabian gulf produced from the *Pinctada radiata*

Bead for cultured pearls

a sphere (usually) or other shape (occasionally) originally formed by cutting and polishing a nacreous shell, usually from a freshwater bivalve, used to accommodate the nacre secreted from a cultured pearl sac. The bead eventually forms the centre of a beaded cultured pearl. Atypically, beads formed from natural or cultured pearls of various types or other materials may be used, however, in such circumstances the product shall be described as containing an atypical bead or the type of bead shall be named, e.g., an 'atypical bead cultured pearl', a 'turquoise bead cultured pearl', a 'coral bead cultured pearl'.

Beaded nacreous cultured pearl

Beaded cultured pearls are usually nacreous formations secreted in the interior of various saltwater and freshwater molluscs. A bead is inserted into the mollusc along with a piece of mantle tissue which eventually forms the

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