



## **CIBJO INFORMATION SHEET**

### **BACKGROUND ABOUT CORAL FOR EDUCATORS**

The following information sheet has been created for jewellery industry educators, providing information about precious and reef coral, definitions, nomenclature and standard references, according to the guidelines provided in the CIBJO Coral Book (2017 edition). The information is not presented as a structured course, and it is up to the educators to select, edit, organize and present the information provided according to the needs of the particular audiences of students.

## Table of Contents

<b>1.</b>	<b>INTRODUCTION TO CORAL AS A JEWELLEY ITEM .....</b>	<b>3</b>
<b>2.</b>	<b>CITES.....</b>	<b>5</b>
<b>3.</b>	<b>CLASSIFICATION OF MATERIALS (CIBJO CORAL BOOK).....</b>	<b>7</b>
3.1.	TAXONOMY OF PRECIOUS AND COMMON CORALS .....	7
3.2.	BIOGENIC VS ORGANIC .....	8
3.3.	PRECIOUS CORAL CLARIFICATION .....	8
<b>4.</b>	<b>PRECIOUS CORAL VARIETIES .....</b>	<b>9</b>
<b>5.</b>	<b>COMMON CORAL VARIETIES (INCLUDING REEF CORAL) .....</b>	<b>12</b>
<b>6.</b>	<b>CORAL TREATMENTS.....</b>	<b>14</b>
6.1.	GENERAL DISCLOSURE .....	14
6.2.	SPECIFIC DISCLOSURE .....	14
<b>7.</b>	<b>PRECIOUS CORAL CARE .....</b>	<b>15</b>

## 1. INTRODUCTION TO CORAL AS A JEWELLEY ITEM

- Coral has been used as an adornment since the Iron Age.
- *Corallium rubrum* from the Mediterranean has been exported to Asia since the 1<sup>st</sup> Century AD.
- Pagan and religious beliefs about the protective powers of corals in Western civilization come from Greek mythology.
- Corals are present in sacred texts and traditions in many religions, including Christianity, Islam, Judaism, Buddhism and Hinduism.
- Corals are deeply rooted in the local culture of traditional manufacturing areas like Torre del Greco in Italy and Kochi in Japan.
- The discovery of the dead coral deposits in the Sciacca Banks of the Sicily Channel significantly cut the price of corals in the late 19<sup>th</sup> century.
- Sciacca coral is the trade term for the dead orangey coral branches that were found in 1885 off the coast of Sciacca in Sicily, Italy.
- Precious coral production in Japan began in 1871.
- Precious coral production in Taiwan started in 1923.
- Corals belong to the Anthozoa class of the phylum Cnidaria, formerly known as Coelenterata.
- Coral is the collective name of more than 7000 species, but fewer than 10 of them are considered precious corals.
- Precious corals are usually deep-water species (living between 50 and 2000 metres beneath the surface of the sea), while reef corals live in shallow water.
- Climate change has been especially detrimental to the shallow-water reef corals, but these are varieties that are not used in jewellery.
- Angel's skin (pink) is a trade term for the albino variety of *Pleurocorallium elatius* (usually orangey-red).
- Mediterranean coral, which occurs off the coasts of both Northern Africa and Europe, is famous for its deep red colour and history. It is known in the trade as Sardinian coral.
- Colourless surface waxing is not considered a coral treatment, but rather a normal lapidary procedure.
- The most common coral treatments are multi-process, and involves bleaching, dying and, subsequently, possible impregnation with polymer.
- All treatments must be disclosed and, depending on the process used, the disclosure may involve general information or more specific information.
- Treatment disclosure is important to promote consumer confidence in the jewellery industry.
- A set of gemmological techniques, namely visual observation and refractive index are usually sufficient to positively identify fashioned precious corals and to distinguish them from their substitutes.
- For an experienced observer, the identification of precious coral is much easier before processing than after it has been cut and polished.
- The gemmological properties of precious corals are essentially a result of its calcium carbonate (calcitic) composition.

- In certain cases where visual observation is not conclusive, advanced analytical techniques are required to collect diagnostic information for species determination and detection of colour treatments.
- Carbon dating, a minimal destructive technique, may be used in the validation of historically important artefacts.
- DNA fingerprinting is being developed as a minimally destructive technique to identify fashioned precious coral at the species level.

## 2. CITES

CITES is The Convention on International Trade in Endangered Species, also known as The Washington Convention, established in 1975. CITES lists three levels of species protection according to their current situation: Appendix I (species that are threatened), Appendix II (species that are not necessarily threatened), and Appendix III (species that are not endangered, but that require monitoring).

Precious coral species that are not listed in any of the CITES appendices include the Sardinian coral (*Corallium rubrum*), Garnet coral (*Hemicorallium regale*), Deep Sea coral (*Hemicorallium laauense*), Misu coral (*Hemicorallium sulcatum*). Some common corals, like the Bamboo corals (*Isididae* family), are also not listed.

**Appendix I** - No precious coral species are considered endangered, and therefore none are listed.

**Appendix II** - Common corals, including certain reef corals, which may be used for decoration or in trinkets are listed, including black coral (*Antipatharia* spp.), blue coral (*Heliopora coerulea*), stony corals (*Scleractinia* spp.), organ-pipe corals (Tubiporidae family), fire corals (Milleporidae family) and lace corals (Stylasteridae family). No precious corals are listed.

**Appendix III** – At the request of China in 2008, certain varieties of red and pink coral were listed for the monitoring of the trade, including *Corallium elatius*, *C. japonicum*, *C. konojoi* and *C. secundum*. The recommendation expired in 2013 and consequently was extended until 2016. CITES still has to make a decision whether to include these species in Appendix II or to exclude them from the Washington Convention.

### Precious Corals and CITES (adapted from the 2017 CIBJO Coral Book)

Commercial Name	Scientific name	CITES Appendix	Note and Comment
Mediterranean Sardinian Sciaccia	<i>Corallium rubrum</i>	Not included	Can be exported and imported in every country.
Garnet	<i>Hemicorallium regale</i>	Not included	Can be exported and imported in every country. Recommended taxon listing is <i>Corallium secundum</i> *
Deep Sea	<i>Hemicorallium laauense</i>	Not included	Can be exported and imported in every country. Recommended taxon listing is <i>Corallium secundum</i> *
Misu Missu Miss	<i>Hemicorallium sulcatum</i>	Not included	Can be exported and imported in every country. Recommended taxon listing is <i>Corallium secundum</i> *
Midway	<i>Corallium secundum</i>	Appendix III (2008-2016)	Appendix III listing requested by China Lives only in the Pacific Ocean
Aka	<i>Corallium japonicum</i>	Appendix III	Appendix III listing requested by China.

Moro Oxblood		(2008-2016)	
Cerasuolo Momo Satsuma	<i>Corallium elatius</i>	Appendix III (2008-2016)	Appendix III listing requested by China.
White	<i>Corallium konojoi</i>	Appendix III (2008-2016)	Appendix III listing requested by China.
Angel skin Boké Magai	<i>Corallium elatius</i>	Appendix III (2008-2016)	Appendix III listing requested by China.

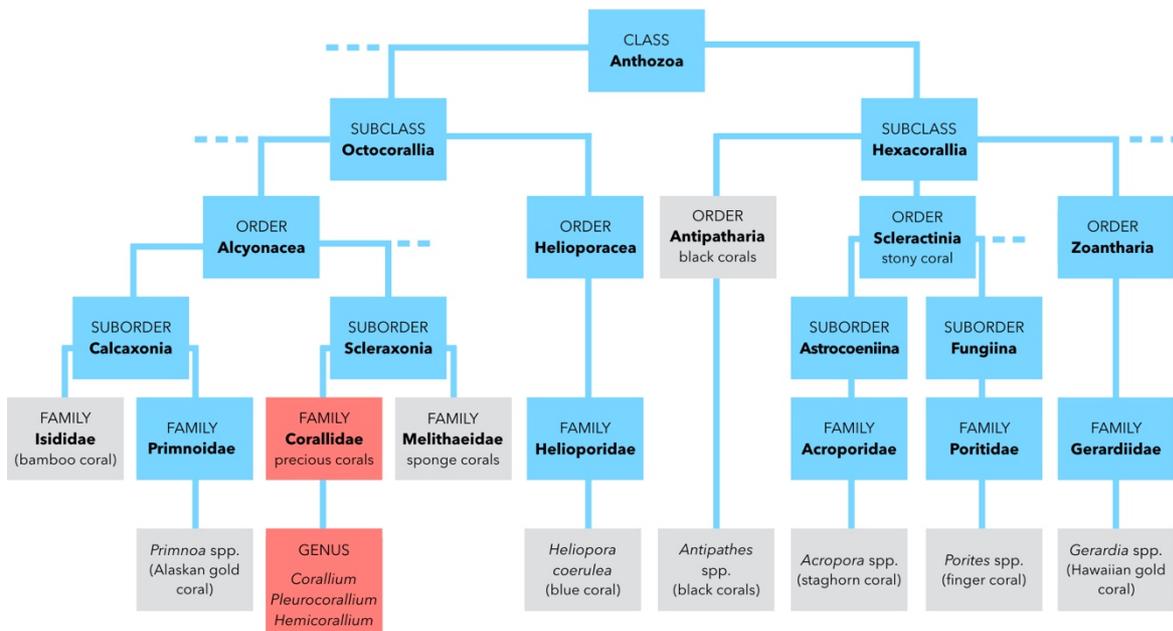
\* CITES listed taxa have not been updated to reflect current scientific practice. This is a discrepancy that was recognized at a CITES meeting in Geneva in July 2018, and it is scheduled to be rectified in 2019.

### 3. Classification of Materials (CIBJO Coral Book)

<b>Natural materials</b>
<b>Corals</b> - Cnidarians with skeletons are referred to collectively as “coral”. Corals are marine invertebrates formed by nature without human intervention. Corals may have been subsequently modified by normal lapidary practices.
<b>Precious corals</b> - Corals used in jewellery and decoration, specifically red, pink and white varieties with porcelain like lustre after polishing. They are limited to species belonging to the Corallidae family, consisting of the three following groups: <i>Corallium</i> , <i>Pleurocorallium</i> and <i>Hemicorallium</i> . They have a specific gravity of approximately 2.8 and a hardness of 3½ on the Mohs scale.
<b>Common corals</b> - Common corals are mostly of a calcareous type, usually found in coral reefs. Examples include sponge coral, bamboo coral and blue coral. After treatment, some species are sometimes used as ornaments.
<b>Treated corals</b> - Corals which have been treated to change their appearance and/or durability.
<b>Artificial products</b> - Products that are partially or completely made by man.
<b>Imitations of corals</b> - Artificial products that imitate the appearance of natural materials, without having their chemical composition and/or their physical properties or their structure.
<b>Artificially produced composite stones</b> - Composite products composed of two or more previously separate parts or layers assembled by bonding or other artificial methods. Their components can be natural and/or artificial.
<b>Other artificial products</b> - Artificial products that imitate the appearance of corals.

#### 3.1. Taxonomy of Precious and Common Corals

(Precious corals in red, common corals in grey)



### **3.2. Biogenic vs Organic**

Traditionally, organic gem materials (e.g. ivory, bone, coral, tortoiseshell, pearl, mother-of-pearl, shell, horn) have been defined as the ones that derive from the activity of living organisms. But, strictly speaking, some of these are not organic in composition, and these include precious corals, pearls, cultured pearls, mother-of-pearl and shell. The major composition of such materials is bio-mineralized calcium carbonate in aragonitic and/or calcitic structures and carbonates, as crystal matter. Therefore, it has been suggested that precious corals are better termed as biogenic gem materials rather than organic gem materials.

### **3.3. Precious Coral Clarification**

As a collective term, “coral” has been used to describe most of the cnidarians of the Anthozoa class. But the general lack of information in the public arena about different coral varieties, coupled with recent media coverage about of the endangered shallow-water corals in Australia’s Great Barrier Reef and elsewhere, including Florida, have negatively impacted on the reputation of coral as a luxury product. This was despite the fact that CITES, environmental organizations and several governments had taken steps to minimize the impact of precious coral harvesting on existing resources, thereby promote sustainability for the future. To properly distinguish between the threatened shallow-water reef coral species and those used in jewellery, it is imperative that the latter be defined as “precious corals”, as suggested by CIBJO, the World Jewellery Confederation.

## 4. Precious Coral Varieties

There are only few species of coral that are used in jewellery that can either be described by their taxon name (biological classification) or by their trade names, with the latter varying according to geographic location and the local vernacular. But increasingly, both consumers and jewellers are requesting specific information about precious corals, and particularly on the varieties and the species from which they originate and their provenance. Since different types of coral have different market value, it is important be able to differentiate between them.

### **Aka, Moro or Oxblood**

Dark red to very dark red corals with a lengthwise white interior, sometimes called “soul”, these are derived from the branches of *Corallium japonicum*, which live at depths of 80 to 300 metres in Japanese waters. On average, this fan-shape coral stands at a height of 20 centimetres, has a trunk diameter of 12 millimetres and weighs 200 grams.

Dark red saturated, oxblood coloured, beads or cabochons are among the most sought-after precious coral varieties worldwide, especially in large sizes that are exceedingly rare. Aka means “red” in Japanese.

### **Momo, Cerasuolo or Satsuma**

Bright red, salmon, orange and flesh colour with a lengthwise white interior, these are derived from the branches of *Pleurocorallium elatius* (also known as *Corallium elatius*), which lives in depths of 150 to 350 metres off the coasts of Japan and Taiwan. On average, this fan-shape coral stands at a height of 35 centimetres, has a trunk diameter of 25 millimetres and weigh 500 grams. In some cases, the branches can reach sizes of more than 1 metre, being the largest type of precious coral. The large artistic coral carvings typical of the orient are usually made in this type of precious coral. The name “momo” stands for peach in Japanese and “cerasuolo” is a generic Italian term usually seen in cherry-red coloured rosé wines.

### **Angel Skin, Boké or Magai**

Delicate flesh pink, with different colour intensities, these are derived from the branches of a rare variety of *Pleurocorallium elatius* (also known as *Corallium elatius*), which live at depths of 150 to 300 meters off the coasts of Japan, Taiwan, Hong Kong and Hainan, China. On average, this fan-shape coral stands at a height of 35 centimetres, has a trunk diameter of 25 millimetres and weighs 500 grams.

The gracious pink colour of this almost albino precious coral has many fans in the high-end jewellery segment. It is probably the most popular coral variety after the traditional Mediterranean red coral.

### **Pure White or Shiro**

Milky white and sometimes with red or pink specks, these are derived from the branches of *Pleurocorallium konojoi* (also known as *Corallium konojoi*), which live at depths of 80 to 300 meters in the South China Sea and off the coast of Hainan. On average, this fan-shape coral stands at a height of 35 centimetres, has a trunk diameter of 25 millimetres and weighs 500 grams.

This coral is somewhat similar to Momo and Boké in terms of its shape, but its colour is mostly white, hence the name Shiro (white) in Japanese.

### **Midway, Rosato or White/Pink**

Veined white or pink, and sometimes with red specks, or uniform clear pink, these are derived from the branches of *Pleurocorallium secundum* (when invoicing CIBJO suggests the use of *Corallium secundum\**), which lives at depths of 400 to 600 meters off the coasts of Hawaii and Midway Island. On average, this fan-shape coral has a height of 25 centimetres, a trunk diameter of 15 millimetres

and weighs 200 grams. The Italian word “rosato” (*rosé* wine) refers specifically to the rose colour of Midway corals.

#### **Deep Sea or Shinkai**

Bright white, clear pink or white pomegranate with red veins or spots, these are derived from the branches of *Hemicorallium laauense* (when invoicing CIBJO suggests the use of *Corallium secundum\**), which live at depths of 1000 to 2000 meters off the coast of Midway Island, north-west of Emperor Seamount. On average, this fan-shape coral stands at a height of 30 centimetres, has a trunk diameter of 10 millimetres and weighs 150 grams.

The most striking characteristic of these corals is the colour distribution, where a uniform white to pink background is decorated with reddish veins, cracks and spots that are caused by the change in water pressure and temperature.

#### **Garnet**

Pomegranate colour with different shades of uniform pink, these are derived from the branches of *Hemicorallium regale*, (when invoicing CIBJO suggests the use of *Corallium secundum\**), which live at depths of 350 to 600 metres off the coast of Hawaii. On average, this coral has a height of 15 cm, a trunk diameter of 8 mm and weighs 100 grams.

Usually small in size, this precious coral variety is distinguished by its characteristic colour, hence the “garnet” name.

#### **Misu, Missu or Miss**

Pink to violet uniform colour, these are derived from the branches of *Hemicorallium sulcatum*, (when invoicing CIBJO suggests the use of *Corallium secundum\**), which live at depths of 100 to 300 metres in the Philippines northern coastal waters. On average, this fan long-shape coral stands at a height of 25 centimetres, has a trunk diameter of 15 millimetres and weighs 200 grams.

#### **Sardinian or Mediterranean**

Uniform red with medium to strong saturation, these are derived from the branches of *Corallium rubrum*, which live at depths up to 1000 metres (harvested only below 50 meters) in the Mediterranean and in the Atlantic Ocean off the coast of North Africa, including in the waters of the Canary Islands and Cape Verde. On average, this bush-shaped coral stands at a height of 15 centimetres, has a trunk diameter of 8 millimetres and weighs 100 grams. Many historical artefacts are embellished with corals sourced from this precious biogenic material in the Mediterranean. It is the most popular coral variety and is associated with the traditional red colour.

In non-harvested populations, red coral colonies can reach notably large sizes and enjoy high longevity. Reaching heights of 50 centimetres, maximum life-spans of 106 years were recently estimated.

#### **Sciacca**

Orange, pink and dark “smoky” orange in colour, these are derived from the branches of *Corallium rubrum*, which are deposited in geological sediments at various depths off the south-west coast of Sicily. The deposits were discovered and extensively exploited commercially in the late 19th century and are no longer productive. On average, these often-broken branches or trunks are 7-10 centimetres in height and have a trunk diameter of 5 millimetres. They are collected as sediments, and not as a product of a harvest. Similar deposits have been reported in Alboran, south of Spain. It is interesting to note that these marine deposits of dead corals are of geological origin and are considered sedimentary formations.

*\* - At the time of writing, CITES taxa nomenclature is not in line with the latest nomenclature being used by the scientific community, hence the discrepancy between the correct terminology and suggested terminology for invoicing for customs purposes.*

## 5. Common Coral Varieties (including reef coral)

Coral species other than precious corals are used in jewellery and the decorative arts. These include mostly calcareous types, like sponge corals, bamboo corals and blue corals that can be used as ornaments as well as black and golden corals, which have non-calcareous exoskeletons. These are considered common corals.

Strictly speaking under the trade current terminology standards, apart from precious corals belonging to the Corallidae family, the handful of other corals used in jewellery and decorative arts are common corals. Certain non-precious corals that are used as ornaments are included in CITES Appendix II.

### Bamboo coral

Also known as mountain coral, Bamboo coral belongs to the family Isididae (subclass Octocorallia) and includes species of the genera *Isis*, *Lepidisis* and *Acanella*. These have a flexible and segmented structure composed of white calcitic trunks and dark keratinous gorgonian nodes, resembling bamboo canes, hence the name. The white calcareous component is commonly died pink or red. Bamboo coral occurs practically all over the world.

### Black coral

Colonial corals of a very dark brown to black colour that form non-calcareous skeletons composed of protein and chitin, which are quite flexible, spiny, tree like, unbranched or branched, that belong to the order Antipatharia (subclass Hexacorallia). These have a much lower specific gravity than the calcareous corals ( $SG \approx 1.34$ ) and can be bleached to obtain golden colouration. Common trade names include accarbaar, akabar and king coral. They occur almost worldwide, especially in strong current environments at depths up to 6000 metres.

All corals belonging Antipatharia order, including the *Antipathes* genera (*Antipathes* spp.) are listed in Appendix II of CITES.

### Golden Coral

The trade name golden coral is used for two natural golden coloured non-calcareous varieties. The one is a species of the family Primnoidae and features characteristic ring growth structures. It occurs in Alaska, at depths up to 1000 metres or more. The second is a species of the family Zoanthidae, *Kulamanamana haumea*. It also features characteristic growth structures and lives at depths of 340-580 metres off the coast of Hawaii. After polishing, it acquires a characteristic sheen. Bleached black coral (*Antipathes* spp.) may be confused with these two types of golden corals.

### Blue coral

These reef corals of calcareous composition belong to the Helioporidae family (subclass Octocorallia), and especially *Heliopora coerulea*. They have a distinct blue colour, with a rough and porous skeleton that usually requires resin impregnation, if they are to be fashioned into an ornament. They occur in shallow waters in the Indo-Pacific region as reef building coral. Listed in CITES Appendix II, they are protected and almost never seen today as a gem material.

### Sponge coral

These natural sponge-like corals belong to the Melithaeidae family (order Alcyonacea) and are very porous, requiring stabilisation treatment with impregnation and filling with resins or polymers before they can be polished. In addition to being filled, some material is also dyed, and reportedly small amount of sponge coral are crushed up and mixed with epoxy to be formed into different shapes. Sponge corals occur mainly in off the coasts of Taiwan and Indonesia. Trade names include natural Congi, "red spongy coral" and "red king coral".

**Lace corals**

Pink-to-red branches produced by the *Stylaster* genus, a species from the Stylasteridae family, have similar visual characteristics to certain precious corals, and are known as lace corals. Apart from a totally different taxonomy and geographic distribution, they are composed differently, having an aragonitic skeleton rather than the calcitic skeleton of Corallidae species. They are usually dyed and impregnated to imitate precious corals. All of the species belonging to the Stylasteridae family have been listed in Appendix II of CITES since 1990, so their presence in the jewellery industry is very limited.

## 6. Coral Treatments

There are various processes to change the appearance and/or durability of precious corals. These include fissure filling, heating (namely to make coral colour look antique), dying, bleaching and impregnation with artificial polymers and coating. The most common treatment, dying, is usually preceded by a bleaching pre-treatment to guarantee better penetration of the colouring agents, and then an impregnation with polymers follows to enhance its surface appearance. This would be considered a multi-process treatment.

It is important to note that, according to the trade standards, surface waxing of corals with a colourless agent is not considered a treatment, but rather a normal lapidary procedure. Therefore, corals that were processed and polished using colourless wax must not be classified as treated coral.

### 6.1. General Disclosure

Treatments of corals requiring general information on their description, especially at the point of sale, include:

- Substances present in fissures that do not add colour, *i.e.* coral that have fissures permeated with colourless agents such as oil, wax, resin, polymer, or any similar substances. An observation tip: when filled fissures are polished flush with the surface of the stone, the filler will be found to have a different polished surface lustre to the polished surface lustre of the host material, when viewed at 10 power magnifications by a trained observer.
- Heat treatment affecting the colour of the coral, such as those used to make the material appear antique (*i.e.* Sciacca coral).
- Bleaching, which is the alteration or removal of colour by means of chemical or physical agents or even light.

### 6.2. Specific Disclosure

Some treatments of corals requiring specific information, meaning that a disclosure procedure must be followed with appropriate information specific to the material, including product care. These need to be provided to the buyer in all advertisements, communications and commercial documents at the point of sale. This disclosure policy requires a combination of a verbal and written disclosure.

Treatments requiring specific disclosure include:

- Surface waxing that cause an alteration of the colour with the use of agents such as oil, synthetic wax or organic fluid\*.
- Artificial irradiation of coral to change its colour.
- The use of dyes or other colouring agents to alter the colour of coral.
- Filling of opened fractures and cavities of coral with substances.
- Impregnation of porous or fissured coral with plastics or polymers. This does not include the artificial products made of pieces of coral and other substances bonded together by plastics or artificial polymers, which are considered artificial products and not treated coral.
- Coating of the surface of coral with different substances.

*\* - The exception is with natural colourless wax used to protect the surface of the coral, which is considered a normal lapidary practice and not a treatment and does not require general or specific disclosure.*

## 7. Precious Coral Care

### Normal care

Avoid rough handling, for example, during sport or physical outdoor activities. When it is not being worn, coral jewellery should be separated from other jewellery artefacts to avoid scratching. Coral should be clean using soft leather and gentle brushing.

Ultrasonic cleaners should not be used for corals in the same way it should be avoided with other porous gem materials, like pearl and mother-of-pearl.

As a carbonate-based material, coral (along with pearls and cultured pearls) is prone to corrosion by common chemical agents, so avoid contact with perfumes, soaps and creams.

Direct contact with the skin human perspiration requires regular cleaning.

For optimal cleaning procedures, refer to your coral or jewellery supplier.

### Special care

In addition to the normal care recommendations listed above, some corals have special care requirements:

- Corals are prone to scratching due to low hardness. Wear them with care.
- Corals are porous. Do not allow contact with coloured fluids.
- Corals are prone to crack due to loss of structural water. Keep away from heat and other environments that could cause them to dry out. As a biogenic gem material, coral must be kept in a condition that is not too dry and not too humid.
- Corals are prone to damage from thermal shock. Do not expose them to extreme temperature changes.
- Corals fade or revert to original colour when exposed to strong light. Do not wear or leave them for extended periods under these conditions.
- Corals dissolve upon contact with acids and solvents (such as nail varnish remover). Keep them away from all solvents and other strong chemicals.
- Corals are particularly susceptible to damage from ultrasonic cleaning.
- Modifications to corals with dye, oil, resin, wax, or plastic are not permanent. Keep away from all solvents (including various dish-washing liquids), chemicals and heat.
- Coral with superficial colour and surface layers are not suitable for re-cutting or re-polishing.
- Coatings on coral are often easily removed by the action of solvents, heat or abrasives, which are generally harmful to the coral. Keep away from all solvents, heat or abrasives. Coated coral is not suitable for re-cutting or re-polishing.