

# Black Pearls – Grey Pearls

## 黑珍珠 – 灰珍珠

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作者描述好些黑珍珠並非純黑色，而是啡色或不同深淺程度的灰色。各地不同的貽貝和蠔所產的黑珍珠亦各有不同的色和調，而市場上也有一些經幅照處理、染色和經人工處理的黑色珍珠。

### Introduction

Are black pearls really black, or are they actually brown or grey? Would we do better to speak of dark pearls, and why are they dark? Observations in the trade show that we can expect grey to even light grey pearls even from the darkest Tahiti oysters. And grey pearls are sometimes produced from the whitest South Sea oysters. This article aims to shed some light on this subject.

### Age defines pearl colour

It is broadly known that the dark nacre of the Polynesian oyster *Pinctada margaritifera* is responsible for the unique dark cultured pearls from Tahiti, Fiji and the Cook Islands. When we inspect the interior of the shell we recognise that the dark colour is confined to a rather narrow band along the outer border of the shell. Towards the inside, however, the body colour quickly changes to grey and white (Fig. 1). As the whole shell is produced by the mantle tissue it seems clear that it is the younger mantle tissue, overlying the outer area that is producing the nacre with dark body colour. The more we look towards the hinge, that is the oldest part of the shell, the brighter the nacre is. Also the thickness is greater as an expression of the long time segregation of older mantle tissue (Hänni, 2012). Only the youngest mantle tissue has the capacity to form the dark pigment porphyrine (Caseiro, 1993). We can draw a parallel to young people with black hair,

and older people with grey or white hair. The older tissue gradually loses the capacity to form the natural dye. In the same way the mantle tissue of *P. margaritifera* loses the ability to produce the dark pigment that forms the body colour of dark nacre (Fig. 2). Interference colours are therefore less visible when the dark background is missing. With age the thickness of aragonite tablets also increases slightly, making interference phenomena beyond the visible part of the light spectrum.



**Fig. 1** *Pinctada margaritifera* shells with a strong dark pigmentation only at the margin. The dark colour fades towards the inside of the shell.

Photo © H.A. Hänni, GemExpert



**Fig. 2** Three strands of Tahiti *Pinctada margaritifera* cultured pearls with darker and lighter body colours.

Photo Andy Müller, Kobe, Japan.

The transplanting of the mantle tissue, also called saibo, taken from the mantle of a donor shell (Southgate & Lucas, 2008, Hänni, 2012) is the crux of the whole production of cultured pearls. The

saibos are collected from the section of juvenile mantle where porphyrines, the dark pigment, are still forming. When *P. margaritifera* oysters are beaded for a second time it is possible that the pearl sack is already past its best. The nacre may contain only a little porphyrine so the pearl will appear grey. It may be due to the aging of the mantle tissue of the pearl sack that Tahiti pearls can be grey to almost white. They need not necessarily be from *P. maxima* or *P. martensii* (Akoya).

### Necrosis yields black colour

When oysters are operated on it is not always under aseptic conditions! Occasionally bacterial infections occur and sepsis affects living tissue and toxins develop, even in the pearl pocket. Organic material decomposes and forms black residues and also gases. The necrotic tissue is black and may be situated around the nucleus. The gases may blow up the pearl pocket and a baroque form will take shape. The bead may be loose and difficult to drill. Multiple drill holes witness such formations. Large baroque pearls of grey colour are the result. The necrotic residues shine through the usually thin layer of nacre (Fig. 3). A bad smell is noticed when they are drilled. For Tahiti cultured pearls such a contribution to the general colour is not negative as the pearls are expected to be dark or grey. With white South Sea pearls from *P. maxima* or white Akoya pearls from *P. martensii* the grey contribution is less desirable. The necrotic deposits shining through the thin



**Fig. 3** Larger cultured pearls of grey colour with beads. They have a dark inside lining of decomposed organic matter and a blown up baroque shape.

Photo © H.A. Hänni

nacre coating take on the appearance of a light to dark grey stain. We may thus encounter an overlapping of body colours, so grey pearls are not always from Tahitian *P. margaritifera* oysters (Fig. 4).

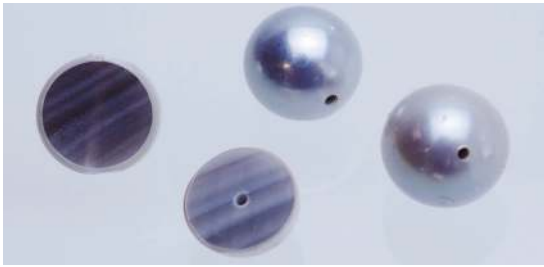


**Fig. 4** A large baroque shaped cultured pearl pendant of grey-blue colour. The object is quite light and suggests a large cavity inside.

Photo © H.A. Hänni

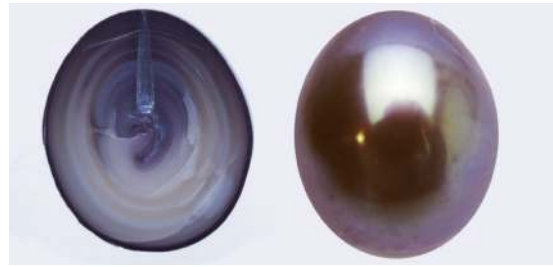
### Irradiation and dyeing

Another way to get black to grey pearls is by treating light coloured pearls and tinting them artificially. There are basically two technologies used: irradiation and dyeing. To make freshwater pearls become grey they can be exposed to gamma rays by a Cobal 60 radiation source. The energy of this source affects the manganese ions in the calcium carbonate of the pearl. Freshwater shell material contains manganese, a requirement for a successful treatment. Thus treatments affect freshwater pearls and nacre beads in saltwater pearls. Provided that the coating of an Akoya cultured pearl is thin, the grey will shine through the overgrowth. (Fig. 5)



**Fig. 5** Akoya cultured pearls with irradiated freshwater nuclei and thin coatings. Manganese in the beads responds to the gamma ray treatment.

Photo © H.A. Hänni



**Fig. 6** A Chinese freshwater cultured pearl, treated with Ag-nitrate. The distribution from the drill hole was quicker than from the surface.

Photo © H.A. Hänni

Often pearls are stained dark regardless of whether they are the freshwater or saltwater variety. An impregnation with a silver nitrate solution drives silver into the fine gaps between the aragonite platelets. The concentration of the solution governs the strength of black dye, from light grey to black. The treatment works faster when the pearl is drilled. From the drill channel the dye can distribute easily between the aragonite layers (Fig. 6). Clearly any artificial colour treatment must be disclosed on invoices and test reports, in accordance with the CIBJO Trade Rules (CIBJO, 2017).

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