

## Recent developments in pearl oyster culture and pearl production at Bahía de La Paz, Mexico

by Mario Monteforte<sup>1</sup>

A research programme for the technological development of pearl oyster culture and pearl production in the Mexican (Calafia) Mother-of-pearl, *Pinctada mazatlanica* and the Rainbow Mabe, *Pteria sterna*, has been conducted by the Pearl Oyster Research Group of CIBNOR, SC for nearly 11 years at Bahía de La Paz, South Baja California, Mexico.

By 1991, the techniques for spat collection, extensive culture and repopulation of natural beds for both species were considered fully determined. These achievements represented the second success in the history of our native species; the second, because the honour of having been the first belongs to Don Gaston Vives, who managed the Compañía Criadora de Concha y Perla between 1903 and 1915 at San Gabriel Bay, Bahía de La Paz.

A harvest of high-quality mabe was achieved in *Pteria sterna* by September 1993, and in *Pinctada mazatlanica* in February 1994. These events represent the first success in America in cultivating marine pearls. It should be mentioned that the abundant production of pearls that Don Gaston Vives attained in his enterprise was all of natural incidence (8 to 12%, on 10 million *Pinctada mazatlanica* yearly, from 1907 until the destruction of the installations in June 1915 during the social disturbances of the Mexican Revolution).

Since our research programme still operates out of a government institution, CIBNOR, the scale of our production remains at an experimental stage. Many specific studies are being carried out on both species; consequently, not all of them are used for pearl induction, and a certain number undergo sacrifice for anatomic and histologic studies, or monitoring pearl formation.

Nevertheless, an enterprise was founded in 1995. Perlamar de La Paz, formed by members of the Pearl Oysters Research Group, has acquired legal status and owns a territorial concession of coastal land and a protected bay with excellent water quality. Although investment is still lacking to start a serious commercial activity, some solid interests have been expressed in joint ventures. We expect an interesting situation soon.

In our research programme at CIBNOR, we are conducting experiments aimed at the production of round pearls and keshi from both species, spat production of the Mexican (Calafia) Mother-of-pearl in the laboratory, and genetic studies in both species.

Round pearls (8 to 10 mm) and keshi (as large as 10 mm in the longer axis) have recently started to appear in *Pinctada mazatlanica*. The incidence is still inconsistent but quality seems to be satisfactory. The anatomy of this species favors the insertion and a good percentage of nuclei retention. *Pteria sterna*, on the contrary, presents anatomical difficulties for round pearl production, because the pearl sac is very wide at its base and the graft moves freely. The nucleus and the graft tissue are easily separated by the movements and contractions of the oyster, and the nucleus is either expelled through the wound, or lost somewhere into the gonad. However, X-rays seem to reveal the presence of keshi in some individuals.

As for experiments on nursery culture, a group of wild and cultivated adults of *Pinctada mazatlanica* is currently in the laboratory, under maturation induction. So far, the oysters are behaving perfectly, with zero mortality, and the gonads are nearly ripe. We will attempt spawning in the next few days.

The genetic studies aim at defining variability and polymorphism on populations of *Pinctada mazatlanica* and *Pteria sterna*, compared to other species of the genus. This study is being carried in cooperation with Professor Françoise Blanc, from the Laboratory of Zoogeography and Genetics at Paul Valéry University, Montpellier, France. Aside from the focus of Madame Blanc in studying the genetic structure of the genus *Pinctada* in the world, we intend to reveal several unknowns about the distribution of *P. mazatlanica* and *P. sterna* populations on the Mexican Pacific coast and the Gulf of California.

As part of these studies, the identification of genetic 'signatures' comparing wild populations and cultivated specimens could be useful to determine the origin of collected spat. If we consider that the larval stage of our species is 25 to 30 days, we can suppose that the distance the larvae drift with the

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coastal currents may be quite far, so we would be receiving larvae settling on collectors at Bahía de La Paz from as far as 300 km or more north over the eastern coast of the Southern Peninsula. Through the comparison of these genetic 'signatures' we would be able to identify the best sites for repopulation along the south-east peninsula coast and enhance spat collection at Bahía de La Paz.

Another important subject under study is the comparison of the genetic structure between the populations of *Pteria sterna*. This species is present on both sides of the southern Peninsula, at Bahía Magdalena on the Pacific coast, as an isolated population, and along the Gulf of California over both the continental and the Peninsula coasts, as far as Ecuador. However, we have observed conspicuous differences among the Baja California populations, not only morphological but also related to zonation and the reproductive periods.

The aim of this study is to determine the possibility of transferring spat from Bahía Magdalena, Loreto and/or Mulegé (where spat incidence is usually high, especially at Bahía Magdalena) to Bahía de La Paz (where spat incidence is lower). Nevertheless, we suspect we are dealing with different popula-

tions, at least to the level of variety or sub-species. *Pteria sterna* from Bahía Magdalena is larger than the La Paz species, but its shell is very thin, the wing is short or absent, and it lacks the beautiful colours that show in the specimens from the eastern coast, especially those from La Paz and Mulegé. The results of these genetic studies will help to define a transfer programme, or avoid it in case of differences.

This is a general glance at our programme. Extensive culture, repopulation and mabe production have been determined in both species. The elements still lacking for a complete and efficient technology are quite few.

The results already achieved after all these years of work are satisfactory and allow us to establish a productive and conservationist management programme for both species, to be applied as a model in Bahía de La Paz, and, through this, to extend pearl culture farms on the Mexican Pacific coast, where both species occur along the thousands of protected bays and inlets existing there.

The future is in fact promising, but there is still much work to do, not only in the context of scientific research, but also on the social and political aspects.



## *Pinctada margaritifera* hatchery trials in Iran

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During the research project on larval rearing and production of blacklip pearl oyster, *Pinctada margaritifera* (Linnaeus), in the Persian Gulf Mollusc Research Centre, breeding and larval rearing of this pearl oyster were investigated in the laboratory during the spawning season on September and October 1995. Warm shock technique was used for induced spawning of the mature oyster. Oyster lar-

vae were fed with *Isochrysis galbana* and with mixtures of *Isochrysis galbana* and *Chaetoceros calcitrans*. We succeeded in rearing larvae from fertilised eggs up to pediveliger during 34 days. Maximum size of pediveliger larvae reached 470 µ on the 34th day. Many of the larvae died at this stage and settlement was not achieved, mainly because the water was not of adequate quality.

