

Nacre Deposition Rate in Japanese and Hybrid Mother Oysters, *Pinctada Fucata*, and Its Relationship with Their Respective Pearls

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Abstract : *Pinctada fucata* has been the most important pearl culture species in Japan and known as Japanese Akoya Pearl Oyster. However, during summer 1994, mass mortality devastated pearl culture in most parts of Japan. Therefore, pearl farmers started to import Chinese Pearl Oysters from Hainan Island that came from the same species because they are believed to be more resistant towards high water temperature, despite their lack of ability in producing high-quality pearls. The local farmers were then hybridized Japanese and Chinese pearl oysters and currently known as Hybrid pearl oysters, as an attempt to produce a new oyster's strain which is more resistant towards high temperature but also able to produce higher quality pearls. However, despite both strains were implanted by mantle tissues from the same group of donors, the thickness of pearl nacre produced by both strains was different, even though tablet thickness shows a rather similar pattern. Hence, this leads to a question of whether mother oysters play a major role in both nacre deposition rate and tablet thickness of pearls or not. This study first describes the nacre deposition rate of the shells of Japanese and Hybrid mother oysters towards the water temperature condition in Ago Bay, Mie Prefecture, Japan. Later, a comparative study was conducted among 4 shell positions that had been chosen according to the mantle tissue location and shell growth directions. A correlative study was then taken between shells and pearls nacre deposition rate to know whether mother oyster ability in depositing nacre on their shells is related to that of pearls. All the four shell positions were significantly different in shell nacre growth rate (Kruskal-Wallis, p-value < 0.05), and the third position have faster nacre growth among the other three both in Japanese and Hybrid strains, especially in warm temperature. The ability to deposit nacre between Japanese and Hybrid during warm water conditions (August and September) is also significantly different in almost all positions (Mann Whitney U, p-value < 0.01), Japanese oyster growth faster than Hybrid in all four positions. This leads to a different total growth among the two strains and a higher possibility of thicker nacre thickness in Japanese shell nacre. Tablet thickness is significantly different among all positions of shells (Kruskal-Wallis, p-value < 0.01), the 2nd position deposited rather thinner tablet thickness than the other three, including on the 6th month of culture which is more desirable in producing pearls with good luster. This result gives us new information that pearl growth rate is highly affected by the mother oysters; however, nacre tablet thickness might be the result of the shell matrix expressed by different mantle position from donor oysters.

Keywords : nacre, deposition, biomineralization, pearl aquaculture, pearl oyster, Akoya pearl, pearl

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