Jaison Arivalagan - Early Stage Researcher No.6

Shell proteomics

Hi, I am Jaison Arivalagan from Museum National d'Histoire Naturelle, Paris, France. My research is in the field of biomineralization that studies the hardening or stiffening of existing tissue through minerals.

The ocean acidification is the greater threat nowadays, resulting from a marked increase in carbon dioxide in the atmosphere due to human activity and industrialisation. When carbon dioxide dissolves, carbonic acid is formed, leading to higher acidity. This creates imbalance in the ocean ecology through adverse effect on the molluscs. These are soft bodied invertebrates, calcified shells builders, hence sensitive to acidification. Moreover, the molluscs are very important to ocean ecology because they are filter feeders, they filter the ocean water and let the light to enter the ocean floors helping plants and planktons, (producers in ocean food web) which use sunlight as a food source to thrive.

Most of the molluscs get protection and support through external shells covering their body. These shells are made of calcium carbonate, it has very complex architecture. Imagine a concrete wall made of bricks and mortar. Here the bricks are calcium carbonate (shaped by scaffolding) and the mortar made of proteins, chitin and other organic materials. These organic material form an excellent framework in and around the calcium carbonate to form such a solid structure. All the mollusc shells do not possess the same architecture - it may vary from species to species.

I study four different mollusc bivalve species and use their shell powders (made up of 95% of calcium carbonate) to extract proteins present in it which play important role in the construction of the shell. What happens to the bivalves exposed to acidic environment due to ocean acidification?? It has some direct and indirect effects, (on the calcium carbonate chemistry and on shell building cells / organs /organism physiology) which leads to changes in the proteins or in calcium carbonate structure. My research is to identify the different proteins involved in shell formation and repair in order to understand the resilience and adaptation capacity of these species.

How to contact Jaison: jarivalagan@mnhn.fr @jaison_505