Hi, I am Jaison Arivalagan from Museum National d Histoire Naturelle, Paris, France. I work among conchologist, who study about bivalve mollusc, shells.

The ocean acidification is the greater threat nowadays, resulting from a marked increase in CO2 in the atmosphere due to human activity and industrialisation, thus higher CO2 absorption in the oceans surface water. When carbon dioxide dissolves, carbonic acid is formed, leading to to higher acidity. This may lead to the imbalance in whole ocean ecology by having an adverse effect on the molluscs, the 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 a scaffolding) and the mortar made of proteins, chitin and other organic materials. These organic material forms a 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 their shell proteins. So in my work I use different methods to dissolve the calcium carbonate and collect the proteins, to study their role in the shells. Although these shells are very rigid with very complex structure they are very prone to the attack by increasing ocean acidification. So whats happening to the bivalves exposed to acidic environment due to ocean acidification?? It has some effects (on the calcium carbonate chemistry and on shell building cells / organs /organism physiology) which leads to modulation in the proteins or in calcium carbonate. In my project I am investigating the protein signatures of the acid modified shells by comparing with the shells from the natural habitat.

My undergraduate and post graduate education at the University has provided me with a comprehensive background in Biotechnology-Biochemistry. Now I got a PhD position (2014-2017) focusing on proteomics analysis, in a european partnership People Marie Curie network comprising partners from different european countries. The aim of this network is to take a coordinated multidisciplinary approach to understanding calcium regulation and shell production in four european bivalve species (*Mya, Mytilus, Pecten* and *Crassostrea* species).

PhD topics : Studying molecular diversity by proteomics - application in shell biomineralisation.

In biomineralisation, shotgun approach enabled the identification of many organic matrix proteins present in mollusk shells. Inter species conservation of proteins is questionnable and is based on the correlation between the protein identification and the transcriptomics data sets from different related species. Shell matrix proteins are often amazing featured sequences e.g. repeat rich, which may represent functional diversity and plasticity. Variation in the number of these repeats could have relevance with modulation of the function of the proteins. Before we could delve into target or function tag, an important question needs to be addressed: is it possible to access the complete information expressed by the proteome in a reproducible way? Efforts are driven with the integration of analytical strategies, thanks to the developments in mass spectrometry technology (fast scan rates, high mass precision and sensitivity), new generation sequencing technology, and physiological responses to improve the information quality.

Sujet de thèse (contrat doctoral 2014-2017) :
'Shell proteomics' - Analyse de l'effet de l'acidification des océans sur la biominéralisation de la coquille de mollusque par l'approche protéomique

Thèse sous la co-responsabilité de Arul Marie, UMR 7245 MCAM RDDM et Sophie Berland, UMR 7208 BOREA,

Contexte : L'impact du réchauffement et de l'acidification des eaux océaniques est projeté sur quatre espèces de mollusques coquilliers importants dans le secteur Economique pêche et aquaculture en Europe : la coquille Saint-Jacques (*Pecten maximus*), l'huître (*Crassostrea gigas*), la moule bleue (*Mytilus edulis*) et la mye (*Mya arenaria*).

Objet : Amélioration de la compréhension du contrôle des assemblages organique/inorganique et des interactions minéral et vivant dans les biominéralisations par la connaissance connaissances des protéines impliquées dans les processus de biominéralisation dans les différents modèles identifiés et de leur rôle dans différentes voies de calcification (ex : aragonite, calcite). Etude de l'influence du stress environnemental sur l'expression de ces protéines par une approche protéomique 'gel-free' et au bénéfice d'analyse transcriptomique dans l'objectif de comprendre les implications fonctionnelles. Développement en protéomique quantitative envisagé sur des échantillons (coquilles et tissus) issus d'organismes maintenus dans des conditions environnementales de différents pH et en expérimentation de réparation coquillères, poua aborder l'effet du stress environnemental sur les processus de biominéralisation via la régulation des protéines ciblées.