



## **James Morris - Experienced Researcher No.4**

### **Biomimetic valorisation of mollusc shells from the aquaculture industry**

The planet has a finite amount of many resources which are important or essential for the human population to survive and thrive. In recent years, attention has been brought to the possibility that our exploitation of some of these resources has peaked as they become more scarce and costly. “Peak Oil” has been well publicised, and more recently “Peak stuff” has been suggested. There is a pressing need for improved sustainability in all our processes. One simple way to improve sustainability is to re-assess waste production.

The global food industry is one of many sectors that must show a significant shift towards more sustainable practices as the population swells. In 2012, over 15 million tonnes of molluscs (live weight) were produced by the global aquaculture industry, and this number is on the rise. As the primary function of the mollusc aquaculture industry is to produce food, the shell, which can account for over 60% of live weight, is usually considered a waste product. Consequently, taking 2012 as an example, this may have equated to ~6 - 8 million tonnes of shell production by global aquaculture, the majority of which ended up in land-fill disposal sites.

Historically, mollusc shells have been deeply engrained in human culture and society: having been used as tools, currency, jewellery etc. Science has long known about the incredible attributes of mollusc shells, and material scientists are still unable to match such attributes when attempting to mimic their structure.

My project explores the disparity between our understanding of the incredible nature of mollusc shells, and their large-scale disposal as a by-product of the aquaculture industry. I will use the fundamental research being produced by the CACHE network, and others, to explore the potential for valorisation of shells from the aquaculture industry, both from an economic and environmental standpoint. Such applications range from the use of ground shells in bone and tissue re-engineering procedures, to oyster reef restoration programs, and to large-scale carbon sequestration techniques. My project urges a change of mind-set away from considering mollusc shells as a waste product towards considering them a valuable resource

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