

Aquaculture and immunostimulation through the eyes of *Artemia*

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Diseases still cause unpredictable and high mortalities in intensive crustacean culturing, leading to major economic losses. Controlling diseases has traditionally been done using antibiotics; however, resistance is now a major problem and they became a threat to human health and environment. To obtain a more sustainable production, new strategies for controlling pathogenic bacteria are necessary; for example immunostimulation and priming (the induction of resistance in the host organism using natural signaling molecules, i.e. immunostimulants). Immunostimulants, products derived from yeast or bacterial components, are widely used for aquaculture purposes. However, the efficacy of these compounds is not yet sufficiently validated, as are effects on the host organism and possible long-term effects (Smith *et al.*, 2003). A simple model system using animals reared in a germ-free environment or with a known microorganism community (a gnotobiotic system), has been shown to be instrumental in studying immune effects. An excellent candidate for such a gnotobiotic model system is the crustacean *Artemia franciscana*, being a small and robust animal with a short life cycle. Larvae of *Artemia* are an important live-food in fish and shellfish larviculture and ingestion of pathogenic microbes may have dramatic consequences for both *Artemia* as animals that prey on them. For exploring the phenomenon of priming and immunostimulation a gnotobiotic system is being developed during this PhD project using axenic *Artemia franciscana* and a pathogen is being identified to perform challenge tests at different points in the life cycle. *Vibrio campbellii* LMG21363 is a known opportunistic pathogen for *Artemia* and is currently used as a standard strain for challenge tests using instar II nauplii of *Artemia*. Recently, there are newly identified pathogenic strains of *Vibrio* available of which our preliminary results showed at least one of them has a significantly higher virulence than the LMG21363 strain of *Vibrio campbellii*. Expected results from ongoing experiments will reveal more information about this strain, giving us a better understanding if it is better suited for challenge tests at different points in the life stage of *Artemia* compared to the standard *Vibrio* strain. It is anticipated that these experiments will also provide us information that will allow us to explore the immune response of gnotobiotic *Artemia* adults in future experiments, thus contributing to the discussion of immunostimulants for aquaculture purposes.

References

Smith V.J., J.H. Brown and C. Hauton. 2003. Immunostimulation in crustaceans: does it really protect against infection? *Fish & Shellfish Immunology* 15:71-90.