Unravelling the contribution of halophilic bacteria to the *Artemia* diet

Lopes-dos-santos Ruy[1]

[1] Laboratory of Aquaculture & Artemia Reference Center, Faculty of Bioscience Engineering, Ghent University Coupure Links 653, 9000 Gent, Belgium
E-mail: ruy.santos@ugent.be

The stagnation of capture fisheries, combined with the increasing demand of seafood by the world's growing population, urges for the sustained high growth of aquaculture (average annual growth rate of 8.8 % over the last three decades) as a keystone in global food security.

The production of sufficient live food for the larviculture stage is a bottleneck for aquaculture expansion and diversification. As a substitute for the natural food, the larvae ("nauplii") of the brine shrimp *Artemia* are used as a universal live food source thanks to its convenience, flexibility in use, and nutritional value. Natural populations of *Artemia* are found worldwide in hypersaline ecosystems (e.g. inland salt lakes and coastal salt pans). Annually about 3000 tons of dormant eggs ("cysts") are commercialized and hatched into nauplii in larviculture units ("hatcheries") as larval food for most farmed fish/shellfish species.

In addition to cysts from natural salt lakes and to meet the increasing demand for cysts, *Artemia* culture integrated in solar salt production, has been introduced successfully in several (sub)tropical countries where dense brine shrimp populations are maintained through a labour intensive and economically costly stimulation of microalgae blooms and supplementation with inert feeds. Lowering these production costs would therefore contributes to the sustainability of the technique, and hence to the security of the *Artemia* supply.

Recent field studies are trying to optimize such salt pond based *Artemia* production by stimulating the naturally occurring halophilic bacterial flora as additional food source for the *Artemia* nauplii. However, in these xenic and open culture systems there is no way to assess the nutritional contribution of bacterial biomass among a variety of available feeds. The results obtained from these field studies do not allow thus patent conclusions about the contribution of halophilic bacteria to the brine shrimp diet, hindering the widespread application of such techniques.

Hence, in the present research we aimed to use gnotobiotic (animals cultured in axenic conditions or with a known microflora) *Artemia* culture systems to investigate for the first time *Artemia* nauplii's ability to survive and grow on diets consisting of pure halophilic bacteria biomass. We successfully demonstrated that several halophilic bacteria strains have positive effects on survival, body length and swimming speed of *Artemia* nauplii at both marine and hypersaline salinity.

This work is therefore the first step to investigate the relative importance of different halophilic bacterial genera and species for the *Artemia* life cycle and for the surrounding hypersaline food web, shedding light into the promising potential of these microorganisms to maximize *Artemia* production in salt ponds.

Keywords: aquaculture; live feed; hypersaline environments; food web; *Artemia*; halophilic bacteria; gnotobiotic culture systems