FACULTY OF BIOSCIENCE ENGINEERING

Artemia Reference Center

LABORATORY OF AQUACULTURE & ARTEMIA REFERENCE CENTER, GHENT UNIVERSITY, BELGIUM

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UNRAVELLING THE CONTRIBUTION OF HALOPHILIC BACTERIA TO THE *ARTEMIA* DIET

Problem Definition

Introduction

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.

Fig. 1: Sea bass larvae eating Artemia

To tackle the increasing demand of *Artemia* from natural salt lakes, Artemia production in salt ponds are maintained through a labour intensive and economically costly stimulation of microalgae blooms and supplementation with inert feeds.

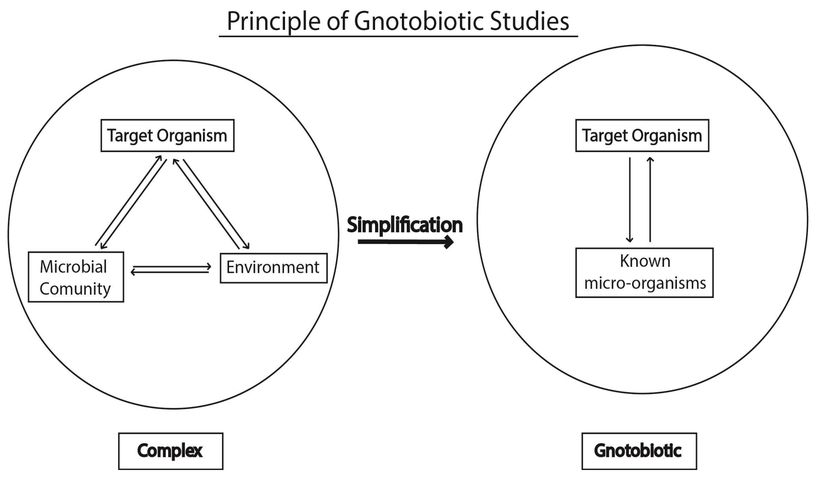
Recent field studies are trying to optimize such salt pond based *Artemia* production by stimulating the naturally occurring halophilic bacterial flora as additional food source for the *Artemia* nauplii. However, in these xenic and open culture systems there is no way to assess the nutritional contribution of bacterial biomass among a variety of available feeds.

Objectives

- To investigate for the first time *Artemia* nauplii's ability to survive and grow on diets consisting exclusively of halophilic bacteria biomass, typical for the hypersaline environment where *Artemia* occurs.
- To understand the relative importance of different halophilic bacterial genera and species for the *Artemia* life cycle as part of the hypersaline food web, and to shed light on the potential of this microorganisms to maximize *Artemia* production in salt ponds.

Experimental Design

Gnotobiotic (animals cultured in axenic conditions or with a known microflora) *Artemia* culture systems were used.



Tested diets

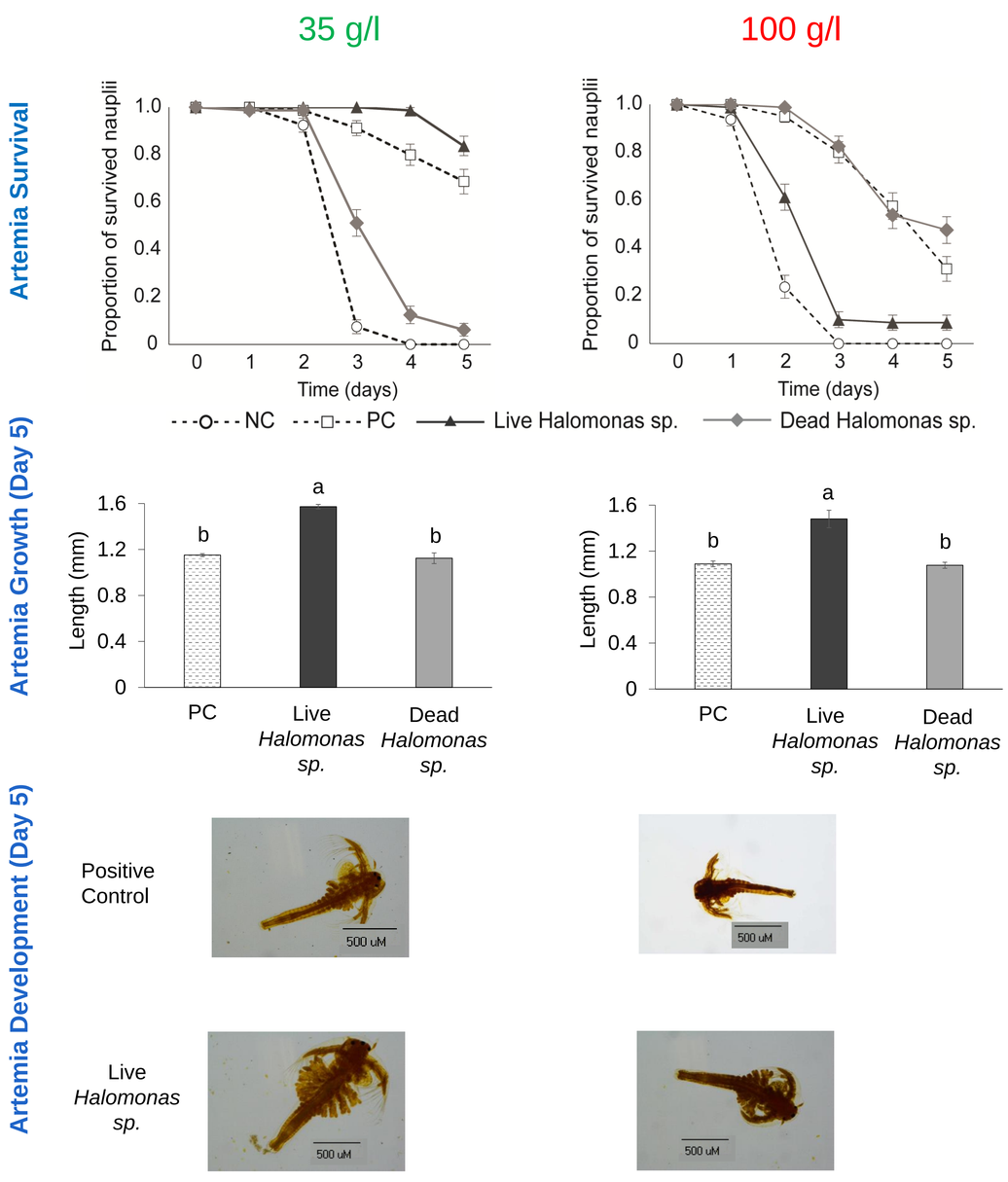
- A halophilic bacterial strain belonging to a genus described as associated with *Artemia* in natural ecosystems was evaluated as mono-diet for *Artemia* culture when offered as live or dead biomass.
- Two controls were used:
  - Negative Control (NC) → Starvation
  - Positive Control (PC) → Marine bacterial strain LVS3 (Aeromonas hydrophila)

Tested culture salinities

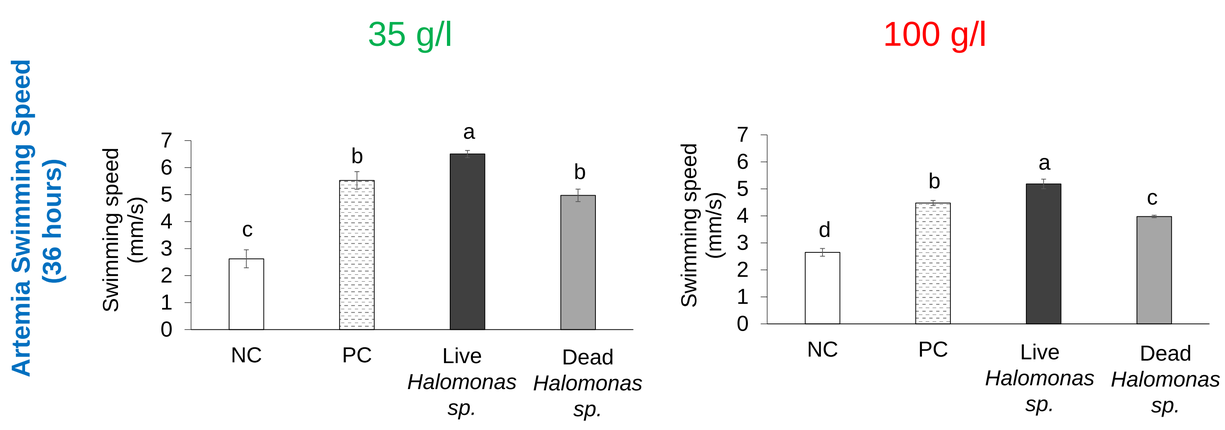
- Tests were conducted with culture water at 35 g/L and at 100 g/L salinity

Results

Experiment 1: 5 days culture experiment to assess survival and growth of *Artemia* nauplii when fed a mono-diet of halophilic bacteria biomass



Experiment 2 : Culture experiments to assess swimming speed of *Artemia* nauplii when fed a mono-diet of halophilic bacteria biomass.



Main Findings

✓ *Artemia* nauplii have the ability to survive and grow on diets consisting of pure biomass of halophilic bacteria strains.

✓ The positive effects on development and swimming speed of the tested halophilic mono-diets compared to both controls in both salinities, clearly denotes their value as food item for *Artemia* culture.

✓ *Artemia* shows better performance when fed with its naturally associated halophilic microbiota than when fed with marine bacteria.

Conclusion

The acquired knowledge is a crucial contribution to understand the role of these bacteria in the hypersaline food webs, illustrating that they can be an integral part of the *Artemia* diet. Furthermore our results indicate that the strategy to stimulate the formation of halophilic biofloc and bacterial aggregates in ponds should indeed provide a valuable extra source of nutrients for *Artemia*.

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