Gilbert VAN STAPPEN, Thanh Toi HUYNH, Nguyen Van Hoa, SUI Liying, DENG Yuangao and Peter BOSSIER, 2014. Microbiota of Salt Lakes as Food for the Brine Shrimp *Artemia*. *Acta Geologica Sinica* (English Edition), 88(supp. 1): 105.

Microbiota of Salt Lakes as Food for the Brine Shrimp *Artemia*

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The brine shrimp *Artemia* is often abundantly found in hypersaline environments. The larvae ('nauplii') hatching from its dormant embryos ('cysts') are a crucial live food item for the larval stages of fish and shrimp in aquaculture facilities worldwide. Though the large majority of these cysts originates from the brine shrimp populations occurring naturally in inland salt lakes (with Great Salt Lake, USA as top resource), relatively smaller quantities are produced integrated with solar salt production in tropical and subtropical countries. Given the economical importance of this resource and irrespective of quasi-permanent ecological monitoring of Great Salt Lake for the benefit of the brine shrimp industry, it is rather in these specific, more or less man-managed pond conditions, that the interaction between the different trophic levels in a hypersaline ecosystem is being studied, aiming to maximize *Artemia* production.

Artemia is generally described as a non-selective filter feeder able to ingest in principle particles below a certain size limit, which is around 50 μm in the adult animal, but less so for its larval stages. Typically, both in salt lakes and in pond production systems, emphasis has been on the importance of phytoplankton for the *Artemia* diet and also aspects such as particle size selectivity, filtration and clearance rate, have mainly been studied from a phytoplankton perspective. Inspired by studies focusing on the role of bacteria for other filter feeders, there is, however, growing attention to the contribution of bacteria to the *Artemia* diet and to the variety of relationships between *Artemia* and its microbiological environment in general. Especially laboratory simulations with a strict control of the microbiota under study ('the gnotobiotic tool box') have proven an adequate tool for our understanding of these relationships, which are thought to be relevant for natural conditions as well. Laboratory studies have shown that when *Artemia* are offered bacteria as food source in combination with suboptimal phytoplankton supply, the presence of the bacteria may compensate for the reduced phytoplankton levels in the *Artemia* diet. *Artemia* may also survive and grow on monodiets consisting of specific bacterial strains, whereas, however, other strains do not support *Artemia* growth. Moreover, the presence of bacteria may even result in improved nutrient uptake from the phytoplankton and vice versa, as shown by feeding tests using ^{15}N labeled bacteria versus phytoplankton. Most of these results, however, have been obtained in marine culture media with bacteria basically originating from the marine environment. Though they are instrumental for our understanding of the trophic relationship between *Artemia* and its ambient microbiota, new work is underway, expanding dietary treatments with bacterial and Archaeal strains, isolated from hypersaline conditions. In combination with the recent description of the annotated *Artema* genome, it is expected that this work will expand our knowledge on how *Artemia* takes dietary advantage of the various types of microbiota in its natural environment such as salt lakes.

Key words: *Artemia*, diet, bacteria, primary production

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