

BRINE SHRIMP ARTEMIA AS A DIRECT HUMAN FOOD

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In 1979, for the first international symposium on the brine shrimp *Artemia* in Corpus Christi, Texas, USA, we published a short paragraph on “the potential use of *Artemia* as a protein source” (Sorgeloos 1980).

“Besides an improved perspective for the use of Artemia in the aquaculture hatcheries, it becomes obvious that other applications show very high potential, even including direct use in human nutrition. Although the acceptability of brine shrimp as food for man might seem to be speculative or restricted to a few areas in the world, it is certainly worthwhile to be considered, not the least for third world countries. From an energetic point of view brine shrimp production is a much more efficient way to produce animal protein than to culture carnivorous fish and crustaceans with Artemia and fish meal as diet ingredients!”

Direct consumption of brine shrimp by humans has been and continues to be practiced by indigenous tribes in the Americas and Africa: “... Indians inhabiting this region used to collect large quantities of this crustacean which they dried and used as food” (Jensen 1918). The Dawada people of Libya consume dried *Artemia* flakes as “... a superb source of protein rich in β -carotene and riboflavin” (Ghannudi and Tufail 1978) and market these “pains d’*Artemia*” (*Artemia* bread) as a nutritious delicacy over a wide area (Oudney 1828 in Bovil 1968, Delga *et al.* 1960, Monod 1969). Taste test panels on *Artemia* conducted in Hawaii concluded that “... the response to an experimental shrimp tempura prepared from frozen brine shrimp was quite favorable.” (Davidson 1974, Helfrich 1973).

Although *Artemia* thrives in very high-salinity waters (up to 10 times the concentration of seawater), it is not too salty for human consumption because *Artemia* is a strong osmoregulator, maintaining its body fluids at a moderate brackish salinity.

We had to wait more than three decades to be able to announce the production and use of “*Artemia* omelette” as a new culinary item in the Mekong Delta of Vietnam. Combined salt-cum-*Artemia* production has become a very lucrative business with major positive socioeconomic ramifications in the coastal area of Vinh Chau and Bac Lieu in the Mekong Delta. Over 500 families of salt farmers have improved their income with more than US\$ 5,000 per household per dry season with the production and sales of brine shrimp cysts (Hoa and Sorgeloos 2015, Hoa *et al.* 2020). Although the main interest has always been in cyst production, recently *Artemia* farmers started to harvest and market *Artemia* biomass for use in local aquaculture as nursery, grow-out and maturation feed for fish and shrimp, either live or frozen.

Similar *Artemia* projects are being set up in artisanal salt farms in different countries in Asia (e.g. Myanmar, Bangladesh, Laos, India). Although the main interest is to cater to the local aquaculture industry through local availability of high quality

Artemia cysts and biomass, there is also good potential to use *Artemia* biomass as a direct protein source for local community members, either under the form of the *Artemia* omelette as described here or as a partial replacement in local recipes for shrimp, crab or fish cakes.

With the initiative of the cooking staff at the *Artemia* experimental station of Can Tho University (CTU) in Vin Chau, a new culinary *Artemia* dish was developed and gradually became popular among local salt farmers and the many international visitors who tasted an *Artemia* omelette for lunch.

References

- Bovili, E.W. 1968. The Niger explored. Oxford University Press, London. UK. 263 p.
- Davidson, J. R. 1974. A new industry – and perhaps a new protein source. Sea Grant Technical Report UNIH Seagrant-MR-74-02. 3 p.
- Delga, J., J.L. Meunier, C. Pallaget and J. Carioux. 1960. Les mangeurs de vers. *Annls Falsif Expert. chim.*: 617.
- Ghannudi, S. A. and M. Tufail. 1978. A report on a two-day visit to eight salt-water lakes of Ramla Az-Zaliaf, Fezzan. *Libyan Arab Jamahiriya. Libyan Journal of Science* 8(A):69-74.
- Helfrich, P. 1973. The feasibility of brine shrimp production on Christmas Island. Sea Grant Technical Report UNIH-Seagrant-TR-73-02. 173 p
- Hoa, N.V. and P. Sorgeloos P. 2015. Integrated salt and brine shrimp *Artemia* production in artisanal salt works in the Mekong delta in Vietnam: a socio-economic success story as model for other regions in the world. Pages 137-144 in: Lauret S (ed.) *Proceedings of the International Conference on Solar Saltworks & the Economic Value of Biodiversity*. EU Salt, Brussels, Belgium.
- Hoa, N.V., L.V. Thong and P. Sorgeloos. 2020. State of the art of brine shrimp *Artemia* production in artisanal saltworks in the Mekong delta in Vietnam. *World Aquaculture* (in press).
- Jensen, A.C. 1918. Some observations on *Artemia gracilis*, the brine shrimp of Great Salt Lake. *Biol. Bull.* 34(1): 18-28.
- Monod, T. 1969. A propos du Lac des Vers ou Bahr ed-Dud. *Bull. Inst, fondam. Afr. noire* (A) 31 (1):25-41.
- Oudney, W. 1828. Excursion to the Westward of Mourzuk in June, July and August 1828. p. 64-111. In: *Narrative of travels and discoveries in North and Central Africa*. Denham D., H. Clapperton and W. Oudney (Eds). Reprinted by Hakluyt Soc. 1966, Cambridge University Press. London. UK.
- Sorgeloos, P. 1980. The use of the brine shrimp *Artemia* in aquaculture. Pages 25-46 in: *The Brine Shrimp Artemia*. Vol. 3. Ecology, Culturing. Use in Aquaculture. Persoone G., P. Sorgeloos, O. Roels. and E. Jaspers (Eds). Universa Press, Wetteren. Belgium. 456 p.

INGREDIENTS (For 4 people)

- Live Artemia biomass (1 kg)
- Chicken eggs (4)
- Rice flour (200 g)
- onion, pepper, sea salt and seasoning to taste

PREPARATION OF AN ARTEMIA OMELETTE

1. Keep collected live biomass in a small tank or aquarium with strong aeration for at least one day to allow full gut evacuation.
2. Clean Artemia biomass several times with tap water before cooking.
3. Put all ingredients in a bowl or cooking pan and mix them well.
4. Make a paste as shown in the photo. The paste is now ready for cooking.
5. Cook the Artemia omelette like an egg omelette. Heat a frying pan with some cooking oil on the stove on medium heat. When the pan is warm, scoop some of the brine shrimp mixture and add to the pan. The paste will become crispy with a light brown color. Turn to cook the other side.
6. Now the Artemia omelette is ready. It can be eaten while it is still warm, served with vegetables, salad, cucumber, or tomato. Fish sauce or soy sauce can be added to taste.
7. In Thailand commercial Artemia pond production was initiated in the late 1970s. Ever since then, “Artemia fish sauce” (known as “nam pla” in Thailand), an extract of fermented Artemia biomass, has been produced. Nam pla is a popular staple seasoning of Thai cuisine and is sold in bottles near the salt and Artemia farms southeast and southwest of Bangkok.

