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Trophic structure of colonization modules at chemosynthetic habitats: a comparative approach

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Vent and cold seep ecosystems sustain cognate faunal communities of high biomasses based on chemoautotrophic production. Many of the metazoans of these communities are taxonomically allied but only infrequently they share affinities at the species level. Nevertheless, other environments also can create reduced conditions where chemoautotrophy is present, namely
wood falls, whale carcasses, and many other rich organic falls. The aim of the CHEMECO project (ESF EURODEEP) was to gain information on the biological, microbial, biogeochemical, and ecological aspects of colonization by metazoans into reducing habitats. The study included a combination of site surveys and replicate colonization experimental devices named CHEMECOLI using organic (wood and alfalfa grass) and inorganic (carbonate) substrate. Under this project, and focusing on the MoMAR hydrothermal sites (Lucky Strike (1700m) and Rainbow (2300m)) on the Mid-Atlantic Ridge and in the four mud volcanoes in the Gulf of Cadiz (Mercator (350 m), Meknès (700 m), Darwin (1100 m) and Carlos Ribeiro (2200 m)), sets of CHEMECOLI, each with one of the three substrate, were deployed.
The objectives focused on three large questions: i) Will the degradation of wood and alfalfa create a reducing habitat? ii) Will the vent and cold seeps metazoans colonize the substrate on a similar way? iii) Can we trace that on the food web? To answer those questions we aimed to study: a) the first steps of colonization (using stable isotopes and fatty acids approaches) in order to understand if the same type of metabolic bacteria was present; b) if the colonizing metazoans were benefiting from those bacteria. c) the trophic structure of the colonizing modules using stable isotopes. No typical chemosynthetic fauna was sieved on the cubes studied, and no typical chemosynthetic isotopic signal was observed on the colonizing metazoans. Biofilm issued from the wood cubes, has shown a 34S isotopic discrimination. Some bacterial fatty acids were incorporated into the metazoans lipid extracts. Overall, the first steps of colonization (using stable isotopes and fatty acids approaches) has revealed that, for the same type of substrate, there are similar biofilms in terms of fatty acids (qualitatively) and in terms of stable isotope signatures. The differences observed, are between substrates (wood, alfalfa and carbonates) and not between sites (vent and seeps). Despite different stable isotope signatures, we can observe the same pattern among metazoans with the same trophic guild.