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Nutrition study of *Bathymodiolus azoricus* from Menez Gwen: development of stable isotope enrichment techniques to follow the assimilation pathways by symbiosis versus filter-feeding.

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The Mid-Atlantic Ridge hydrothermal vent mussel *Bathymodiolus azoricus* hosts a dual symbiosis with a type I methanotroph and a thiotroph located in bacteriocytes in the gills. These bacterial symbionts provide nutrition for the host, but similarly to non-symbiotic bivalves, *B. azoricus* also has the capability to filter-feed despite a reduced digestive tract. Filter-feeding has already been demonstrated for other *Bathymodiolus* species (the seep *B. childressi*, Page *et al.*, 1990 and the East Pacific Rise hydrothermal vent *B. thermophilus*, Ben Mlih *et al.* 1992). This bivalve is the last one to survive after extinction of hydrothermal vents thanks to its mixotrophic nutrition and adaptability to local environmental changes (Desbruyères and Laubier, 1984). For example, variations in the distribution and relative abundance of the different symbiont types have been observed in *B. azoricus* and $B.$ *puteoserpentis* and appear to be related to the CH_4 and HS^-availability at the vent fields. Ben Mlih *et al.* (1992) furthermore saw an increase in photosynthetic fatty acids biomarkers in *B. thermophilus* indicative of a switch to nutrition by filter-feeding when the hydrothermal activity was decreasing. The aim of my PhD study is to identify specific phospholipids fatty acid biomarkers of the endosymbionts by means of stable carbon isotope tracer experiments in a controlled laboratory environment (LabHorta facility in the Azores).

Indeed, these bacteria are uncultivable and the use of biomarkers from other bacteria species with a similar metabolism might not be accurate. The identification of endosymbionts biomarkers together with their quantification by a new FISH image treatment technique developed at the Université Pierre et Marie Curie will enable us to track bacterial variations in response to vent site specific geochemical and physical properties and to seasonal events. Secondly, we wish to gain insight on the assimilation of carbon through filter-feeding, by tracing the uptake of ^{13}C labelled algae. However, estimates of tissue stable isotope turnover due to metabolic turnover alone in *B. childressi* transplant mussels with no shell growth were found to be as low as 36% and 34% per year for carbon and nitrogen, respectively (Dattagupta *et al.*, 2004). As a result, our aim for carbon stable isotope tracer studies at atmospheric pressure represents a challenge. We present here the first results of short-term ^{13}C-labeling experiments with enriched substrates ($^{13}CH_4$ for the methanotrophs, H_2S + $NaH^{13}CO_3$ for the thiotrophs, and ^{13}C labelled algae for filter-feeding), together with the first advances in endosymbionts quantification by FISH image treatment.