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Biogeosciences Discussions

Interactive comment on "Influence of chemosynthetic substrates availability on symbiont densities, carbon assimilation and transfer in the dual symbiotic vent mussel *Bathymodiolus azoricus*" *by* V. Riou et al.

V. Riou et al.

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1. Gill Index

I agree to use the index that you recommend (gill dry wt./rest of body dry wt.)*100 and will use it in a revised version. However, the overall trend observed with the other index seems to be similar, and the first paragraph of the Results section could be changed for: "... Mussels collected in January were allowed to recover from the decompression stress during 5 days at atmospheric pressure (transport followed by LabHorta). A quick drop of their gill index (GI) could be noticed over this short period (although not statistically significant, Mann-Whitney U test p = 0.237, Fig. 1). A significant drop

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was observed in May mussels maintained with H2S and CH4 for up to 52 days (23-52 days in aquarium median GI = 28.5, n = 12; wild animals median GI = 40.9, n=10, Mann-Whitney U test p = 0.002, Fig. 1). Following this rapid loss in relative gill weight, no significant difference could further be evidenced between individuals collected at different time points of the maintenance period (Kruskal-Wallis p = 0.393). No specific trend was observed for the GIs of mussels from the stable isotope tracer experiments."

2. Fixation rates

The results you are sharing now are really important and up to now there was no published data to compare to. You measured the uptake rates with gills excised from wild mussels freshly collected, and one explanation for the discrepancy with our results might most probably be due to the acclimation period we used. The main difference with your experiments must come from the total amount of bacteria in the gills. We addressed this point by calculating the surface occupied by symbionts per filament length (FISH experiments) in a fresh mussel as opposed to a mussel acclimated for 38 days in LabHorta. Table 1 summarises these results and the bacterial area per gill filament appears to drop by 5 to 10 fold, with a particular drop in the area occupied by MOB. If we could normalise the fixation rates by the bacterial volume, we would probably find fixation rates that would be close to the uptake rates you demonstrated. Moreover, as mentioned in the discussion, the rates we display may not reflect those in their natural environment : "... as rates depend upon concentration of substrates and are probably influenced by the physiological state of the animals and bacteria, we can not extrapolate our results to mussels in their home environment."

3. CO2 fixation in the absence of sulphide

Carboxylation reactions may indeed be responsible for some of the 13C uptake.

Interactive comment on Biogeosciences Discuss., 5, 2279, 2008.