

# **Review of van Oevelen et al. Food Selectivity and processing by the cold-water coral *Lophelia pertusa*.**

## **General Comments**

The manuscript by van Oevelen et al. presents a very elegant experiment that tests the food selection and processing by the cold-water coral *Lophelia pertusa*. The experiments conducted provide a novel insight into the whether this coral is capable of feeding selectively and the potential mechanisms that underlie this. The authors' experimental design was excellent, particularly the neat use of  $^{13}\text{C}$  and  $^{15}\text{N}$  tracers to independently trace the uptake of algal and bacterial derived C and N into the corals. One broad concern I have with the paper is the low level of replication within the paper, it would have been nicer to see a greater number of experimental replicates to improve statistical power. I recognise that there are both logistical and ethical considerations to take into account when sampling cold-water corals, but I think the authors need to justify the limited replication within the study. On a further note, I believe the manuscript could be further developed to address how consumer and resource stoichiometry may help to explain the observed differences in food assimilation. It may be useful to look at the relative carbon and nitrogen content of each food source (%C, %N and C:N ratios) and the C:N ratios of the corals, and investigate the changes in food selectivity as responses to these parameters. Overall, I believe this paper is worthy of publication once the authors have addresses the specific comments outlined below.

## **Specific Comments**

1. This is an experimental study, as such I believe that the authors need to state a working hypothesis or at the minimum a clearly articulated set of aims. At present the introduction provides a nice review of the current knowledge around *Lophelia pertusa* feeding, but this is not just a descriptive study.
2. I do not believe that the authors' use of analysis of variance is appropriate. I would recommend that the authors remove the statistical tests and seek to describe and interpret the results graphically. Analysis of variance relies upon the assumption that a mean and variance can be estimated from the data.

Given that the lowest food concentrations ( $8.3 \mu\text{mol C l}^{-1}$ ) treatment had only two replicates, this means that estimating a reliable sample mean for this treatment is not possible. Furthermore, given that the bacterial / algal proportions are not repeated over all 3 food concentration treatments, I cannot see how a two-way interaction can be tested within this study. The experimental design is confounded by the fact that the algal:bacterial biomass was 1:1 in two of the treatments but 3:1 in the third. I would ask the authors to acknowledge the limitation this places on the study and interpret their results accordingly.

3. I believe that more could be learned about the feeding responses of *L. pertusa* by investigating the relative quality of each food source, in terms of average particle size and the %C and %N content. Given that the algal cells were 5 times larger than the bacteria, what can be said about the relative nutritional content of each?
4. Furthermore, some exploration of consumer and resource stoichiometry may help to elucidate selective uptake and incorporation. I would ask the authors to do some data exploration of the C:N ratios and if it is possible to derive a  $^{13}\text{C}:^{15}\text{N}$  ratio for the food sources and corals. This would potentially allow a greater insight into resource partitioning by the corals.

### **Minor Comments & Technical Corrections**

Page 1 Line 10: Comma missing – “In this study, we investigated...”

Page 2 Line 14: “it is presently unclear whether cold-water corals exhibit selective resource utilisation or feed proportionally to resource availability” Do you have a reference which would support this supposition.

Page 2 Line 20-21: “However, to advance our understanding of cold-water coral physiology...” This sentence is rather poorly structured. Consider revising to “In order to advance our knowledge of cold-water coral physiology, we must understand how dietary carbon partitioning affects the organismal energy budget.” or similar.

Page 2 Line 26-31: Please state the hypothesis for this study.

Page 4 Line 10-13: What were the %C, and %N values of the algal and bacterial food sources?

Page 4 Line 14: Poor grammar, please revise to “Prior to the start of the experiment, incubation chambers (10 L) **were** placed in a temperature-controlled room at 7°C **and...**”

Page 6 Line 2-5: Please can you clarify the terms in the equation. Looking at the I cannot tell if the uptake of resource is per unit time or total? Also is the availability of the resource a ratio or does it have units?

Figure 2: Given that there were only two replicates of the lowest food concentrations ( $8.3 \mu\text{mol C l}^{-1}$ ) I would suggest that the authors plot the raw data. Sample mean and variance cannot be reliably estimated with less than 3 replicates. This would also apply for figure 4.