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Interactive comment on "Virus mediated transfer of nitrogen from heterotrophic bacteria to phytoplankton" *by* Emma J. Shelford and Curtis A. Suttle

Anonymous Referee #2

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This manuscript describes relatively "simple" experiments (that is not a bad thing!) to try to quantify the remineralization and uptake of organic matter released via cell lysis. This concept of the viral shunt has been around for almost 2 decades now, and has been sorely lacking in actual quantitative evidence to evaluate it. The present manuscript is reminiscent of the 1999 paper by Proctor and Fuhrman (Aquatic Microbial Ecology) who used radiolabeled lysates to try and track the fate of lysis products.

Main comments: Strangely, the present manuscript does not cite the 1999 paper by Proctor & Fuhrman. It is my opinion that this omission should be remedied, especially given the similarities between the studies and the comprehensive way in which the prior

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authors discussed their results. For example, the present manuscript unfortunately has to deal with some of the same factors that the aforementioned authors had to deal with in their research – continuous recycling of the labeled substrates during the incubations. This does not diminish the importance of continuing to push on this type of research avenue, but it does mean that the results should be discussed a bit more carefully with respect to the quantitative nature of this type of experiment. Also, the prior publication showed increased uptake of lysate products in oligotrophic vs eutrophic environments. I am wondering if the authors of the present manuscript could comment on any relationship between their own measured ammonium uptake and the ambient concentration of nutrients measured in their field sites (Table 1).

Further Comments:

Figure 1: It is very confusing for me to have an experimental design shown in a Venn diagram, which is generally used to describe overlap of differing categories in results. It is even more confusing to have the (Lys) as a non-treatment in a diagram designed to show treatments. If the authors wish to visually show their fully crossed experimental design, I suggest using a table which includes the statements in the Methods section (pg 5, line 19 – pg 6 line 4) to visually show the readers what each experiment entailed and what the aim of the experiment was. As the figure currently stands, I still had to write down everything in those lines of the Methods so that I could understand the remaining portion of the manuscript.

Figure 2A: For some reason, it is very difficult for me to see the difference between the black and dark grey lines in this figure. Please consider using additional different patterns for the lines instead of these similar colors.

Pg 15, lines 9-12: I am having a hard time understanding the logic behind this statement, which means I think it should be explained more thoroughly. My confusion is related to the fact that the experiment with a highly dense culture in the laboratory shows only that the ammonium released can be taken up again. It does not demon-

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strate *how much* of the ammonium needs will be met by lysate remineralization in a natural system. I thus think this statement should be tempered to reflect the accurate conclusions of the lab experiment.

Pg 17, lines 20-21: Please correct the 2 uses of the word “uptake” in this sentence.

Figure 5: There realistically should be arrows from the Primary Producers pie chart into the Ammonium and DON boxes because the phytoplankton cells will release these products via viral-induced lysis, exudation, and from being grazed (the so-called “sloppy feeding”). This brings up my point mentioned above, that any experiments of this nature (i.e., Proctor & Fuhrman, 1999) will have to take into account the continuous recycling of these labeled compounds throughout the course of the experiment (i.e., there is no unidirectional arrow into Phytoplankton).

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