

Interactive comment on “Ideas and Perspectives: When ocean acidification experiments are not the same, reproducibility is not tested” by Phillip Williamson et al.

Cristian Duarte

cristian.duarte@unab.cl

Received and published: 21 December 2020

The paper of Williamson et al. highlights several interesting topics associated to the scientific work in Ocean Acidification (which could be easily extrapolated to other scientific areas), mainly: - On the highly variable responses of the organisms faced to environmental stressors, - On the impossibility of recreating the real world in laboratory conditions, and - On the importance of creating a positive atmosphere to discuss on the scientific work. Specially, on the limits of the experimental studies, mainly those in laboratory.

It is increasingly documented that the responses of marine animals to stressors such

C1

as ocean acidification can vary widely among and within species (Duarte et al., 2015, Shaw et al., 2016). Differential tolerance to environmental stressors is partly due to the conditions to which the individuals have been naturally exposed (Vargas et al., 2017), so it is important to consider those conditions prior to the experiments in order to correctly understand the consequences of Ocean Acidification. Given that it is impossible to determine all the abiotic conditions to which species are exposed to in nature, as Williamson et al. suggest, it is impossible to recreate them in mesocosms. In addition, animal condition (fitness) could vary through conditioning and experimentation, and so it should be taken into consideration as well. All this calls for caution when the results of the laboratory experiments are interpreted and, more importantly, in line with Williamson et al., when they are compared with studies carried out in different areas or in different times in the same area, either with the same or with a different species. This doesn't mean that laboratory experiments are not a good tool to understand how nature works. In fact, laboratory experiments have proved to be key tools to understand, for example, how human activity (e.g. Ocean Acidification) affects different ecosystems. This simply tries to highlight how difficult it is to compare the results of laboratory experiments and emphasize that they are normally complementary to each other and by no means the final truth in the generation of new scientific research. Williamson et al., describe clearly these points and, in this context, their article contributes to the discussion and understanding of the usefulness of laboratory experiments in ocean acidification research. Finally, as highlighted by Clements et al. (2020), it is not necessary to be harsh in the peer review process, and I would add that it is not necessary to be harsh after the review process either. That would allow the creation of an atmosphere to carry out this type of research (Williamson et al.) which is, at the end of the day, what motivates everyone involved.

References

Clements, J.C. 2020. Don't be a prig in peer review. *Nature*. 585, 472. Duarte, C., Navarro, J.M., Acuña, K., Torres, R., Manríquez, P.H., Lardies, M.A., Vargas C.A.,

C2

Lagos, N.A. & Aguilera, V. 2015. Intraspecific variability in the response of the edible mussel *Mytilus chilensis* (Hupe) to ocean acidification. *Estuaries Coasts.* 38:590–598
Shaw, E. C., Carpenter, R. C., Lantz, C. A. & Edmunds, P. J. 2016. Intraspecific variability in the response to ocean warming and acidification in the scleractinian coral *Acropora pulchra*. *Marine Biology.* 163, 210.

Cristian Duarte

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-394>, 2020.

C3