

Biogeosciences Discuss., author comment AC2  
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## Reply on RC2

Jutta E. Wollenburg et al.

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Author comment on "Permanent ectoplasmic structures in deep-sea *Cibicides* and *Cibicidoides* taxa – long-term observations at in situ pressure" by Jutta E. Wollenburg et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-62-AC2>, 2021

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Response to

Comment of Anonymous Referee #1 (response in bold)

**We are very grateful for the very positive and helpful comments of the anonymous referee that helped to improve the manuscript. We addressed all comments in the revised version.**

The authors provide new observations on ectoplasmic structures in deep-sea foraminifera and it is the first to describe the shell of *Cibicidoides* as internal rather than an external feature. They further describe how these structures are used as scaffolding for activities such as motility and feeding.

There is a lot less known on the deep-sea species compared to other groups of foraminifera which makes any new observations an important contribution, and specifically when culturing is done under in situ pressure. Thus, I think these observations are important for further understanding of the physiology and ecology of deep sea benthic foraminifera and only have a few suggestions that might help with clarity

Introduction: at the end of section (line 52-54) it's unclear to me why they did these extra experiments. The authors should consider rephrasing to include the aim

**We wanted to unravel whether the observed features were unique to *C.***

*pachyderma* or common features of the genera *Cibicides*/*-oides*. BCECF-AM labelling just works for living cell parts, thus, we conducted confocal microscopy with this label to ensure that the specimens were completely surrounded by living cytoplasm not dead tissue.

**We have modified the paragraph and it now reads 'To determine if the observed ectoplasmic structures are unique to *C. pachyderma* or common to the related genera *Cibicides* and *Cibicoides*, 40 *C. lobatulus* and 3 *C. wuellerstorfi* specimens were cultured at corresponding conditions and visually inspected daily to weekly for a time period of 6 weeks. To prove that shells were covered by living cytoplasm, in addition, fluorescence studies on the ectoplasmic envelope of *C. lobatulus* were carried out for 1-3 days.**

Method: This section starts with a statement that central to this study are observations from a previous study but don't mention what these are. If they are central, maybe they should have been introduced before, perhaps even in the introduction part.

**This obviously is a misunderstanding, as this manuscript is the first to describe the ectoplasmic structures. As the cited paper addressed different aspects of this experiment, we deleted the reference here to prohibit any confusion.**

Results: The observations are described in much detail and combined with the images report clearly the development of the ectoplasmic extensions. However, it is not mentioned if the observations were done on all specimens and if not on what proportion of them.

**We added the respective information to the respective positions in the results chapter. To 3.2, we added 'In 68 out of 100 specimens ectoplasmic 'roots' were observed. In an unknown proportion of the rest (32 specimens), such structures might have existed but due to the large working distance and/or a less optimal observational position of the specimens in the aquarium not noticed.' To 3.2.2., we added 'Distinct ectoplasmic 'trees' were observed in 6 of the 50 studied *C. pachyderma* specimens, others might have been overlooked as the experimental set-up just allows a vertical view inside the aquarium.' To 3.2.3, we added 'Ectoplasmic 'twigs' are directed above the umbilical side into the water column, thus, in our experiments they could only be observed in specimens that had attached themselves on an, in respect to the observation, ideal position on the aquarium's wall. In 16 of the 50 observed *C. pachyderma* specimens ectoplasmic 'twigs' were observed.'**

Discussion: This section was a bit hard to follow, will the authors consider dividing it to sub sections with headings? this will help the reader follow each part.

**As requested, we have divided the discussion in subsections.**

Some parts of the discussion might be better suited in the results parts (for example lines 371-376)

**We followed the suggestion and moved these sentences to the results.**