

Interactive comment on “A new model for biomineralization and trace-element signatures of foraminifera tests” by G. Nehrke et al.

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Comments of the article entitled "A new model for biomineralization and trace-element signatures of foraminifera tests" By Nehrke et al

â€” The work done presented an elegant set of experiments, which have resulted in a nice set of data about the calcium transport in forminifera. â€” The data and calculations made could show that endocytosis cannot be the only method for calcium transport and suggest that a trans-membrane transport and a passive transport must exist.

I have some major remarks and concerns about the conclusions drawn from the results obtained; â€” For calcification to take place, the saturation state must be increased.

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This can be done by increasing the concentrations of calcium and carbonate at the site of calcification through the transport processes and by increasing the pH. To be able to do this, the organism must isolate the site of calcification from the seawater, otherwise, there will be no build up for the concentrations of the needed ions and also there will be no control on the pH. The authors said that passive transport (PT) is achieved by diffusion of cations through gaps in the pseudopodial network and by vacuolization of seawater. This cannot be true, because the suggested pseudopodial network is not able to control the diffusion of ions to and from the site of calcification, which is a function beyond the capability of a network to achieve. Rather a selective membrane is needed.

It is highly unlikely that the pseudopodia can seal the site of calcification. Also, the pore size created will be too big to control the diffusion of ions.

If, as the authors suggested, that passive diffusion is allowed to the site of calcification, then the diffusion will be against the calcification process and not supportive at all as the model said. This is because the concentration of ions at the site of calcification must be higher than that in the seawater, and therefore the diffusion of ions will be from an area of higher concentration to an area of lower concentration. This free diffusion will lead to dissipation of the concentration built-up and will lead to decreased saturation state. When this happens, calcification will stop.

The authors suggested the presence of trans membrane transport of ions, but they could not show this by the set of experiments done. There is nothing written about the nature of this TMT!

Based on the above mentioned points, I think that the work done cannot predict a new model for biomineralization in foraminifera. The data obtained can only show that the endocytosis is not the only method of ion transport. The conclusions made are not based on actual data. I believe that the research team needs conduct further experiments to fully characterize the ion transport methods in forams.

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â€” My personal feeling is that the mechanism of calcification in foraminifera is very much like that in other calcifying organisms in the sea, such as corals.

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