

## ***Interactive comment on “Fossilized bioelectric wire – the trace fossil *Trichichnus*” by M. Kędzierski et al.***

### **Anonymous Referee #2**

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Kedzierski and coworkers present here a very original interpretation of the trace fossil *Trichichnus*. From scanning electron microscope data including 3-D microCT data they propose that these structures are formed from *Thioploca* sheets, which upon on a later stage of development are colonized by bacteria. These bacteria may eventually attach to framboids formed in the sheets and through nanowire – mineral interaction they may form a conductive network, similar to that proposed in the biogeobattery model. The whole idea, however is in my view is only, loosely founded in observations of structures, that might or might not be interpreted as remains of *Thioploca* filaments and indications of framboids that might or might not have been colonized by nanowire forming bacteria. I would prefer to see more hard that data that necessitate the author’s interpretation and exclude other possibilities. While the interpretation of the *Trichichnus* fossil as remains of *Thioploca* sheets might be a convenient alternative to the classical

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interpretation (that is a deep-tier burrow produced by unknown invertebrates), justified from observations of filamentous structures of a size that is comparable to Thioploca filaments, the hypothesis proposing the function of the structure as electric wires is not supported by the data. Though nothing in the data set contradicts the idea, my point is that idea is not needed to explain the Trichichnus fossil scientifically. Further, as there to my knowledge are no data demonstrating that biogeobatteries do form in empty Thioploca sheets (I'm not excluding that this might occur), the "Trichichnus-biogeobattery" hypothesis is not needed to understand better phenomena observed at present in nature. In other words: the hypothesis is superfluous and according to the principle of Ockham's razor it should therefore not be included in a scientific theory. I therefore recommend that the authors reconsider the presentation of their data: A) Focus on the thioploca interpretation and include eventually here eventually the work of Schulz et al., 2000: (

Schulz, H. N., B. Strotmann, V. A. Gallardo, and B. B. Jorgensen (2000), Population study of the filamentous sulfur bacteria Thioploca spp. off the Bay of Concepcion, Chile, Mar. Ecol. Prog. Ser., 200, 117-126) as documentation for presence of iron sulfide encrusted filaments. When discussing the role of microorganisms in element turn over make sure that correct terms are used. Desulfotomobacterium frappier is not related to Thioploca as indicated in the text. (p 17715 l. 20). Is this species at all present in Thioploca mats? – If not it, it is irrelevant in the context. B) Tone down the Trichichnus-biogeobattery idea. It might be a (somewhat wild) perspective that can be expressed in a few lines in the end of the manuscript, but without substantial evidence it cannot be the main message of a scientific paper,

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Interactive comment on Biogeosciences Discuss., 11, 17707, 2014.

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