

***Interactive comment on* “The unique skeleton of siliceous sponges (Porifera; Hexactinellida and Demospongiae) that evolved first from the Urmetazoa during the Proterozoic: a review” by W. E. G. Müller et al.**

Anonymous Referee #3

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Manuscript review for:

The unique skeleton of siliceous sponges (Porifera; Hexactinellida and Demospongiae) that evolved first from the Urmetazoa during the Proterozoic: a review

by W. E. G. Müller, J. Li, H. C. Schröder, L. Qiao, X. Wang

This article is a fascinating review of the evolution of skeletal formation in the siliceous

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sponges (classes Demospongiae and Hexactinellida). While the article is well written and appropriate for publication in Biogeosciences, there are a few issues that should be addressed before this article would be suitable for publication.

Abstract Page 386 Line 23

This reviewer has a slight problem with the terminology used in this sentence. The use of the term “axial canal” is somewhat misleading as it implies that the canal is formed prior to the synthesis of the axial filament. Is it not the axial filament that templates the growth of the surrounding silica, and not the silica that templates the growth of the filament? Is there is a historical reason for this specific word use? In the same sentence, “hexactinellida” and “demospongiae” should be changed to “hexactinellids” and “demosponges”. In addition the authors state that the axial filaments of hexactinellids are composed of silicateins, which has never been shown previously. If an article has been published previously, confirming this, then the reference should be cited. It would thus seem more appropriate to simply say something like

Both the silica spicules from hexactinellids and demosponges contain organic axial filaments.

Role of silicon and silicate Page 388 Line 9

As stated above, there is no published data that the hexactinellid axial filaments are enzymatic. The text should thus be modified to reflect this.

Unique formation and degradation of biomaterial (biosilica) in sponges: silicatein and silicase Page 393 Line 26+

Again, the authors state here that the silica is deposited around the axial canal. How

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is it possible that an empty space can template the growth of anything? This is the function of the axial filament. The so-called “axial canal” is merely the channel that is left behind if the axial filament has been destroyed. The text should be modified to reflect this.

Also, in the title of this section, the word “biomaterial” is incorrectly used.

A “biomaterial” is specifically defined as: a natural or synthetic material (such as a polymer or metal) that is suitable for introduction into living tissue especially as part of a medical device.

The word “biomaterial” should therefore be deleted here as well as any other place it appears in the manuscript.

Unique formation and degradation of biomaterial (biosilica) in sponges: silicatein and silicase Page 394 Line 2-4

The authors mention that in figure 4A-C, the spicules and their axial canals from fossil sponges exhibit all of their characteristic features. What are these characteristic features?

Hexactinellida: first approaches to understand spicule formation Page 397-398 Line 28-1

The authors claim that the spicules from hexactinellids contain specific proteins that 1) cross-react with anti-silicatein antibodies and 2) exhibit proteolytic activity, however no data is shown to support these claims. Since this is a review article, if a published reference cannot be cited, then the supporting data should be included.

Throughout the manuscript the term "hexactinellidan" is used. It should be replaced by "hexactinellid" (see caption of figure 6, for example)

Figure 8

What are the knobby structures shown on the spicule surface in figure 8B? These are likely salt crystals arising from inadequate sample preparation. To the non-specialist, this micrograph is very misleading and should be replaced with an artifact-free image.

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