

***Interactive comment on* “The environment recording unit in coral skeletons: structural and chemical evidences of a biochemically driven stepping-growth process in coral fibres” by J. P. Cuif and Y. Dauphin**

**Anonymous Referee #1**

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Coral skeletons are now widely used for paleoclimatological reconstruction. However, numerous papers have pointed out that the distribution of stable isotopes and trace elements within skeletons is influenced not only by environmental parameters but also by host physiology. To fully appreciate the extent of these biological contributions, it is critical to understand how corals make their skeleton.

Cuif & Dauphin present here a careful study of the structure and general composition of skeletons belonging to temperate and tropical scleractinians corals. This is an important topic within the scope of BGD. The paper provides an excellent and comprehensive review of coral skeleton structure based on the authors' own data. Presentation as a review paper instead of as a research paper will better suit the goals of this manuscript, given that most of the data have been already published by the authors and are only

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extended here to other species. In fact, in certain parts of the text it is difficult to distinguish new data from those already published. Also, some data are discussed but not presented in the results (see Fig. 14).

In this paper, the authors present strong and convincing arguments showing that coral skeleton is a composite material comprised of both organic and mineral fractions. They conclude by introducing an original model of skeleton formation via cyclic phases of matrix/mineral fraction secretion (i.e. a polycyclic model for the growth of coral fibers).

All the pictures are of very good quality. The text is clear, even if some phrases are difficult to understand, see for example p. 639, lines 19-22). The methods have been published previously. I have no serious criticisms.

Minor comments: ¶ Some of conclusions are perhaps speculative. For example p. 635, l.4: No biochemical analyses (and no references) are provided to conclude that proteoglycans are close to aggrecan or versican. ¶ Additional references should be added to extend the review: for example, p. 634, 4.1, a reference about the recent description of the first protein from the organic matrix of a scleractinian coral should be included (Fukuda et al. (2003) BBRC 304: 11-17; Watanabe et al. (2003) CBP 136B: 767-774); p. 637, 4.3.1: the self-assembly concept should be discussed using the paper by Pereira-Mouries et al. (2002) Eur J Biochem 269, 4994-5003); p. 637, 4.3.2: ion transport mechanisms in corals (p. 637, l. 17) can be discussed using Tambutté et al. (1996) JEB 199: 1029-1041 and other papers by the Monaco group. The detailed description of acid polysaccharides in the skeletal matrix and calicoblastic epithelium made by Goldberg (2001) Tissue & Cell 33, 376-387 should also be cited. ¶ The reasons for replacing the widely used term “ calcification centers ” by “ EZM ” (Early Mineralization Zone) should be clearly explained by the authors. This not the case in this version of the manuscript. Also, the meaning of EZM should be explained in some legends (Fig. 7 for example). ¶ The use of the term “reticulum” (p. 633, l. 21) should be avoided since it designates a specific cellular organelle (endoplasmic reticulum). I do not think that Johnston used this term. ¶ The authors make an interesting parallel

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between coral skeleton and Pinna prisms, but is it not possible that all skeletal structures follow a polycyclic growth pattern? Other possible analogies might be considered as well.

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