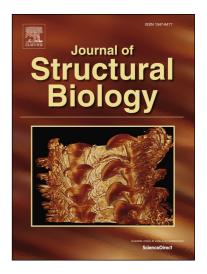
Accepted Manuscript

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PII:	S1047-8477(16)30199-X
DOI:	http://dx.doi.org/10.1016/j.jsb.2016.09.010
Reference:	YJSBI 6985
To appear in:	Journal of Structural Biology
Received Date:	1 March 2016
Revised Date:	8 September 2016
Accepted Date:	15 September 2016



Please cite this article as: Hood, M.A., Leemreize, H., Scheffel, A., Faivre, D., Lattice Distortions in Coccolith Calcite Crystals Originate from Occlusion of Biomacromolecules, *Journal of Structural Biology* (2016), doi: http://dx.doi.org/10.1016/j.jsb.2016.09.010

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Lattice Distortions in Coccolith Calcite Crystals Originate from Occlusion of Biomacromolecules

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Keywords: Biomineralization, Coccoliths, Calcium carbonate, High-resolution X-ray diffraction,
Biogenic crystal growth

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16 17 ABSTRACT

During biomineralization, organisms control the formation and morphology of a mineral using 18 19 biomacromolecules. The biomacromolecules that most strongly interact with the growing 20 crystals frequently get occluded within. Such an observation has been recently obtained for the 21 calcium carbonate producing coccolithophore species *Pleurochrysis carterae*. Coccolithophores 22 are unicellular algae that produce calcified scales built from complex-shaped calcite crystals, 23 termed coccoliths. It is unclear how widespread the phenomenon of biomacromolecular 24 occlusion within calcite crystals is in calcifying haptophytes such as coccolithophores. Here, the 25 coccoliths of biological replicates of the bloom forming *Emiliania huxleyi* are compared with that of *Pleurochrysis carterae*, two species with different coccolith morphologies and crystal 26 27 growth mechanisms. From high-resolution synchrotron X-ray diffraction, changes in the lattice

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