

**MINERAL PHASE MICROSTRUCTURE IN TEETH OF THE SHORT SPINED  
SEA URCHIN (*Lytechinus variegatus*) STUDIED WITH X-RAY PHASE  
CONTRAST IMAGING AND WITH ABSORPTION MICROTOMOGRAPHY**

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The teeth of sea urchins are very complex, self-renewing biocomposites and achieve a high degree of functionality by combining strengthening and toughening strategies often employed in artificial composites. These include varying reinforcement morphology of the calcite mineral phase, varying composition of the crystalline reinforcement phase, incorporation of toughening inclusions (macromolecules) within individual crystals and noncrystalline CaCO<sub>3</sub> in the composite's matrix. In this study, x-ray absorption microtomography, a high resolution variant of medical "CT", and synchrotron x-ray phase contrast imaging reveal the distribution of mineral within teeth of the sea urchin *Lytechinus variegatus*. The results obtained with these imaging modalities on intact teeth are compared with sections of teeth observed with optical and scanning electron microscopy, including histochemically and immunohistochemically stained samples. The results suggest that biomineralization strategies are conserved, to a considerable degree, across the wide evolutionary distance between Metazoan Echinodermata and vertebrates.