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Multiscale imaging of mammalian teeth

Teeth are three-dimensional consisting of highly mineralized tissues. Both the formation of tooth shape during development and the structural details of mature dental tissues are active topics of research. We have used phase-contrast holotomography synchrotron imaging to study mineralized dental ultrastructure with voxel resolutions down to 25 nanometres. The resulting details uncovered provide novel insights into the structural and developmental bases of mineralized tissues. The 3D models obtained from the synchrotron data help to direct laboratory investigations on developing teeth using confocal microscopy. Conversely, developmental biology data combined with X-ray imaging on gene expression patterns can be used to direct the use of synchrotron imaging in the study of developing organs.

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