

X-RAY MICROCOMPUTED TOMOGRAPHY

X4 POSEIDON - Fossil ammonite and shark tooth

Innovation with Integrity

MicroCT imaging is limited only by size and X-ray opacity of samples, and the X4 POSEIDON in its dual X-ray detector configuration is able to achieve excellent scan results with large dense samples as well as high resolution at submicron voxel sizes for smaller samples. This means the scanner can be applied to paleontology research with non-destructive 3D imaging of fossils of appreciable size and density. This makes paleontology, alongside geology, an advantageous application for the X4 POSEIDON desktop scanner.

Fossils bear the shape imprint of the often extinct biological organisms that made them; however little or none of the material constituent of the fossil comes from the organism. Instead the process of diagenesis including mineral deposition and precipitation, water dissolution, even microbial processes, result in a diverse structure of various minerals comprising the fossil. Such mineral like rocks have a high density, requiring specialized x-ray tomography equipment and software.

Fossils are formed in rare and special circumstances and a discovered fossil is a precious, sometimes fragile object. Thus increasingly paleontology researchers are employing microCT to non-destructively image fossils without cutting or otherwise damaging the original specimen.

Reference

Costeur L et al. (2024) *Developments in X-Ray Tomography XV* (Vol. 13152, p. 131521D).

Scan parameters

- Detector: 7 MP flat panel
- Voxel size:
9.6 μm (ammonite)
10.0 μm (shark tooth)
- Source: Transmission type
- Source power:
100 kV, 14W (ammonite)
85 kV, 8.5 W (shark tooth)
- X-ray filter:
Cu 0.5mm (ammonite)
Cu 0.1mm (shark tooth)
- Rotation step: 0.12° over 360°

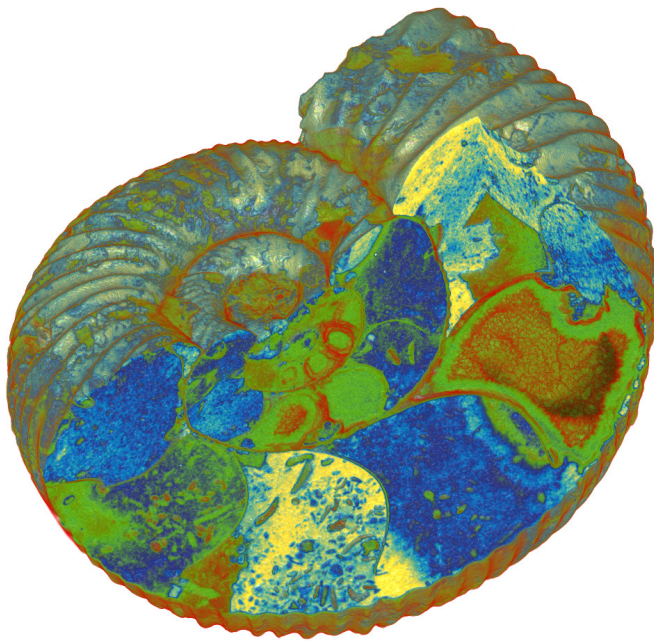


Figure 1: A volume rendering of the ammonite fossil showing both outer shell surface and a cut rectangular volume within the fossil, revealing both chamber structure of the ammonite and mineral heterogeneity due to mineral diagenesis in the fossil.



Figure 3: The fossil ammonite and shark tooth shown to scale.

Ammonites were coiled-shell cephalopods, a class of molluscs related to squid and octopus. They dominated the pelagic community in the surface water of Cretaceous oceans. Ammonites lived a long time, from 400 million years ago in the Devonian until the end-Cretaceous extinction.

Squalicorax – the “crow sharks” – also lived in the Cretaceous and are now extinct. They were a coastal predator who also scavenged dead creatures. Their teeth have been found in land dinosaurs and Pteranodons which fell in the sea, making a meal for the crow sharks.

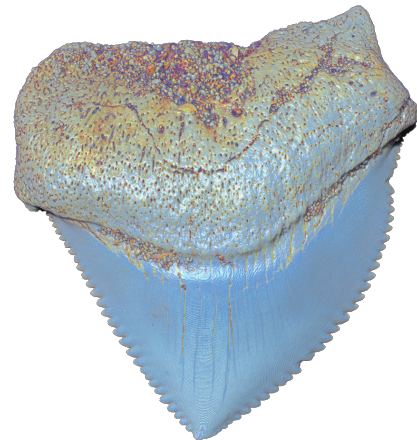
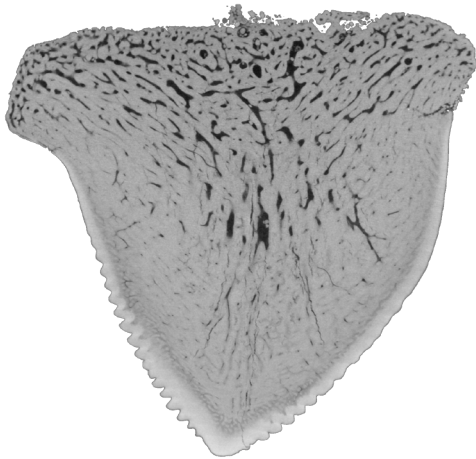


Figure 2: The fossil tooth of the Cretaceous shark *Squalicorax*, scanned at 10 micron pixel with the flat panel X-ray camera. Left: reconstructed image of coronal section; Right: volume rendered image

Bruker BioSpin is continually improving its products and reserves the right to change specifications without notice. BS-100064 01/2025 Bruker BioSpin.

Bruker BioSpin
info@bruker.com

Worldwide Offices
bruker.com/

X4 POSEIDON
bruker.com/

bruker.com

