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Neutron Micro-Computed Tomography: A Revolution in Non-Destructive Paleontology

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The physical extraction of fossilised remains from rocks enables quantitative physiological investigation of bone-dimensions, volume, and porosity, however leads to the destruction of valuable contextual information and soft-tissue remains within the matrix.

Conventional and synchrotron-based X-ray computed tomography (XCT) have been utilised for many years as critical tools in uncovering valuable 3-D internal and surface renderings of scientifically important fossils, however poor contrast and X-ray penetration often prevents thorough tomographic analysis. DINGO, Australia's neutron micro-computed tomography (nCT) instrument, located at the OPAL nuclear research reactor, is being used to obtain unpreceded renderings of extraordinary fossilised anatomical features not visible with conventional imaging techniques. Drawing upon specimens scanned from across Australia, North America, New Zealand, and China, this presentation will demonstrate DINGO's capabilities and the complementarity of nCT to classic XCT methods for certain geological formations and fossil localities.

A selection of nCT case studies to be presented:

- nCT studies conducted on a Jurassic cynodont, one of the earliest and most primitive ancestors to all living mammals, revealing exceptional conservation of internal bone structure of the cranium, teeth and internal tissues; features that are not visibly rendered by XCT, nor phase-propagation synchrotron XCT methods.
- The illumination of "corrective procedures" in paleontological specimens
- Uncovering the morphology and internal anatomy of fire-adapted mid-Cretaceous south polar conifers
- Applicability of nCT to the Richards Spur locality,Oklahoma, USA.
- Stomach contents of dinosaurs and early birds.

Speakers Gender

Male

Travel Funding

No

Level of Expertise

Expert

Do yo wish to take part in the poster slam

No

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