MicroCT Magic Bundle

Magic Bundle
Natural fibre, animal bone, stone, 19.2 x 9.1 x 7.0 cm
Baiyer Valley, Western Highlands, Papua New Guinea
SoAA New Guinea Collection

MicroCT scanning, or micro-computed tomography, is the process of taking a series of two-dimensional x-ray slices from 360 degrees around an object and then digitally combining these slices to form a three-dimensional virtual model or tomogram. The model is based on the x-ray attenuation values, or number of x-rays that are absorbed, reflected or pass through the object, which are averaged for each point in three-dimensional space including both internal and external details. This process is very similar to medical CT scanning, however, for microCT scanning the object is placed on a rotating stage between an x-ray source and an x-ray detector, whereas for medical CT scanning the source and detector are rotated around the patient. The other major difference is that because microCT is not limited by radiation dosage limits, it is able to reach higher energy levels and is therefore able to produce images of much higher resolution, usually between 1-100 microns dependent on sample size. The resultant datasets can then be virtually rendered, segmented or animated dependent on specific research questions and the samples can then be subjected to further analytical methods informed by the CT images.

MicroCT scanning has a long history of use in archaeology due to the lack of sample preparation required and the non-destructive nature of the scanning process. Samples must simply be stabilized to prevent movement during scanning and do not require any destructive preparation methods such as staining, coating or subsampling. The technique has been used on a wide range of archaeological materials to answer a broad range of archaeological questions. These have included scanning mummies to analyse the human remains and other artefacts contained within, to determine the contents of sealed jars such as cremation urns within having to damage the vessels and to read ancient papyrus scrolls without unrolling the fragile documents. MicroCT has also been used to digitize rare and valuable samples in order to make them more freely available to study for scholars around the world. The ability to provide digital access to full 3D datasets has reduced the need for costly travel and dangerous shipping to study rare archaeological samples and enables samples to be easily accessible to a broader range of people for a broader range of uses. These 3D tomographs can also be useful records in cases of lost, damaged or degraded samples.

The School of Archaeology and Anthropology has worked closely with the ANU CTLab to scan a wide range of archaeological materials from their collections for a number of interdisciplinary research projects. Organic-tempered pottery was scanned in order to study cereal remains within the pottery, which can help determine the domestication status of cereals and therefore the wider subsistence strategies

and human-plant relationships of the past. A number of megafauna holotype fossils have been scanned to enable the sharing of morphological information of valuable specimens. Magic bundles from Papua New Guinea were scanned in order to determine their contents without removing delicate organic wrappings. These scans revealed an assortment of bones and rocks (see animation) not visible externally.

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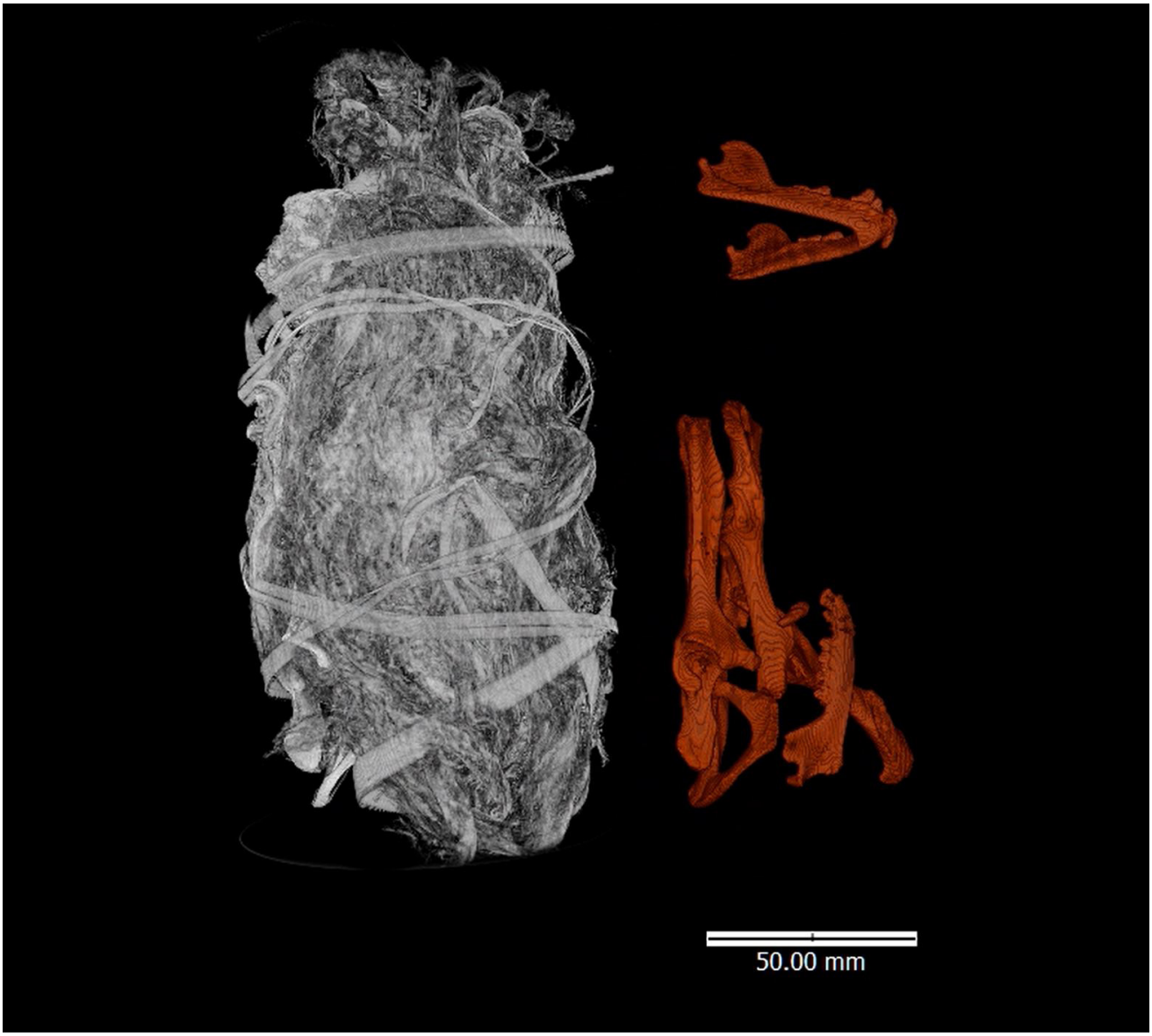

Still from animation of MircoCT scan