

Tomography and radiocarbon dating used to examine Australian Aboriginal knife

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A3396 Knife, southern cassowary casque / resin / abrus seed, maker not recorded, location not recorded, Queensland, Australia, made circa 1877–1930, acquired 1941. Credit: The Powerhouse Museum

A number of sophisticated non-invasive nuclear and accelerator

techniques were used to provide information about the origin and age of an Australian Aboriginal knife held in the collection of the Powerhouse Museum.

The knife with a striking highly polished resin handle was selected to be part of a 26-object exhibition, "The Invisible Revealed," held at the Powerhouse during 2021–2022.

Prior to the exhibition, the Powerhouse Museum wanted to determine the materials used in the construction of the knife and handle.

Powerhouse Museum First Nations Collections Coordinator, Tammi Gissell, explained that because little was known about the origin or use of the blade, it had to be handled with caution and following cultural protocols.

For this reason, the object was sent in a closed box to senior instrument scientist Dr. Joseph Bevitt.

"Essentially, we had to answer these questions without looking at the object. We took it to the Australian Synchrotron where we used a 3D imaging technique, known as tomography, on the Imaging and Medical beamline to analyze it. The powerful X-ray can penetrate the box and the object to reveal important information about the materials," explained Dr. Bevitt.

"We could determine that the object was not made of metal but a very dense bone. Only two animals had bone that dense—the Australian cassowary and the water buffalo. As the [museum](#) told us it was found in northern Queensland, the source would have been the cassowary," he added.

The next investigation used radiocarbon dating of the red Abrus seeds

found on the handle.

Radiocarbon dates of the seeds from the Center for Accelerator Science at ANSTO indicated that they were most likely to have been harvested between 1877 and 1930— which may indicate the knife's time of production.

"The use of decorative seeds, *Abrus precatorius*, along with the generous amount of resin used in the construction of the handle indicates a potential for ceremonial significance," said Gissell.

"The knife, which was added to the collection in 1941 without provenance, is an example of First Nation Australian use of bone, and not stone as commonly found in Leilira knives.

"The casque has been carved into three faceted, triangular sections. Commonly used for hunting, leilira knives were also used as spearheads," she said.

The museum believes the handle on the blade is most likely a resin created with a [native plant](#) in the region of Northern Queensland. ANSTO testing was unable to specifically identify the [resin](#), however, it did confirm it was made of an [organic material](#), possibly beeswax.

The artifact was displayed alongside 3D visualizations and other imagery that revealed the structural details of the 26 objects in the exhibition.

Provided by Australian Nuclear Science and Technology Organisation (ANSTO)

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