AFP helps solve a mystery

Australian War Memorial conservators have enlisted the help of the AFP's Forensic and Data Centres to help identify whether the body of a man known as the 'Unknown Sailor' is indeed a crew member of the HMAS Sydney.

Three months after the 1941 sinking of the HMAS Sydney, a body was found off Christmas Island. The body was buried with military honours, but uncertainty over whether the man had been part of the ill-fated ship's crew remained.

A parliamentary inquiry[1] highlighted concerns by those who made submissions to the inquiry that if the Unknown Sailor was indeed a crew member of HMAS Sydney, the body should no longer lay in an unmarked grave in a remote location on an island in the Indian Ocean. These concerns led to an investigation that drew together colleagues and friends in the area of scientific research to try to solve this mystery.

With its highly-skilled forensic scientists and the equipment available to them at the Forensic and Data Centres, the AFP is well placed to assist with the investigation into the Unknown Sailor's history.

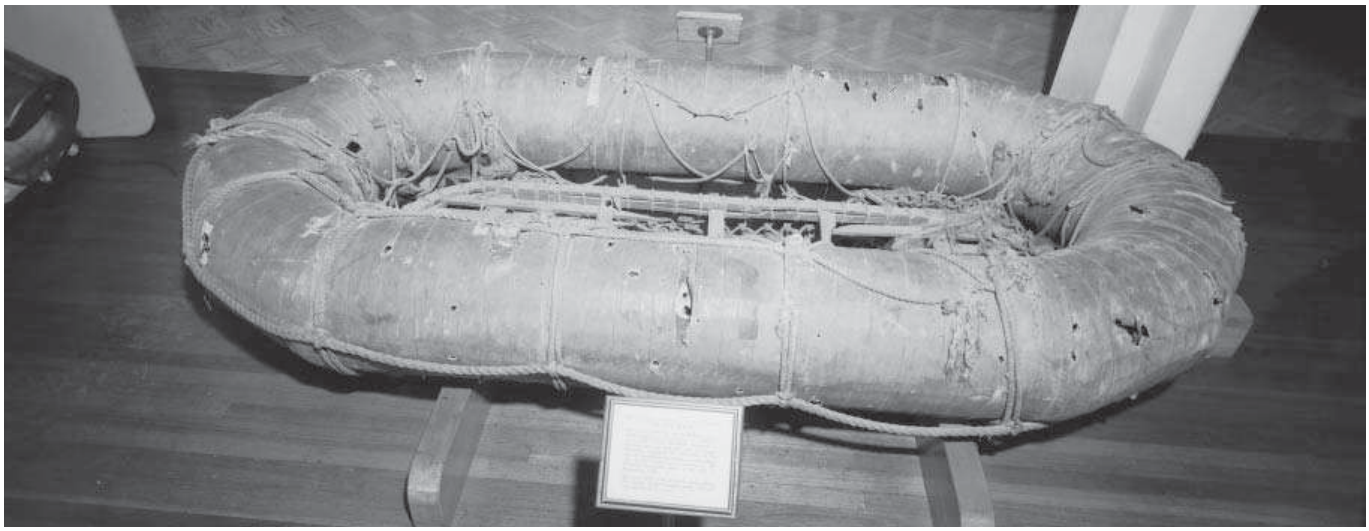
The HMAS Sydney sank in November 1941 off the coast of Western Australia after a battle with the German cruiser Kormoran. All 645 men on board, including six Royal Australian Air Force (RAAF) members, were lost. HMAS Sydney seemed to have vanished without a trace.

In February 1942, a Carley float containing a corpse was recovered off Christmas Island in the Indian Ocean. Carley floats were a life-buoy device commonly used on naval vessels. They consisted of an oval-shaped flotation tube fitted with a wooden platform suspended by a net made of rope. The float is constructed so that the net is free to fall through the flotation tube either way so that it doesn't matter which way it lands in the water. There were 11 standard sizes in Carley floats, carrying from six to 67 people.

The remains of this Carley float were taken to Fremantle in late February 1942, but there is no record of it since that time.

A Carley float was recovered by HMAS Heros during the search for HMAS Sydney in November 1941 and is part of the collection of the Australian War Memorial (AWM). Although there were no obvious identifying features to connect this Carley float to HMAS Sydney, the time and place of its recovery, the types of rope that were attached to the float and evidence of shrapnel damage led the AWM to believe that it probably came from HMAS Sydney. In 1991, after years of speculation, further investigations by

[1] *Parliamentary Joint Committee on Foreign Affairs, Defence and Trade report on the loss of HMAS Sydney*



Carley float recovered in 1941 on display in the Australian War Memorial. Photo courtesy Australian War Memorial

the AWM revealed that the Carley float in the Memorial's collection was made from materials that originated in Australia and New Zealand. This strengthened the belief that it may be the only relic to have been recovered from HMAS Sydney. Particles of shrapnel were also recovered from the float.

When the float containing the body was recovered in 1942, two witnesses provided evidence about the clothing on the partly-decomposed body. One said the overalls on the corpse were white, while the other suggested they were originally blue and had faded from exposure to the elements.

The body was buried with military honours in 1942 in an unmarked grave on Christmas Island. Documents identifying the location of the grave were lost during the Japanese occupation of the island and it was not until 2006, after a review of 1950 photographic evidence of the grave site, that the Royal Australian Navy (RAN) conducted a search and successfully located the grave of the person known as the Unknown Sailor.

The remains were exhumed for the purposes of identification and forensic examination. The grave also contained a few small artefacts, including some remnants of wood and nails from the coffin as well as metal eyelets and press-studs. Some of the press-studs contained fragments of fabric.

The RAN approached the AWM and asked for help to find out if the artefacts were associated with the clothing and, if so, the type and nationality. This information could help to prove the body was indeed a crew member of the HMAS Sydney.

One of the press-studs found in the grave of the Unknown Sailor

In December 2008, the AWM formally requested the AFP's assistance with the investigations. Dr Vincent Otieno-Alego of the AFP Forensic and Data Centres Chemical Criminalistics Team, and Alana Treasure, a senior conservator from the AWM, began analysing the press-studs in February 2009.

National Manager Forensic and Data Centres James Robertson noted that conservation science and forensic science have a lot in common.

"Samples are often small and degraded, so our forensic experts are happy to work with our colleagues from the Australian War Memorial to help provide answers to this mystery," Dr Robertson said.

"Along the way professional relationships have been developed and enhanced with our Australian War Memorial colleagues."

Elemental analysis of the press-studs suggested they were originally brass which had corroded from exposure to the elements. Dr Otieno-Alego used x-ray fluorescence (XRF) and scanning electron microscopy – energy dispersive spectroscopy (SEM-EDS) to make this finding.

"We used Raman spectroscopy and fourier-transform infrared spectroscopy (FTIR) molecular analysis techniques for the press-stud corrosion products," Dr Otieno-Alego said.

"These methods of analysis were largely non-destructive for this purpose, as the items were small enough to be placed in their entirety within the instruments."

The Australian National University also assisted with the analysis of the press-studs, by providing x-ray tomography scans on the most intact sample. X-ray tomography takes x-ray images of an object from a variety of angles, then computers stitch the images together to create a three-dimensional model of the object.

"Using x-ray tomography for this kind of analysis is innovative as it has been used mostly for the analysis of fossils in the past," Dr Otieno-Alego said.

The x-ray tomography scans revealed the inscribed letters "CA" and "AU", which had the same spacing and orientation as the inscription "CARR AUSTRALIA" on a

Fabric removed from within one of the press-studs

Photos taken using AFP microscopes,
Australian War Memorial collection reference: AWMREL38991.002

press-stud of the same vintage made by Carr Australia. The elemental composition of the press-studs was also found to be consistent with press-studs manufactured by Carr Australia.

Carr Australia press-studs commonly appear on Australian War Memorial collection material such as uniforms, bags and money belts, as well as non-military clothing and items. This made it an easy task for the scientists to compare the corroded press-studs with well-preserved samples from the same era.

The fragments of fabric that were enclosed within the press-studs have been identified by Raman analysis as cotton. Raman analysis is used to identify the types of fibre and dyes or colourants used in the fabric. The samples were discoloured brown in the centre, with varying amounts of blue colouration in some parts. The blue colouration was not evident on the originally exposed areas of the fabric which could be attributed to degradation by exposure to the harsh environmental conditions. FTIR analysis was also used on the fabric to try to identify the blue colourant.

"While much has been discovered about the press-studs, the evidence so far is inconclusive," Dr Otieno-Alego said.

To date, the blue colourant has not been identified. As well, fibres from several RAN and RAAF issue overalls and other fabrics from the same era have been examined to compare them with the samples of fabric found in the grave, but no match has yet been found.

The whole story will remain a mystery for some time, but these forensic techniques, honed through criminal investigations, can help increase knowledge, Dr Robertson said.

"We are not always able to provide definitive answers, but forensic analysis has helped build a picture of what may have happened," Dr Robertson said.

"The AFP forensic teams have previously worked with the Australian War Memorial on fabrics recovered from the bodies of World War I victims in Europe. Our joint aim is to bring comfort and closure, even after half a century, to the relatives of the missing. It is challenging but important work for our nation."

The investigation continues.