

Bringing a mummy to life

Right: The outer sarcophagus

Asru was a temple singer over 2000 years ago in ancient Egypt. She was preserved as a mummy, and now lies snug inside her double coffin in The Manchester Museum's Egyptology section. Thanks to developments in medical science, researchers in Manchester are revealing the secrets of her life and piecing together the diseases she suffered from.

GCSE key words

X-ray
Tissue
Microscope

The hieroglyphs on Asru's coffin read, 'Asru, Singer of Amun. You are in Temple of Karnak'.

Mummy studies are nothing new in Manchester. One of the first scientific investigations of mummies was carried out by Dr Margaret Murray in 1907. Before this mummies had been treated as curiosities and untravelled with little care. Dr Murray gathered together many scientists for her investigation — experts in anatomy, chemistry, textiles and of course Egyptology.

Seventy years later a similar project was devised by the Keeper of Egyptology, Professor Rosalie David. The project aims remained the same — to use the

most modern of scientific techniques to investigate one of the mummies in the museum collection. Professor David put together a team of specialists to create an interdisciplinary team that worked towards two main aims:

- To discover as much information as possible about religious or funerary customs, living conditions, physical and dental health and the actual process of mummification.





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Left: X-rays of Asru's skull and chest

- To establish a methodology — a way of using these techniques for the study of human remains which other institutions could adopt for their own investigations.

THE ART OF MUMMIFICATION

Asru was already unwrapped when she arrived at the museum in the 1800s. Her inner and outer coffins are works of art, painted with scenes and inscriptions. The mummy itself is exceptionally well preserved and dates from the XXV Dynasty of Egyptian chronology (c. 780–656 BCE). Asru has fine facial features, with her arms outstretched and extended over her thighs. A package of mummified viscera (her internal organs) was placed upon her thighs.

Mummification is a complicated procedure. New information is constantly being uncovered as no two mummies were treated exactly the same. Unusually, the Egyptians seem to have kept no written records or instruction manuals, which makes us think that this was a secretive profession. The brain was removed through the nasal passages in the skull. All the internal organs except the heart were extracted through an

incision, and dried using a salt mixture before being placed into Canopic jars. The body was dried using the same salt mixture, then washed and anointed with oils and spices. Finally the body cavity was packed and bandaged with linen and placed in the coffin for burial.

INVESTIGATING ASRU

The Mummy Team in Manchester has used a variety of techniques, such as X-rays, CT scans, endoscopy, tissue biopsy, histology, DNA studies and chemical analysis to find out about the quality of life Asru may have had in Pharaonic Egypt.

X-rays

Asru's X-rays show that her teeth were worn down, probably from eating food contaminated with sand and that she lost some teeth after her death. She seems to have had arthritis in her arms. Her legs show signs of arrested development, perhaps as the result of a poor diet at times during her childhood. We can also see that her kidneys were removed. Some of the vertebral discs in her spine are damaged. A skull can provide other information, such as the gender of its owner and his or her dental health. From all this information we can conclude that Asru was an elderly female who had calcification — hardening — of her main arteries, as well as slipped discs and arthritis.

A polystyrene copy of Asru's skull was made using information from X-rays of her head. Specialist

BCE = before common era.

Canopic jars were urns with lids in the form of animal heads of the gods. They were used to hold the internal organs of a mummy. The stomach, intestines, lungs and liver were placed in separate jars. Egyptians regarded the heart as the seat of learning and left it in the body cavity.

In **endoscopy** a narrow tube is pushed through a small incision in the body cavity, a joint, or along the gut. Tiny television cameras or surgical tools can be moved through the tube to allow internal examination, sampling or even microsurgery.

Left: Asru inside the inner coffin



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Professor Rosalie David with Asru

Above: *Asru* undergoing endoscopy

medical artists were able to use this skull to reconstruct how Asru's face might have looked before she died. The size and shape of your skull determine your facial features and this is one of the principles behind facial reconstruction, as seen in television history programmes such as *Meet the Ancestors*.

Histology is the study of tissues.
Cytology is the study of cells.

Tissue biopsy

Sectioning and staining pieces of tissue allows scientists to see the different tissue types that make up the organs of the body. Tissues from a mummy, unlike those from a living person, are dry, hard and brittle and this makes them difficult to cut. Scientists get around this by rehydrating the tissue, soaking it in a saline solution before embedding it in wax and then slicing it into very thin sections that will transmit light. The thin slices are stained with

coloured dye to make the cellular structure visible under a microscope.

Asru's tissues tell us that she was infested with parasitic worms. She had a worm infection in both the lining and the muscular wall of the intestine. There is also evidence that she had a cyst in her lungs caused by a tapeworm. This would have resulted in chest pains and breathlessness. Asru also had schistosomiasis, a disease caused by yet another worm (see Box 1).

LIFE AND DEATH

It is hard to say whether her heavy load of parasitic worms was responsible for Asru's death, but there is no doubt that it would have been uncomfortable and debilitating. The blood loss caused by the infestations might have made Asru anaemic, and her intestine may sometimes have been severely inflamed, causing pain and diarrhoea. This infection could have spread to other parts of her body resulting in her death.

This is just speculation — despite all we know about Asru and her life, we do not know why she died. She obviously had a good quality of life as a temple singer and she would have had access to medical treatment and good food. Her hands and feet show little wear, which tells us that she did not have to do much manual labour.

Asru's body tells us the story of her life, but we should also remember that once she was like us, living and breathing, with thoughts and emotions. Her help in the study of ancient diseases may one day prove invaluable.

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BOX 1 SCHISTOSOMIASIS

This water-borne parasite affects millions of people today in the developing world. The eggs of the parasite hatch inside the bodies of water snails and release larvae into the water. The larvae enter the human body through hair follicles and immediately become worms. The worms move through the body and enter the liver, where they breed and lay eggs. If enough eggs hatch the sufferer develops internal bleeding. The cycle continues when the parasite re-enters the water via sewage. Researchers are still investigating schistosomiasis; by studying its ancient patterns they hope to find ways of reducing the infections suffered today.

BOX 2 FURTHER INFORMATION

Find out more about research on mummies, as well as what else can be seen at The Manchester Museum at <http://www.museum.man.ac.uk/home/index.htm>

Log on to <http://www.pbs.org/wnet/pharaohs> and hit *Secrets and Science*.

There are video clips of CT scans of mummies at <http://www.gustavianum.uu.se/ums/>

Borrow *Conversations with Mummies: New Light on the Ancient Egyptians*, by Rosalie David and Rick Archibold, from the library. This richly illustrated book shows how modern biomedical technology has been used to explore the lives of ancient people from every walk of life — from pharaohs to labourers.