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The ROM / UWO Mummy Project: A Microcosm of Progress in Mummy Research

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Introduction

The beginnings of the Royal Ontario Museum can be traced back to the excavations with the beginning of a collaboration of a大胆

• we hope to use these studies to form the basis of a collaborative mummy database, based on GE’s internet based Picture Archive Communication System

• This would allow us to identify the wood used in the unnumbered individuals as well as other artifacts enclosed in wrappings or coffins.

• The three mummies chosen for this project are ROM 910.5.3, a 3rd dynasty individual with a coffin indicating that it belonged to a low-ranking priest known as a ‘wab priest’. The second is ROM 910.1, a Roman period infant with an exquisite painted textile. The third is an uncontexted infant mummy. These mummies were CT scanned at London Health Sciences Centre on 3 separate occasions during 2007/2008. In addition, digital x-rays were taken of the infant mummies.

Nakht

Peter Lewin oversaw 20+ years of research focused on this collection of mummies and accomplished several “firsts” for mummy studies. In 1974 he led the autopsy of Nakht, a mummy with a particularly fine collection that belonged to the XXI Dynasty. The undertaking was inspired by the autopsy of PUM –II (Lewin 1977), performed in 1973 by A. Cockburn and the Paleopathology Association (Cockburn et al. 1978). Nakht’s autopsy brought together a diverse and talented group of medical and Egyptological researchers who found that Nakht was an adolescent male who had suffered from episodes of childhood stress, had granite particles in his lungs, schistosomiasis and tape worm cysts in several organs, and a corroded pelvis of the liver, probably secondary to the parasite infestation. They also noted that he had been laid out embalming without the use of natron, all his organs (including his brain) were in situ, and the body had apparently been wrapped before it had fully desiccated. These results shed new light on the life and afterlife of a poor weaver who had served in the temple of User-khu-re (see Hart et al. 1977a and accompanying papers).

Firsts

Lewin & Harwood Nash (1977) were the first researchers to use the then new technology of Computerized Axial Tomography (CT) to look at the internal structure of mumified tissue when they analyzed Nakht’s brain. At that time, CT body scanners had only been installed in hospitals in North America for about 2 years. The XXI Dynasty Mummy Djedmaatesankh, was the first whole mummy to be scanned, once in 1977 (Lewin 1978), then again in 1994 at the Hospital for Sick Children (Melcher et al. 1997). Later, in 1997, a CT scan of the mummy 910.5.3 at the London Health Sciences Centre on 3 separate occasions during 2007/2008. In addition, digital x-rays were taken of the infant mummies.

Current Research

In 2007, mummy research on ROM mummies moved into a new phase, with the beginning of a collaborative project involving the ROM and The University of Western Ontario. The purpose of the new project is to build on the work already done by including 3 new mummies, to construct osteobiographies for these 3 individuals and to bring new developments in imaging physics to bear on mummy studies. Some of the preliminary results of the current research project and to outline directions for future work.

ROM 910.5.3

Our first surprise was that the mummy 910.5.3 was not a male, as the coffin text would suggest; instead, “he” is a she! Like Nakht, her embalming was not of high quality. She was eviscerated through her perineum, all internal organs as far as the tongue were removed and her brain was left in place. The retraction of the skin from the wrappings indicated that she had not been fully desiccated when she was wrapped. There is extensive damage to the tissue around the throat and lower back, accompanied by evidence for insect activity. No amulets or other offerings were noted in her wrappings.

This pattern of preparation of the body is roughly consistent with Herodotus’ description of methods performed for those who wished to avoid expense or were of “poorer classes”. In his description, cedar oil (or similar corrosive fluid) was introduced into the abdomen to dissolve and wash out the organs (see Rawlinson 1897). However, he also suggested that these mummies were then treated in natron for 70 days, which does not appear to have been the case here. We estimated the age of this individual to be in her 20s, as her 3rd molars had erupted and are in position to be in occlusion, the basi-sphenoid suture and medullary cavities are fused and her skeleton does not demonstrate evidence of advanced wear and tear. The only pathological condition noted was the impaction of her lower 3rd molars and unilateral sacro-iliitis.

We segmented the skull from the CT scans, created a 3D print and a facial reconstruction was undertaken by Victoria Lywood.

The Babies

Both the infants were determined to be very young. The unnumbered individual was approximately 9 months old, while 910.13 was less than 6 months old. The internal organs of both mummies appear to have been removed. The bones of 910.13 are out of order, as far as the tongue was removed and the brain was left in place. The retraction of the skin from the wrappings indicated that she had not been fully desiccated when she was wrapped. There is extensive damage to the tissue around the throat and lower back, accompanied by evidence for insect activity. No amulets or other offerings were noted in her wrappings.

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Ongoing Research

What began 30+ years ago as a collaborative, multidisciplinary project focused on a mummy autopsy has now shifted to be a collaborative, multidisciplinary project focused on minimally invasive methods of obtaining information from these valuable specimens. As such, this project represents the development of the field of mummy studies, and the move toward the use of techniques designed to maximize the recovery of information while minimizing the impact on the mummies, in order to preserve them for future generations.

Ongoing projects include:

• Isotopic analysis of a small sample of exsolved hair of 910.5.3: d13C = -20.3, d14N = 14.6. These figures are consistent with a C diet (wheat, barley, fruits, vegetables) and with an origin in a Nile Valley site.

• A magnetic resonance scan of Nakht’s brain. Nakht’s brain did not desiccate completely, rather it is saponified. This MR scan with spectroscopic analysis of an Egyptian mummy’s brain is another first (Karlik et al. 2007).

• Virtual animation – we have prepared an animation based on the CT scan data of 910.5.3. The animation will feature in a video, as part of the Canadian Museum of Civilization’s exhibit “Tomb of Eternity: The Afterlife in Ancient Egypt” (Dec. 19, 2008 – Aug. 16, 2009, Ottawa, Canada).

• Dual energy scans – we are working to apply methods developed in medical and small animal imaging to automate segmentation on the base of repeat scans at different energy levels. This technique has great promise for mummy studies in general (Friedman et al. 2009).

• Identification of wood – we are investigating the possibility of identifying wood at the species level on the basis of its CT characteristics. This would allow us to identify the wood used in the unnumbered individuals as well as other artifacts enclosed in wrappings or coffins.

• Optimization of image quality by minimizing signal to noise ratios.

• We hope to use these studies to form the basis of a collaborative mummy database, based on GE’s internet based Picture Archive Communication System (application in to CFI).
Citation


Literature Cited


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