3-2009

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

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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 this work are presented here.

The three mummies chosen for this project are ROM 910.5.3, a XXIst dynasty individual with a coffin indicating that it belonged to a lower-ranking priest known as a “web priest.” The second is ROM 910.13, 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.

The “Infant”

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, accompanied by evidence for insect activity. 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 basicranial suture and medial clavicles 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-ilitis.

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, accompanied by evidence for insect activity. 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 basicranial suture and medial clavicles 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-ilitis.

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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 exhaled hair of 910.5.3: d13C = -20.3, d14N = 14.6. These figures are consistent with a C3 diet (wheat, barley, fruits, vegetables) and with an origin in a Nile Valley site.

• 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 Afterlives 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 basis 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).

see handout for references and acknowledgements

Nelson, A.J.1,2, Chhem, R.,-L, Cunningham, I.A.1,3, Friedman, S.N.1,2, Garvin, G., Gibson, G., Granton, P.V.1,2, Holdsworth, D.W., Holowka, S., Longstaffe, F., Lywood, V., Nguyen, N., Shaw, R., Trumpour, M., Wade, A.D., White, C.D.1
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Dual energy segmentation

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 mummmified tissue when they analyzed Nakht’s brain. At that time, CT body scanners had only been in hospitals in North America for about 2 years. The XXIst Dynasty Mummy Djedmaatesankh, was the first whole mummy to be scanned, once in 1977 (Lewin 1978), then again in 1994 (Lewin & Harwood Nash 1977a and accompanying papers). These results shed new light on the life and afterlife of a poor man, who had apparently been wrapped before it had fully desiccated. The results also addressed the question of whether the mummy was violently disturbed when its 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 1890). 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 basicranial suture and medial clavicles 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-ilitis.

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

The “Birthes”

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, accompanied by evidence for insect activity. 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 basicranial suture and medial clavicles 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-ilitis.

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Nakht

Peter Lewin oversaw 20+ years of research focused on this collection of mummies and has uncovered several “firsts” for mummy studies. In 1974 he led the autopsy of Nakht, a mummy with a particularly fine coffin that was related to the XXIst dynasty. This undertaking was inspired by the autopsy of PUM –II (Lewin 1977), performed in 1973 by A. Cockburn and the Paleopathology Association (Cockburn et al. 1998).

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, schistosome and tapeworm cysts in several organs, a hemorrhage on the liver; probably secondary to the parasitic infestation. They also noted that he had been given a large 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-n-re (see Hart et al. 1977a and accompanying papers).

Introduction

The beginnings of the Royal Ontario Museum can be traced back to the excavations and collections of a dynamic trio. Dick Currie, a staff member of the Egyptian Exploration Fund in the early 1900s. Currey excavated with Sir Flinders Petrie at Abydos and with Edouard Naville at Deir el Bahari. With the assistance of Robert Mond and others, Currey amassed a rich and diverse collection that became the basis for the ROM, which opened its doors in 1914. Part of that collection included several Egyptian mummies (Currey 1971).

The Egyptological holdings at the ROM include eight mummies: one dating to the Predynastic Period, five from the Pharaonic Period, one from the Roman Period and one without context. Two of these, Nakht and Djedmaatesankh, have been well studied by Peter Lewin and associates, while three more are the subjects of the current investigation. The objectives of this poster are to review the work and accomplishments of the previous research, to describe the preliminary results of the current research project and to outline directions for future work.

The Royal Ontario Museum, a microcosm of progress in mummy research

The ROM / UWO Mummy Project

A microcosm of progress in mummy research

The Royal Ontario Museum

Musee royal de l’Ontario

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Citation


Literature Cited


Acknowledgements

Current research:
Core funding for this project was provided by Dr. Brian Timney (Dean of Social Science, University of Western Ontario), Dr. Carol Herbert (Schulich School of Medicine, UWO) and Dr. Ted Hewitt, Vice-President Research (UWO). Scan time was generously donated by the London Health Sciences Centre. The Northern Casket Company (Lindsay, ON) kindly provided the shipping crates for the mummies. Additional funds were provided by the lead author’s Faculty Scholar Grant and from the Department of Anthropology’s mummy outreach program.

In addition, we would like to acknowledge:
- from the Royal Ontario Museum: Cathy Stewart and the staff of the conservation department, Nur Bahal and Krzysztof Grzymski.
- from the London Health Sciences Centre: Gordon Allan, Douglas Brunton, Mary Castle, Eadie Deaville, Paul Howarth, Sheila MacDonald, Barb Mylemans, C. Romagnoli, Barb Smith and Trevor Szekeres.
- from UWO – Tim Wilson.
- from John Abbott College – M. Ewanchyna.
- the Department of Anthropology, UWO.