B102 Pollen Evidence of Diet and Environment From a Nebraska Mummy

Marina Milanello do Amaral, MS, Instituto de Criminalística, Superintendência de Polícia Técnico-Científica, 233 Jovina de Carvalho Dau, Taboão da Serra 68583, BRAZIL; Nicole A. Wall, MFS, University of Nebraska-Lincoln, School of Natural Resources, 804 Hardin Hall, Lincon, NE 68583; and Karl J. Reinhard, PhD, School of Natural Resources, 719 Hardin Hall, Lincoln, NE 68583-0987*

After attending this presentation, attendees will understand how pollen and microfossil evidence can be recovered from a mummy. Attendees will learn how control samples can be used to sort out contamination of internal mummy contents through quantification and statistical analysis.

This presentation will impact the forensic science community by showing how the attention to quantification of pollen remains can provide a foundation for understanding the influence of ambient pollen contamination in recovery of pollen during the autopsy process. In this way, victim diet and activities within a region is able to be discerned.

Palynological investigation of archaeological mummies established methods of environmental and dietary study.[1,2] These methods have been applied to mummies in criminal and Missing in Action (MIA) situations.

The case of a mummified homicide victim in Nebraska provided an opportunity to apply these methods to actual forensic material. The individual was thoroughly desiccated in such a manner that the thorax was essentially hollow. Control samples from the area in which the corpse was located provided an idea of the normal ambient pollen of the crime scene. Samples from the victim's sacrum as well as a section of intestine were analyzed. Another internal control sample of powder was recovered from the area inferior to the diaphragm. Finally, pollen was washed from the victim's hair. An section of intestine was rehydrated and microfossils were recovered from the inside of the section.

Quantification was based on the Lycopodium method based on adding a known number of spores to a known amount of sample.[1] The number of pollen grains per gram ranged from 980 to 1,680. This provided a quantitative basis for analysis.

The control samples were dominated by wind-pollinated, environmental types. The internal intestine sample was dominated by dietary pollen. The sacrum sample was also dominated by dietary types, with some environmental types. The internal powder of the corpse exhibited a dominance of environmental types which suggests that contaminant pollen entered the corpse at the time of autopsy. It is suspected that the vibration of the Stryker autopsy saw caused some external pollen grains to fall into the corpse. The intestinal section method, proven important in archaeological investigations of mummies, can be directly transferred to forensic investigations.

Pollen consistent with the genus Brassica (broccoli type) was most common with 980 grains per milliliter of the final material recovered from the sample. Traces of oak, hackberry, and clover were present. Pollen was more abundant in the sacrum sample. Brassica-type was most common and approximately 1,680 pollen grains were present per gram. Other dietary types included maize (200 grains per gram) and prickly pear cactus (80 grains per gram). A variety of environmental types including goosefoot, ragweed, juniper, dandelion, grass, pine, cottonwood, oak, and cattail were also encountered. All of these types grew in the vicinity of the victim's house.

The powder from the diaphragm area contained only air-borne ambient pollen consistent with the pollen from control samples. The victim lay on a rug which was heavily contaminated by air-borne pollen leading to the transfer of pollen from the rug to the victim's chest and abdomen. This transfer provided a source of contaminant pollen which apparently entered the hollow thorax during the autopsy, probably related to the vibration of a Stryker autopsy saw.

A second case involved an analysis to help determine the identity of an MIA case from the Korean War. The goal of this analysis was to determine the decedent's diet to assess his military identity. The analysis of a coprolite recovered from the individual revealed a diet completely composed of indigenous Korean plant foods. Comparison with Korean mummies that are currently under analysis in the laboratory confirmed that the MIA diet and medicine pollen is completely consistent with Korean culinary traditions that persisted for hundreds of years. The individual components of the diet are consistent with Korean food and medicinal teas. It appeared that this was the body of an indigenous individual; however, the remains were ultimately identified as those of a United States serviceman. Thus, the decedent was subsisting on indigenous foods in the days immediately before he was killed. In such cases, adaptation of military personnel to indigenous foods obscures cultural identity.

References:

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2. Lee S, Lee E, In K, Yoo S, Woo O, Rhee Y, Cho H, Kim K, Shin B, Kim H. 2008. Paleopathological analysis on bronchial washing fluid from a mummy: The "General Hak-Bong" mummy, Korea. *Basic Appl Pathol* 1:164–167.

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