**INTRODUCTION**

The Basketmakers were groups of sedentary agriculturists in the American Southwest dating from 1500 B.C. to A.D. 500. They were the basket-making antecedents to the Ancestral Puebloans (formally known as the Anasazi), who are well known for their pottery and cliff dwellings at places like Mesa Verde. Less is known about the Basketmaker populations, which occupied a large geographical area with varying climates and available resources. Figure 3. Previous research has focused on their basketry, pottery, diet, and agriculture, but few studies have addressed their skeletal biology. In this regard, Harvard University’s Peabody Museum of Archaeology and Ethnology and the University of Pennsylvania Museum of Archaeology and Anthropology (the Pea Museum) have become important in the presence of mummified remains identified as “Basketmakers” in their collections (Figures 2-8).

**CASE STUDY #1: “WOMAN & CHILD”**

Archival records state that this individual is a possible female Basketmaker mummy found in the Hance and Colorado River Canyons, Utah1 (Figures 7–9). Preserved external breast tissue and genitalia confirm identification as female. Hair, eyebrows, and eyelashes are present. Her hair is dark brown in color and the hair of the child is reddish-brown (Figure 9). The unusual red shade likely indicates protein-calorie malnutrition, since this condition results in dyspigmentation and textural changes in hair2.

CT scan data and 3D modeling of her skeleton show developing dentition and unfused epiphyses, indicating an age of about 14 years (Figures 12-18). Gross examination noted abnormally enlarged breast tissue and distended abdominal tissues. Typically, mummified tissues of the abdomen recede inward during desiccation (Figure 14), but her abdominal tissues do not. 3D modeling also shows a markedly expanded ribcage (Compare Figures 12 and 13). Anatomical examination of preserved tissue confirmed an extended body and a sunken abdomen. These features suggest late stage pregnancy or recent birth.

CT scans show no evidence of a fetus within her uterus, however, the distance between her pubic bones is 5.8 mm (Figure 18). The normal distance between the pubic bone is between 4 to 6 mm. During pregnancy, the biomechanical changes relax, which can increase the distance to 6 to 8 mm in mature adults, and does not return to normal until 4 to 12 weeks after birth3. The distance between her pubic bones, lack of fetal remains, and other physical evidence suggest that she is postpartum.

**CASE STUDY #2: “PROBABLE FEMALE”**

Archival records state that this individual is a possible female Basketmaker mummy found in the Hance and Colorado River Canyons, Utah1 (Figures 7–9). Preserved external breast tissue and genitalia confirm identification as female. Hair, eyebrows, and eyelashes are present. Her hair is dark brown in color and the hair of the child is reddish-brown (Figure 9). The unusual red shade likely indicates protein-calorie malnutrition, since this condition results in dyspigmentation and textural changes in hair2.

Computed Tomography (CT) technology allows non-invasive analysis of mummified remains and was critical for the collection of biological data. CT scans were obtained from the Open Research Scan Archive at Penn. 3D models of the remains were created using Mimics Innovation Suite. Featured below are two case studies of these mummified individuals from the Penn Museum that were analyzed using gross observation, CT, and 3D modeling. These demonstrate how physical examination and CT scan data can be utilized to conduct initial examination, refine archival records, and guide more in-depth future analyses.

**CONCLUSIONS**

Prior to this study, archival information provided vague and sometimes incorrect information of the human remains identified as Basketmaker mummies at the Pea Museum. Gross examination of the skeletal remains, accompanied by CT analysis and 3D modeling has corrected and refined the biological data as demonstrated in the two case studies detailed above. The “Woman & Child” have both been correctly identified as an adult male and 18-24 month old boy. The “Probable Female” has been identified as a teenage female whose death was likely linked to childbirth. These added insights provide a guide for future analyses. Genetic relationships between the man and child may be pursued through genetic testing of tissues. Chemical analyses could provide dietary data to explore related issues of malnutrition and seasonal migration patterns. Skeletal variation could be identified to distinguish Western from Eastern Basketmakers. These two case studies have added to the knowledge of the ancesitoch Baskermakers of the American Southwest and provide a foundation for future studies of mummified remains.

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