Forensic Science Methods Used in Analysis of Excavations in Çatalhöyük, Turkey

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Abstract
This paper will explore how forensic methodology helps archaeologists analyze excavation sites, specifically in Çatalhöyük, Turkey. Since the examination of an excavation site is similar to the examination of a crime scene, forensic science methods are valuable tools in determining past human lifestyles and historical occurrences. Like forensic scientists, archaeologists work with other scientific experts in order to support or deny hypotheses about artifacts and burials. For instance, biology, chemistry, and physical anthropology are key sciences that enable archaeologists to design theories on how ancient people lived out their daily lives; these sciences are especially useful when written records from ancient cultures were not left behind—such as is the case with Çatalhöyük.

Keywords
Çatalhöyük (Turkey), forensic methodology, burials, anthropology
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Introduction

Dating back to 7,400 BC., Çatalhöyük is one of the oldest archaeological sites ever to be discovered. British archaeologist, James Mellaart, discovered the Çatalhöyük site in 1952, but its excavation did not begin until 1961. In order to understand how this society lived, site archaeologists must possess a concrete understanding of the scientific method. Understanding the scientific method provides archeologists with a specific skillset needed to collect and test site samples that will aide their task of discovering how ancient communities lived. Essentially, this process involves observing a piece of the past, making a hypothesis about the piece, experimenting with the piece in order to collect data for interpretation, analyzing the data, and finally, forming a conclusion. While various artifacts found in archaeological sites can be analyzed to understand the behaviors and the daily life of its past inhabitants, no evidence is more promising as a source of vital historical information than that of what can be discovered in the burial grounds or graves of the Çatalhöyük or any ancient society. Consequently, the purpose of this paper is to discuss how forensic science methods used in reconstructing a crime scene can be equally utilized to reconstruct an archaeological site and provide essential insights into the habits and behaviors of ancient civilizations.

Literature Review

Forensic science consists of scientific techniques that are used to determine what transpired at a crime scene. However, forensic science techniques are not only for the sole benefit of ascertaining a criminal; they can also be used to determine what occurred at ancient archaeological sites. According to Elvidge (2017), forensic archaeologists are professionals who excavate graves and gather remains—this process can include the

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collection of hair, clothing, and miscellaneous biological or material possessions found in the grave, as well as an analysis of the color and state of the soil that concealed the remains. To prevent evidence from sustaining any damage, the excavation is carefully facilitated with the aid of precise tools. Collaborations are then formed with forensic biologists to analyze DNA profiles of human remains in order to determine which specimens were related to each other; they also examine the surrounding soil for remnants of ancient agricultural material that may help them determine the type of food the Çatalhöyük consumed. The archaeologists also work with forensic chemists in order to carbon date artifacts. Using isotopes found in the human remains, forensic chemists can also identify human diets. Clearly, small trace analysis complements the investigation of larger elements from archaeological sites, which in the case of the Çatalhöyük, mainly consists of the bodies found in ancient graves. Since ancient remains are the prime source of evidence found in Çatalhöyük’s excavation site, a forensic anthropologist can be brought in to identify the sex, age, and any significant physical trauma to the bones that the body may have experienced ante mortem.

Forensic archaeology is considered a subsection of the study of forensic anthropology; if either the forensic archaeologist or anthropologist has an understanding of forensic taphonomy, they are capable of determining which environmental changes surrounded the body postmortem, similar to the way the body affects the plant life while in the soil.

**Biological Traces of the Past**

Forensic biology methods are used to identify who or what was at an ancient scene. Such methods were used on both the charred grains found at the Çatalhöyük archaeological site,
and a potential plant that it might be related to today. According to Bilgic, Hakki, Pandey, Khan, and Akkaya (2016), seeds of ancient wheat used by the Çatalhöyük to grow crops were found well-preserved in charred grains. Researchers know that “even a tiny DNA fragment can be used to genetically identify different wheat species, thus allowing the stages of wheat domestication to be presented in dimensions of time and space” (Bilgic, et al. 2016, p. 2). Therefore, the evolutionary process of how the wheat grew in ancient times can be determined and compared to the growth process of present day wheat species. After using Polymerase Chain Reaction (PCR) methods on the grains, it was discovered that the wheat from Çatalhöyük shared similarities with hulled wheat from Europe during the Bronze Age. This was unexpected, since no record of that wheat growing was previously found. Bilgic and his colleagues thus believed that the wheat had grown randomly, or that the wheat had an evolutionary phase that was similar to the wheat grown during the Bronze Age in Europe (Bilgic et al. 2016).

Forensic dentists and forensic anthropologists can also analyze the people of Çatalhöyük’s diet. Boz’s research analyzes the teeth found at Çatalhöyük and shows much chipping—this is an indicator that they must have eaten large amounts of hard foods such as nuts and wild fruits, or that they possibly chewed on bones (Boz 2005). Females also showed more tooth decay (65.6%) than males (34.3%), which is caused from natural sugars in foods or drinks reacting with the plaque on their teeth. Moreover, their oral hygiene was quite poor. This data mainly consists of adults, implying that adults had a varied diet that could lead to more tooth decay and chipping.

Biological science can reveal a great deal about what ancient people ate, thereby illustrating a helpful picture of what
past nutrition habits were like. In the case of Çatalhöyük, it is evident that the grains they ate held a similar composition to a known wheat found in Europe, and according to their respective levels of tooth decay, females ingested more natural sugars than males. However, despite these reasonable hypotheses, ancient patterns of food consumption are still missing pieces of the puzzle. These informational gaps present a number of unanswered questions and leave scientists with a collection of insufficient data. For instance, Boz's research necessitates more information on Çatalhöyük children and an in-depth explanation is needed to explicate how the wheat from the ancient Çatalhöyük civilization transformed into the current wheat that grows there today.

**Bone Chemistry Analysis**

Forensic chemistry methods can also be applied to the archaeological site of Çatalhöyük. Analysis of carbon and nitrogen isotopes in mineral ore of bones collected from collagen can be looked at to determine how frequently a person ate plants, meat, or dairy, if at all. Pearson, Haddow, Hillson, Knusel, Larsen, and Sadvari were able to collect data and form conclusions based on the analysis of remains found at Çatalhöyük. After they graphed the two data sets on separate scatter plots, they realized that once a child had been weaned off their mother’s milk, the nitrogen in their bones dropped (Pearson et al. 2015). Results showed that children rarely ate plants or meat, but a spike in the data suggests a significant increase in the consumption of meat for young adults between the ages of 20 and 29. Overall, this spike remains consistent throughout the remainder of adulthood for the Çatalhöyük population, despite a slight increase in the amount of plants eaten.
These findings can result in various conclusions, but the primary theory is that there is a tradition by the Çatalhöyük in which they increase their meat intake once they become young adults. This can be due to an increase in maturity, giving them the ability to hunt for their own food. The data also showed there was little difference between males and females in their carbon and nitrogen amounts, indicating that males and females had the same or similar eating habits and diets.

**Mortuary Investigation**

Forensic anthropology involves the study of human remains, and for forensic anthropologists studying the people of Çatalhöyük, there were certainly odd patterns to be discovered in the human remains and graves of the Çatalhöyük people. According to Pilloud’s literature reassessment of vulture excarnation, her paper gathers multiple resources that believe the common practice of the Çatalhöyük people would be to first leave the deceased on top of their house in order to attract vultures that would remove the flesh from the decedent’s bones (Pilloud 2016). Researchers can confirm that humans were not physically responsible for the cuts or slashes found on ancient corpses since the tool marks or indentations on the preserved flesh do not match that of known ancient tools when trying to reproduce the same marks on present day cadavers. There were, however, consistencies with how vultures clean the flesh off of carcasses. Furthermore, there are vultures in Çatalhöyük and art that depicts vultures taking away parts of bodies for consumption, which is consistent with the theory that vultures were used to deflesh the bodies to the bone. Additional burial practices, as discussed by Boz and Hager (2013), include the people of Çatalhöyük burying their tightly bound dead under their houses. These burial grounds were also observed to have
disturbed dirt, which likely meant they would add more items to the burial site for some unknown burial practice. Nevertheless, these were not random practices, but rather purposeful actions. Interestingly, these were not the only odd burial practices discovered in Çatalhöyük.

Forensic archaeologists determined that the people of Çatalhöyük had specific burial rituals beyond putting their relatives' remains in the ground under their homes. According to Boz and Hager (2013), bodies were found with belongings, pigments, and bindings used to wrap their bodies in primarily crouching positions. This practice is similar to how many cultures dress up their dead and bury items associated with them in their graves. More often than not, bodies were buried under the family's home. When another relative died, previously buried relatives would be dug up to make room for incoming bodies and to reorganize the placement of older bodies so certain relatives could be placed together. Hence, it was apparent that the majority of graves were disturbed, though 52% of disturbed remains were found complete. Overall, only 42% of graves appeared completely undisturbed and were complete or nearly complete.

It is evident that a significant amount of planning and procedure went into Çatalhöyük burials, and this includes the determination of which side to bury a body on for each burial. For instance, left side burials were discovered in 41% of the graves, while right side burials were only seen in 29% of graves. In general, bodies were buried on their side a noteworthy 70% of the time. Moreover, the most common place for a burial was in the central room of the house where all of the cooking, sitting, and sleeping occurred. However, other rooms, such as side rooms that were used for storage, were also used as grave sites.
Though these burial practices may seem peculiar when compared to modern day burials, the Çatalhöyük took the time to carefully preserve and bury their deceased with items that overwhelmingly illustrate the level of respect this ancient culture had for their deceased loved ones.

Aside from the personal belongings and material possessions that were found in the Çatalhöyük graves, traces of phytolith plant remains were also uncovered. These remains were found on 58 bodies—on more children than adults—and could have been used to wind, wrap, or clothe the dead. Along with these bindings were pigments that colored the remains with red ochre and yellow ochre. The archaeologists also found brown residues—which were suspected to be left by wooden or leather goods—and black residues that could have resulted from a lifetime of smoke deposits on their lungs. Additionally, juveniles were found with beaded jewelry, while small children and babies were found in remnants of baskets that were possibly used to conceal their tiny bodies. Interestingly, one adult body was found clutching a plastered skull; this may be an indicator that the skull was of great importance to this individual, since no other bodies were found with a plastered skull, making the discovery of his remains quite unique.

In today's society, ochre or skulls are not used in burials. Instead, modern communities have different items of familiarity to connect with, such as a picture or a wedding ring. Theoretically, the living understands that items such as photos and jewelry are essentially all that is left of deceased loved one, so they use these remaining tangible items as a source of comfort that helps them maintain an ongoing connection to relatives that no longer walk the earth. It is clear that the people of Çatalhöyük cared for their deceased relatives by ensuring they had personal...
belongings in their graves, pigments to adorn their remains, and strategic burial practices in terms of body position and location. While binding bodies into a crouched position may be thought of as an odd practice for burying remains, it was clearly a valued practice with a purpose that has yet to be discovered. Modern day burials use coffins to bury the deceased in formal clothing; perhaps using decorations, colors, and bindings on the deceased was how the people of Çatalhöyük formally dressed their dead in an ultimate act of honor.

Conclusion

Indeed, Çatalhöyük is a mysterious civilization filled with incredible secrets that have only begun to be unearthed, yielding discoveries only made possible with the strategic use of various forensic sciences. Ultimately, these forensic techniques serve as a scientific taskforce, providing scientific theories about what the Çatalhöyük civilization may have been like. The incorporation of forensic sciences into archeological investigations is particularly vital, especially since archeologists have yet to find any written records beyond ancient artwork. Consequently, the way of life during the time of Çatalhöyük can only be theorized using evidentiary analysis of archaeologists' findings across several scientific platforms.

One platform, forensic archaeology, determines what the people of ancient civilizations valued in their lives, largely based on the items uncovered with them in their graves—these were treasured items that would offer them comfort in the afterlife or items that their relatives knew were important to them. Additionally, the science of forensic chemistry uses its platform to analyze human remains in an effort reveal what a typical ancient diet may have looked like for various members of the community. For the people of Çatalhöyük, a heavy increase in
the consumption of meat and dairy for those over the age of 20 speaks to the belief that 20 years of age was either the start of a hunting period or the age when a villager was entitled to more protein in their diet. Another platform, forensic biology, establishes how healthy a person was prior to their death and how similar, or not, ancient plants are to modern plants. While the analysis of plants may not seem as important as human analysis, the discovery of ancient grains and its connection to modern day grains is an exciting and important breakthrough that would not have been uncovered had it not been for forensic biology. Lastly, forensic dentistry draws conclusions about dental hygiene; for Çatalhöyük, this science hypothesizes that men consumed less natural sugars and therefore suffered less tooth decay than Çatalhöyük women. As a result of all these intricate forensic science techniques, scenes of the past can be recreated from archaeological sites, just as crime scenes can be recreated in the modern world.

References


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Jacqueline Ann Abad Santos is pursuing a bachelor's degree in Forensic Science with a concentration in Chemistry at San Jose State University and expects to in spring 2018. She is an active member in Forensic Science Students Club, the Anthropology Club, and a national member of Alpha Phi Sigma. She recently became a student member of the International Association for Identification. Currently, she helps the anthropology department conduct inventory and analysis on Native American burials. After graduating, she hopes to be hired in a crime scene investigation field, with a particular interest in fire investigation, but she does not mind ending up working in a forensic lab either. In her spare time, you can find her relaxing by watching crime shows that inspired her to decide on her major in the first place or by spending time with her closest of friends.