G149 Decomposition Pattern of Human Heads as Related to Insect Activity

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After attending this presentation, attendees will understand how human heads decompose with the involvement of insects and the different way in which insect activity proceeds depending on whether a head is covered or uncovered.

This presentation will impact the forensic science community by studying the process by which human heads decompose through the activity of insects.

Despite the important role of insect activity in the process of human decomposition, decomposition pattern by insect activity has been an issue of little interest among forensic anthropologists as well as forensic entomologists. The goal of this study is to examine and compare the decomposition patterns of human heads in covered and uncovered conditions through the evidence of insect activity. Heads, as opposed to full cadavers, were chosen for this study because of their forensic significance. Blow flies tend to lay eggs in the head region first, and according to an unpublished preliminary study, the head revealed the most consistent decomposition pattern compared to other body parts.

This research was conducted at the Anthropology Research Facility at the University of Tennessee, Knoxville. A total of 60 donated individuals (36 covered and 24 uncovered), donated between April 2011 and March 2012, were observed and photographed every day until no further taphonomic change was observed.

The results of this research indicate that covered heads were more likely to reach skeletonization than uncovered ones. Specifically, while about 78% (28 out of 36) of covered heads exposed more than half of cranial bones, only 25% (six out of 24) of uncovered heads reached the same degree of decomposition. This result is statistically significant (χ^2=16.33, p=.000). For both covered and uncovered heads, newly-hatched maggots tend to start feeding inside the orifices, among which the mouth and nose are most popular. Observations show that as the maggots grow, they move out of the holes, exposing bones around the T-zone of the face which connects eyes, nose, and mouth.

Further study observations demonstrate that when a head is covered by black plastic sheeting, maggots coming out from the mouth, nose, and eyes tend to congregate on relatively high portions of the head (i.e., the surface furthest from the ground). While some maggots travel on the outer skin, many pass through the narrow space between bones and inner skin, exiting through holes that they make. After conquering the high portion of the head, maggots consume soft tissues downwardly, resulting in the exposure of bones far from the ground first. Thus, for covered heads, any remaining, soft tissues closest to the ground are more likely to remain and dry out relative to tissues further from the ground.

Conversely, observations from the study show that when a head is not covered, maggots coming out from the holes tend to gather together toward the ground, which usually is a shaded area. Because they tend not to feed on the area directly under the sun, soft tissues facing the sky are likely to remain untouched and dry out. Thus, for uncovered heads, any remaining soft tissues close to the ground are more likely to be skeletonized, demonstrating an opposite pattern to that of the covered heads.

In summary, this research suggests that black plastic sheeting functions to block sunlight, which in turn provides maggots with a relatively comfortable environment to feed. Consequently, this particular environment significantly alters the decomposition pattern of heads. The information of this study is expected to be utilized during crime scene investigation when it is necessary to determine if a body was covered during the initial period of its decomposition and if the body was disturbed after its deposition.

Decomposition, Pattern, Insect Activity

 ** Presenting Author*