G150 PMI Estimation in Burned Remains: Real Cases

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After attending this presentation, attendees will have novel information about the applicability of the Forensic Entomology (FE) approach for the Minimum Time of Death (mPMI) estimation in burned remains.

This presentation will impact the forensic science community by validating the entomological approach in the PMI estimation in burned bodies. The two reported cases, and the experiments carried in the same area, statistically confirm the applicability of the entomological approach based on the fly developmental rate for the PMI estimation.

Different methods can be used in order to destroy or hide a body or make its identification very difficult: mutilation, burning, burying, acid dissolution, and concealment into concrete blocks, among others. Burying and burning are perhaps the most common ones. Fire is also used in cases of self-inflicted injuries and suicide or suicide-homicide, but burned remains can also be found in several accidents of different origin (cars, aircraft crash, industries, domestic, etc.), and cases of burnt bodies found in different locations such as open fields, cars, and indoors have been reported by several authors.

In burnt bodies, arthropod specimens may be the only tool useful in the estimation of the mPMI. In fact, burning prevents the use of the classical thanato-chronological techniques (e.g.: livor, rigor, algor mortis, (K^+)) for mPMI estimation.

This work deals with the description of five burned bodies found during the summer 2011, in Central Italy. The studied cases can be grouped in two categories: homicide/suicide (three people) and aircraft crash (two people).

In July 2011, a mother killed herself, her daughter, and her son by administering a drug and setting fire, using gasoline, to the car in which they were located. The last time they had been seen alive was 3:08 p.m. Fire brigades were alerted at 3:38 p.m. When forensic pathologists arrived on the scene, the bodies were completely burned and colonized by fly eggs. Most of the colonization in the mother's body was at the abdomen and inside the skull, fractured by the heat. During the autopsy, performed the day after, the larval mass in the mother's abdomen had a temperature of 35°C, despite the bodies being stored in a refrigerator.

Colonization in the daughter's body was less important than in the other bodies. There was only a mass in the skull and the larval mass temperature was 5°C. In the body of the son, a mass in the chest (temperature was 19°C) and another mass in the abdomen (24°C) were observed. *Lucilia sericata* and Sarcophaga sp. larvae were collected from these masses. It is assumed that the fly oviposition and larviposition occurred immediately after the fire had been extinguished and before the bodies were recovered (two to four hours).

An air crash occured at 7:07 p.m. in July 2011. During the inspection at 8:00 p.m., the air temperature was 25°C. On the ground near the fuselage of the aircraft, firemen collected the broken airplane clock indicating seven hours, seven minutes, and 40 seconds, so the precise time of the impact and of the death (7:07 p.m. 40 seconds) was known. Two people died during the crash. The first body was only partially charred and did not present any fly colonization; the second one was almost completely charred and did present a colonization (eggs) in the lungs, heart, and liver. The fly oviposition (*Lucilia sericata*) occurred immediately after the fire had been extinguished and before the bodies were recovered (two to four hours)

These cases demonstrate that, in burned remains, the composition and the arrivals of the first insect colonization waves (Calliphoridae, Muscidae, Sarcophagidae) are the same as in the case of "fresh" bodies. In addition, the aircraft crash case indicates a faster colonization of the burned body compare to the other. This supports the application of the entomological approach, based on the developmental rate, for PMI estimation.

PMI Estimation, Forensic Entomology, Fire

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