D58   Hanging by a Hair: Animal-Derived Trace Evidence in Criminal Investigations

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The goal of this presentation is to build awareness in the forensic community that animal-derived trace evidence can play a significant role in criminal investigation. Identification of individual animals with animal hairs, using DNA tools and databases existing today, can show a compelling link between a victim and a suspect.

Pets are ubiquitous and leave their biological traces everywhere. This presentation will impact the forensic community and/or humanity by raising awareness of the power of new methods for identification and hence broaden the tools for the investigation of crime scenes. Rather than presenting this talk in the DNA section, it is important that the first and second responders to a crime scene (crime scene teams and trace evidence examiners) hear about these cases firsthand.

Microscopic examination has long been the only tool for establishing a "match" for animal hairs found at crime scenes. DNA identification of hairs, using microsatellites and mitochondrial DNA, provides more precise identification and may be useful in linking a suspect to a victim or crime scene.

Animal hair from pets is a common finding in crime scene investigations. In the cases described, observant investigators collected animal hairs as evidence. Matching those hairs to the pet of the suspect or victim, however, required specialized analysis. The physical similarity of animal hairs, while useful, is often not conclusive. Hairs from the same dog or cat can vary depending on hair type (guard or fur hair) and body location. DNA analysis of animal hairs provides a more accurate means of identification and, using DNA information databases, provides an estimate of the significance of a DNA match. Like humans, animal hairs can be tested with species-specific microsatellites and mitochondrial analysis (Mt haplotyping). The following cases are examples of mitochondrial typing of animal hair trace evidence:

In 2002, 8-year-old Danielle van Dam was abducted from her home in San Diego. Her body was recovered days later in a remote area. The police suspected the van Dam's neighbor, David Westerfeld, and searched his home and motor home, where they thought Danielle was murdered. Among other important evidence, investigators collected short dog hairs on the carpet of the motor home and in the lint trap of Westerfeld's dryer. The hairs were a violet-hued gray, a color unique to the Weimeraner dog breed. The van Dam's owned a Weimeraner dog, and indicated that Danielle frequently cuddled with the dog before bedtime. A DNA match, using mitochondrial analysis, was found between the van Dam's dog and the hairs from the alleged crime scene. Although the mitochondrial haplotype was fairly common (9%), the findings did not exclude Westerfeld as a suspect and aided prosecutors in their case.

In 1987, 10-year-old Amy Schulz of Jefferson County, Illinois was abducted, brutally sexually assaulted, and murdered. A number of black dog hairs were recovered from Amy's clothing as well as a single human pubic hair. Cecil Sutherland, a resident in the town, was later arrested. Sutherland owned a black Labrador Retriever. The hair evidence could not be used, as the DNA techniques available at the time required other sample types. Sutherland was convicted of Amy's murder in 1989 but the conviction was overturned. In 2003, prosecutors re-opened the case and mitochondrial analysis was performed on the human hair and the dog hairs. The DNA from the human hair included Cecil Sutherland and the DNA from the dog hairs included his dog. In June 2004, Cecil Sutherland was convicted of first-degree murder a second time and requested the death penalty.

In crime between strangers or non-family members, such as abductions, the utility of animal hairs as evidence should be obvious. However, important animal-derived evidence may be found even in crimes between acquaintances or family members. In 2002, Andrew Rich pleaded guilty to voluntary manslaughter of a friend, John Helbe in Johnson County, Iowa. Rich had stolen an ammunition box from Helbe and, when found by police, it contained a single dog hair matching a dog owned by Helbe. Compelled to account for possessing his friend's ammunition box, he plea-bargained.

For years, trace evidence examiners have relied on the microscopic similarity of animal hairs to use them as evidence. DNA typing of hairs opens new possibilities for linking suspects to crime scenes or victims. Pets can be identified, occasionally with the precision provided by microsatellite testing. Although mitochondrial typing cannot be used as a unique identifier, a mitochondrial inclusion can be valuable in developing a case or as "another piece of the puzzle" at trial. Pets leave hair everywhere; it is up to investigators to evaluate its relevance and shape its significance with appropriate questions. Trace evidence examiners should assist their crime scene teams by raising awareness of this new evidence resource.

Animal Hair, Trace Evidence, DNA Typing