



B56 Trends of Trace DNA Profiles in Forensic Casework: A Broad Case Study

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Learning Overview: The goal of this presentation is to inform attendees about a case study of trace DNA samples across hundreds of forensic casework samples.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by informing attendees that this research seeks to better understand trace DNA as it pertains to actual forensic casework rather than experimental settings.

Detecting and analyzing trace (“touch”) DNA profiles has long been a challenge for forensic biologists. With the advent of more sensitive forensic Short Tandem Repeat (STR) amplification kits, a larger variety of sample types without identified bodily fluids can now be used as forensic evidence. However, analysis of trace samples often results in inadequate amounts of DNA or DNA that is degraded. Trace DNA samples can also result in complex mixtures that are difficult to interpret. Countless studies have been published by the forensic science community to better understand how trace DNA is deposited and transferred on a variety of surfaces. These past studies have typically focused on experimental conditions rather than on actual evidentiary samples collected from crime scenes.

This study’s purpose was to better understand the behavior of trace DNA evidence that has been observed in forensic casework. To achieve this, an in-depth study was conducted in which data was compiled and analyzed from over 600 trace DNA samples (more than 200 cases) from casework at the Utah Bureau of Forensic Services, comprising data that spans from 2014 to 2020. Metrics that were examined included evidence item type, small autosomal human DNA quantitation values, number of contributors in the sample (if that could be determined), and whether or not the sample yielded a comparable DNA profile. A comparable DNA profile obtained from the sample was ultimately what determined whether or not a sample “succeeded,” although this does not account for if the profile obtained was probative. The numerous types of evidence that were analyzed included ammunition, firearms, structures, vehicles, weapons, clothing, and a category of miscellaneous items. Clothing was also subcategorized based on whether the item was swabbed for the wearer’s DNA or for the profile of someone who had merely touched the garment. After coding and compiling the data, interesting trends were observed. The hope is that by better understanding the results and trends of trace DNA profiles in casework, crime laboratories can gain insight to better approach and prioritize different types of trace DNA evidence.

DNA, Trace, Case Study