

## **CRIME SCENE CULTURE: HOW INADVERTENT COLLECTION OF BACTERIA AFFECTS DNA PROFILING SUCCESS**

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Crime scene samples collected for DNA analysis are comprised of multiple biological materials. One often overlooked area is the impact that microbial materials, collected along with the samples at the crime scene, can have on the resulting DNA profile. Bacteria, fungi, and enzymes, such as DNases, can have a dramatic impact on the stability of a DNA sample possibly breaking it down before it ever reaches an analyst's bench for extraction and amplification.

This presentation will describe the studies performed on mock crime scene samples to study the specific effects of microbes and enzymes on collected samples. Biological fluids and touch samples were deposited on various potential crime scene surfaces. After deposition, the samples were left outside in the environment for a few days to simulate and stimulate normal bacteria, fungal, and enzymatic activity that can occur at a crime scene. The mock crime scene samples were then collected using the wet/dry swab method with a cotton swab and placed in a swab box. Real time and accelerated aging experiments were performed on the samples by placing them in various temperature and humidity conditions.

At selected time intervals, samples were removed and analyzed not only for DNA profiling success but also for enzymatic, bacterial, and fungal presence and activity. Bacterial activity was evaluated by incubating the collected samples in nutrient broth to observe turbidity along with inoculating nutrient agar plates to obtain single colony isolates. Massively Parallel Sequencing was utilized to determine the phylum, genus, and species of the bacteria. DNA profiling success was evaluated following the laboratory's standard operating procedures.

Utilizing the power of Massively Parallel Sequencing, hundreds of different species of bacteria were identified on the mock evidence samples. Approximately 10% of the identified species have previously been identified as capable of actively producing extracellular nucleases.

Co-collected microbes can have a significant impact on the resulting DNA profile. This study demonstrated significant degradation, observed by ski sloping and allelic dropout, of biological evidence can occur in a very short period when the sample is not optimally collected and stored. By understanding both the quantity and functionality of the microbes collected, Crime Scene and DNA Analysts can take proper steps to ensure the integrity of their evidence prior to analysis.