B179 DNA Testimony in the Past, Present, and Future

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After attending this presentation, attendees will be aware of various perspectives on the evolution of forensic DNA-related testimony, will realize what approaches are more effective for judges and juries, and will benefit from the opportunity of asking questions of the invited panel.

This presentation will impact the forensic science community by encouraging a dialogue between DNA experts and members of the legal system.

DNA fingerprinting, as it used to be known, was first applied to criminal cases in the late 1980s. Most notably, Dr. Alec Jeffreys used his technique in 1986 to exclude a 17-year-old boy as the perpetrator of two sexual assaults in the Leicestershire area of England and to later identify the true perpetrator, Colin Pitchfork. The first person convicted by DNA evidence in the United States was Tommy Lee Andrews, who was found guilty in 1987 in Orange County, FL. At the end of 1988, the Technical Working Group on DNA Analysis Methods (TWGDAM) held its first meeting to discuss the best approaches to implementing DNA analysis in crime laboratories, including quality control measures. This ultimately led to the Guidelines for a Quality Assurance Program for DNA Analysis in 1991 (updated in 1995). These guidelines have since evolved into the Quality Assurance Standards (QAS) required by the Federal Bureau of Investigation (FBI) for all forensic DNA laboratories that participate in the national DNA database system, Combined DNA Index System (CODIS). Due to the solid foundation provided by the QAS, DNA analytical techniques have successfully endured admissibility hearings and have been accepted in courts throughout the country over the last 30 years.

In those early days, most DNA testing was restricted to blood and semen. These types of stains yielded relatively straightforward Restriction Fragment Length Polymorphism (RFLP), and later Short Tandem Repeat (STR) Polymerase Chain Reaction (PCR), profiles. Mechanisms were established and promoted by TWGDAM and later the QAS to allow the objective comparison of evidence results to known references. If a match was determined, the statistical significance of the match was reported. In this way, DNA testimony differed from the more traditional police sciences of fingerprint analysis and firearms comparisons in which there were generally no qualifications made on putative identifications other than the expert's opinion.

As technology improved, the nature of biological evidence expanded beyond the rich sources of DNA to extremely trace level samples. This increased complexity of the resulting DNA profiles, their interpretation, and the statistical analysis applied to inclusions. Consequently, presenting DNA analysis to juries has shifted focus from describing the nature of DNA and its capacity to identify individuals to explaining how DNA can be transferred between objects and the intricacies of dropout and mixture ratios. Future technologies promise to provide additional

levels of information from biological material beyond today's STR profile or Single Nucleotide Polymorphism (SNP) haplotype, such as the type of cell, the age of the stain, the physical description, and even the age of the donor. How will this impact future testimony?

A two-hour block of time has been devoted to explore the past, present, and future of DNA testimony. The panel convened for this session will provide the perspective of the judge, the prosecutor, the defense attorney, the DNA expert, and the independent consultant on effective testimony techniques and will discuss the pitfalls to avoid in light of the emerging changes in DNA interpretation and statistics.

DNA, Testimony, Statistics