

## Forensics as a Career Choice

### MicrobeLibrary Article: *Focus on Microbiology Education*

Publication Date: 2/1/2002

#### Author

*Kris Cano Whitman*

United States Army Criminal Investigation Laboratory

I have been a Forensic Serologist for the past six years and have worked for two different crime laboratories both at a State and Federal level. This job is interesting, challenging, and rewarding in the sense that you are able to apply science to matters of the law. The basic requirements for the position are a bachelor's degree in a natural science such as biology or chemistry and coursework in biochemistry, molecular biology, genetics, and statistics. In addition to a college degree, there is extensive on-the-job training that can last up to a year. The training usually consists of extensive reading of pertinent literature, practical exercises, and moot court proceedings. Once the proper training is completed, a supervised casework phase is implemented to ensure competency prior to conducting independent casework. Employment opportunities can be found in state and local governments or federal institutions such as the Federal Bureau of Investigation (FBI) (<http://www.fbi.gov>).

Forensic science is a diverse science in which many aspects of biology, chemistry, and physics are utilized to solve crimes. The discipline of forensic science that is founded on the principles of biology is the exciting field of forensic serology. Forensic serology is defined as the identification of biological fluids such as blood, semen, and saliva on articles of evidence recovered from crime scenes. These biological stains, once identified, can be analyzed by DNA testing to determine if an individual is included or excluded as a source of the biological stain.

The field of forensic serology focuses on crimes of violence such as homicides, attempted murders, sexual assaults, and burglaries. These types of crimes can result in biological stains being left at the scene and this evidence is collected and submitted to the crime laboratory for analysis. Simple chemical color tests and microscopic examinations can be used to identify the biological stains. Once a stain has been identified, a small sample is removed for DNA analysis.

The type of DNA analysis currently used is called short tandem repeat (STR) analysis. In this procedure, small segments of the DNA molecule are targeted and analyzed. Only a small amount of sample is required for analysis since the method is very sensitive. The analysis involves first extracting the stain using various chemicals that allow the DNA to be released from the nuclei of cells in the stain. Then the amount of DNA present in the sample is determined and the DNA segments of interest are amplified. Since the DNA molecule can be a billion base pairs in length, smaller segments such as 100 to 200 base pairs are isolated for the analysis. These segments are isolated from the noncoding regions of the DNA and fluorescent tags are attached and used for visualization. The third step of the process is to separate the fragments by electrophoresis either through a gel or capillary medium. This separates the fragments based on their size. Fluorescence detection is then used to visualize the fragments as peaks. The peaks produced by the DNA in stain are compared to the peaks of reference samples for individuals who might be the source of the stain. Statistical analysis is then conducted to determine how common or rare a profile is in certain population groups.

As one can see, the bulk of the scientific analysis lies in the DNA and STR analysis of the biological samples. When the scientific analysis is completed the scientist may be called to testify in criminal court proceedings as an expert witness to the analysis conducted in the laboratory. Each case or crime is

different, and the amount and type of evidence the perpetrator leaves behind can vary. The sensitivity of the DNA analysis allows for DNA typing from cigarette butts, hair, skin cells, and fingernail scrapings.

The case and work variety the forensic serologist encounters challenges the scientist in many ways. Sometimes the challenge is finding the stain or even in deciphering the number of contributors in a mixed sample. Since the analysis is so sensitive, multiple contributors can be identified in a single stain. The limitations of the science are the proper collection of the evidence and maintaining the integrity of the evidence from the crime scene through the crime laboratory. The forensic serologist must keep abreast of current literature in the field in order to better meet the challenge of courtroom testimony.

Forensic serology is a field of science that has become more popular in recent years due to some high profile cases and reality-based television programs. The field is also constantly trying to improve the current technology so more and more crimes can be solved. Old cases that preceded DNA analysis are now being reinvestigated. To be a good candidate for this field one must be a good scientist with strong laboratory skills and also an effective communicator so one can relay to a jury the significance of the scientific analysis.