1. INTRODUCTION

In the forensic community, serology and DNA analyses are closely related. In fact, in many laboratories they are included within the same personnel section. In the forensic crime laboratory, “serology analysis” refers to the screening of evidence for bodily fluids, whereas “DNA analysis” refers to the efforts to individualize bodily fluids to a specific person. In most cases, bodily fluid identification is performed on evidentiary items before DNA analysis is attempted. Depending on the qualifications of laboratory personnel, analysts can be trained to perform either serology or DNA analysis or can be trained in both disciplines. Although serology procedures have been employed for most of the 20th century and the techniques have essentially remained unchanged, DNA has emerged in the forensic realm within the last two decades and its applications and technology are continuously developing.

2. TYPES OF EVIDENCE EXAMINED

The types of evidence submitted to crime laboratories for serology/DNA analysis are those items on which bodily fluids are thought to be present. A large majority of DNA/serology cases involve sexual assaults. Evidence from these types of cases commonly includes sexual assault kits, complainant clothing, bedding, and sometimes suspect clothing. Other common case submissions include potential blood evidence from homicides, aggravated assaults, and burglaries. Items commonly submitted for blood testing include swabbings from crime scenes, clothing, weapons, or any number of other items that may
possess bloodstains. If an item is small it can be submitted to the laboratory in its entirety. For larger items, stains can either be collected onto a sterile cotton swab or a cutting from the item can be taken for submission.

It is also possible to collect items that have been in contact with an individual’s mouth, e.g., cigarette butts, drinking cans, cups, bottles, gum, candy, toothbrushes, or ski masks. These items usually provide enough DNA for a profile to be established. Objects that have been touched or handled, e.g., a steering wheel, gun, phone, or even a fingerprint may also contain biological evidence that can be collected for analysis, but may not always produce a DNA profile. Generally, all these pieces of evidence do not contain a substantial amount of biological material and are processed for DNA without going through any type of serological screening to maximize the amount of sample available for DNA testing.

Cases involving kinship determination do not require serology screening and can also be sent immediately for DNA analysis. Most often, DNA profile comparisons to determine kinship are used in cases of criminal paternity, child abandonment, or identification of remains. All of these cases rely on the comparison of known DNA profiles from individuals to determine whether two people are related, as opposed to the comparison of evidence to a known profile to determine the source of the biological fluid on a piece of evidence.

Reference samples from known individuals are used for kinship determination and also for comparison to evidentiary samples. Typically, blood or saliva is collected from a living individual to serve as a reference sample. Blood is collected intravenously and stored in a purple or lavender top blood tube, which contains an additive to prevent DNA from becoming degraded. The blood is then placed onto a filter paper card, dried, and stored. Blood samples dried in this manner are stable for many years even at room temperature. Saliva can be collected either by chewing sterile gauze, by depositing saliva onto a collection card, or by swabbing the inside of a person’s cheeks (buccal swabs) to collect epithelial cells. Pulled hairs can also be used as a reference sample, but are not as abundant a source of DNA and, therefore, are not preferred. Reference samples can also be collected from deceased individuals in the form of blood, tissue samples, or bone samples depending on the state of decomposition of the remains.

3. **PLANNING THE EXAMINATION**

The real challenge in evidence screening is determining which items of evidence should be processed and the most effective way in which to process them. In general, probative samples are those in which a transfer of bodily fluids,