B65 Can Trace Evidence be Individualized? A Review of the Basic Principles of Individualization and Identification

Eric Stauffer, MS, 1222 Jefferson Drive, Atlanta, GA 30350*

After attending this presentation, attendees will learn the fundamental principles of individualization and identification of different types of (trace) evidence in forensic sciences and the process leading to the individualization of evidence.

This presentation will impact the forensic community and/or humanity by assisting every attendee to become current in their knowledge of the fundamental concepts behind the science of criminalistics, which will greatly help in interpreting evidence in the most scientific, proper, and efficient manner.

"Criminalistics is a science of individualization" is a famous quote from one of the great contributors to the field of criminalistics: Paul Kirk. Every forensic scientist is familiar with this statement, but are all forensic scientists really aware of the principles behind the individualization and identification of evidence in forensic sciences? When an object or a person is identified as the origin of a certain trace, it means that all other potential sources have been excluded; only this object or this person could have con- tributed to this trace.

The concept of class and individual characteristics should be known by every single forensic scientist. While class characteristics are shared among different objects/persons from a same group, individual character- istics are created in a random fashion and are particular to one and only one object/person. These different levels of characteristics are easily dis- cernable with fingerprints or shoeprints. But what about with paint, fibers, and glass, for example? What are the class and individual characteristics of such types of evidence? These types of trace evidence typically do not present individual characteristics; they only exhibit class characteristics, to which certain discrimination weight or value can be attributed.

There are two types of evidence in forensic sciences from an identifi- cation point of view: those leading to individualization (individual evi- dence) and those leading to group classification (class evidence). Fingerprints, shoeprints, earprints, and toolmarks are some examples of evidence that can be individualized. This means that it is possible to con- clude that only one source contributed to a particular trace. However, DNA, fibers, glass, and ignitable liquid residues cannot be individualized to this date. It is only possible to attribute the origin of the trace evidence to a certain group of objects. Thus, a match between a potential source and a trace evidence of the class type does not establish an exclusive common origin; there are other sources in the population that could have contributed to this trace evidence. Because class evidence does not exhibit any observable individual characteristics, it is not possible to exclude all other existing sources. At this point, the question that everyone would like to answer is "How many of these other sources could have contributed to that trace?"

While the interpretation of individual evidence is usually straight- forward and does not permit misunderstanding, it is not quite the case with class evidence. The interpretation of such evidence is a much more complex process that requires the use of statistics, or at least, qualifiers in the weight attributed to the match between the evidence and the putative source. Normally, the more characteristics that are analyzed, the more discriminatory the results become. Also, as an alternative to many analyses or examinations, it is possible, in some instances, to reduce the starting group of possible sources depending on the circumstances. This would increase the likeliness of a trace to originate from a particular source.

The attendees will learn the fundamental principles of individualization and identification of different types of (trace) evidence in forensic sciences. The process leading to the individualization of evidence will be described in a logical and pertinent manner. Then, a discussion of the (non-)individual- ization of trace evidence will be presented. At the end of the presentation, every attendee will be current in their knowledge of the fundamental concepts behind the science of criminalistics, which will greatly help in interpreting evidence in the most scientific, proper, and efficient manner.

Identification, Individualization, Trace Evidence

