B47 Frequency of Occurrence Data for Textile Fibers

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After attending this presentation, attendees will learn that most textile fibers have considerable evidential value as associative evidence This presentation will demonstrate the importance of considering the evidential value and meaning of associative evidence using textile
fibers as an example.

The question, "What does the evidence mean?" is obviously an important question in a criminal trial. Determining the value and meaning of evidence is one of the most important factors that go into forensic analysis. However, it is often one of the most difficult questions for the forensic scientist to answer objectively and to provide objective support for that answer in the courtroom. Because of this, the question is often ignored in laboratory reports and in testimony at a trial. Assessing and presenting evidential value is especially difficult with respect to trace evidence. Evidential value of a particular type of evidence can vary tremendously depending on the specific evidence available in a case. Forensic scientists must consider the evidential value and be able to present and support their assessment in the courtroom as a jury will not have the knowledge necessary to correctly evaluate the evidence.

Assessing evidential value generally occurs after matching evidence from two objects or locations has been found to exist, resulting in an association. For example, textile fibers recovered from a homicide victim's body are matched to a carpet in a suspect's residence linking the victim to the suspect's residence. However, since it is possible that these carpet fibers came from a similar but different carpet, it could be a coincidental match and, therefore, the probability of a coincidental match must be addressed. To simply say that the fibers on the body are consistent with originating from the suspect's carpet does not address the evidential value and is likely to downplay the significance of the fiber evidence.

There are many factors that go into the assessment of the evidential value of fiber evidence. One of the most valuable pieces of information the fiber examiner could use in assessing evidential value is the frequency of occurrence of the probative fibers in textile materials or in debris from textile materials. This type of information may be difficult if not impossible to determine for a fiber type involved in a specific case, however, it is possible to determine an average or relative frequency of occurrence for particular fiber types, which can then be equated with the fibers of interest in a particular case.

Over the past 20 years there have been many "target fiber" and "population studies" that have addressed the issue of the frequency of occurrence of specific fiber types in clothing and in debris collected from various locations. These studies have shown that, although there are some very common fibers which would have little value as evidence, a fiber that is not one of the very common types will have a very small frequency of occurrence. Most of these studies have been conducted outside the United States, primarily in Great Britain, Germany and Australia. Although these studies would likely apply to fiber analysis in the United States, it would be helpful to conduct similar studies in the United States.

This project is designed to provide data useful in assessing the evidential value of fiber evidence by providing information on the frequency of occurrence of particular fiber types. It consists of three component parts: first fibers have been collected from items of clothing. The clothing sampled came from university students as well as from office staff wearing both casual and business dress. These fibers are being classified initially based on microscopical characteristics such as color, fiber type and diameter. This data can be used to address the frequency of occurrence of different fiber types in clothing. A second component of the project is the collection of fibers from 50 seats and 50 seat backs located in a University auditorium. After using tape to collect the fibers, approximately 10% of the recovered fibers have been mounted and searched until 40 dissimilar fiber types have been identified from each taping. A total of 4000 fiber types will have been identified and classified in approximately 1000 possible classes at the completion of the project. Fibers within a class will then be compared. This data will also address the frequency of occurrence of fiber types from clothing and debris from clothing that has been transferred to the seats and seat backs. A third component of this research is to search the debris from the auditorium seats and seat backs for several fiber types that are present in the composition of three sweaters. The three sweaters selected as targets are various shades of red and at least 50 red fibers were recovered from each taping. The more than 5000 red fibers from the auditorium seats are being compared with the rayon, acrylic, polyester, nylon and cotton fibers in the composition of the three sweaters.

The data obtained thus far support the conclusions that have been reported in the literature in studies outside the United States. While there are some common fiber types, there is tremendous variety in the world of textile fibers. As long as a fiber is not one of the common fiber types, the probability of finding a particular fiber type in a particular location or in the composition of a particular item of clothing by chance is very small. This is particularly true with respect to man-made fibers and especially with colored man-made fibers.

Textile Fiber Evidence, Evidential Value, Fiber Frequency of Occurrence

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