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President's Editorial—The Changing Practice of Forensic Science

The practice of forensic science has changed a great deal over the past three decades, and almost beyond recognition over the past half century. Advances in instrumentation, such as mass spectrometry, and in techniques for the isolation and characterization of trace DNA evidence are obvious examples. It is not just the instrumentation and methods that have changed, however. Expectations of the way forensic scientists uncover, analyze, interpret, and present evidence have also changed. In the past, forensic scientists worked on cases very much as individuals, even when part of a larger institution. Enormous reliance was placed on the technical capabilities, experience and judgment of the individual, with less emphasis on professional standards and guidelines; these barely existed. Over the past decade, however, a number of events have occurred that have necessitated changes in the way forensic science is practiced. These have involved well-publicized failures of forensic science in several high profile cases in the U.S., the U.K., Canada, Australia, and presumably other countries. Some of the failures have resulted from inadequate methods or from the poor training or judgment of individuals. Other failures have resulted from a lack of objectivity in interpreting and reporting scientific data or from drawing conclusions of unwarranted certainty. For example, use of the term "consistent with" in describing hair and fiber comparisons has been severely criticized as implying a greater degree of certainty to a lay-jury than may be scientifically justifiable (1). Similar examples can be drawn from other forensic disciplines such as handwriting comparison and bite-mark analysis.

In the U.S., legal rulings have exerted the biggest influence on how scientific evidence is analyzed and testimony presented. The era when the opinions of forensic scientists were rarely challenged is gone forever. The courts have become considerably more vigilant in reviewing evidence they will allow to be presented to a jury. The Frye standard of general acceptance was one of the first used to determine the acceptability of forensic evidence by the courts in the U.S. (2). It stemmed from a 1923 ruling, the principles of which are still applied in many jurisdictions in the U.S. That standard essentially allows evidence to be introduced if it is based on knowledge or principles generally accepted by the particular scientific discipline. The more recent Daubert ruling, that designates judges as gatekeepers of scientific evidence, has been adopted by the U.S. Federal Courts and by many states (3).

The Daubert standard goes a step further than Frye and requires the forensic scientist to prove that the evidence is fundamentally scientifically reliable, not just generally accepted by his/her peers in the discipline. Defense lawyers have also become more critical and aggressive in challenging forensic evidence and are more willing to hire qualified forensic experts to assist them. At one time, challenges to forensic science evidence were based largely on nonscientific issues and the legal admissibility of evidence. Now, increasingly, the scientific validity and reliability of every major forensic science discipline is being challenged. Even the reliability of fingerprinting, previously accepted with little comment, has recently undergone a major challenge in the courts and continues to be challenged (4).

FIG. 1—*Jones, President, 2002–03, American Academy of Forensic Sciences.*

Has the forensic science profession risen to the challenges posed by Frye and Daubert? Some would say slowly. For example, working guidelines for forensic toxicology were initially developed by the profession out of fear that the courts or legislators would require federal regulations, introduced for the narrow field of workplace drug testing, to be unrealistically applied to broader areas of toxicology. Arguably, the slow speed of development of guidelines and professional standards for the forensic sciences has been, at least in part, due to chronically poor and inconsistent funding of the forensic sciences, resulting in very high caseloads and little time or funding for professional development or re-

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search. It has taken public criticism of the FBI and other laboratories to spur creation of groups to develop technical standards; for example, the consensus technical working groups (TWGs) and scientific working groups (SWGs).[2] The best known of these is TWGDAM (Technical Working Group on DNA Analysis Methods), the recommendations of which are now widely accepted and implemented in accredited laboratories throughout the world. Another example is the forensic science standards adopted by ASTM International as a result of the work of its E-30 Committee on Forensic Science and various sub-committees. For example, ASTM E1387 and E1618 are widely accepted as standards for the analysis of fire debris (5).

One of the more successful laboratory accreditation programs has been that of the American Society of Crime Laboratory Directors (ASCLD). They developed and introduced an accreditation program in 1981, now administered by ASCLD/LAB. Unfortunately, while the ASCLD/LAB program has been successful in accrediting over 200 laboratories, a large number of forensic laboratories in the U.S. remain unaccredited by any agency. A similar situation exists with death investigation agencies accredited by the National Association of Medical Examiners (NAME); forty such medical examiner systems have been accredited, covering only about 25% of the U.S. population. The same dichotomy exists in certification programs for the practicing forensic scientist, even though forensic certification boards for all the major disciplines have been in existence for over a decade.

Why have forensic laboratories and individuals been so reluctant to become accredited or certified? There are many possible reasons, but several revolve around the question "Why do it if it is not mandatory?". Within the U.S., there is no doubt that for the past decade or more, the forensic science profession has been undervalued and this has resulted in considerable budgetary restraints. Both accreditation and certification require substantial financial resources and commitment to obtain and to maintain. To date, these programs have also required considerable volunteer effort to develop and administer. With the exception of New York State, which requires mandatory accreditation of all public sector forensic science laboratories, no other jurisdiction requires accreditation, except in relatively narrow fields like workplace drug testing. The presumption is that other jurisdictions lack the money or political will to assist their laboratories in meeting the required standards. Conversely, many forensic scientists resist any form of mandatory accreditation for fear that the process will become too bureaucratic and restrictive.

In the U.S., one recent legislative initiative does provide some hope of a better future. Several concerned forensic scientists from the southern states drafted a proposed bill that would provide a mechanism for funding improvement of forensic science laboratories and medical examiner facilities. This proposal subsequently gained federal congressional support. An integral part of the proposal was that to receive funding, the facility must be accredited by ASCLD/LAB or NAME, or be preparing to apply for accreditation. The bill was eventually adopted and passed into law on December 21, 2000, and is now called the *Paul Coverdell National Forensic Science Improvement Act of 2000* (106–561). Adoption of a bill does not, however, mean that funding will be available, and at the time of writing of this editorial, considerable efforts are being made to ensure adequate appropriation for the bill. These efforts are being led by the Consortium of Forensic Science Organizations (CSFO).[3]

The profession may have "turned the corner" in one other way. In June 2000, the Forensic Specialties Accreditation Board (FSAB) was formed to act as an accreditation body for forensic specialty certification boards. Several forensic certification boards were formed as far back as 1976, but have evolved different standards for their certificants. Some do not require continuing education, some do not have meaningful reaccreditation criteria, and some do not directly incorporate an ethics or professional standards component. The FSAB will require all applicant boards to meet certain requirements before accreditation will be granted. Boards will also be required to state the minimum required knowledge, skills and abilities a forensic specialist should possess in order to be certified. This will not be as easy an issue to deal with as might first appear. The reason is that many forensic scientists practice in more than one type of specialty (e.g., forensic biology, drug analysis, fire debris analysis, trace evidence) and practice in many different types of facility. The American Board of Criminalistics (ABC) have tried to address this issue by using a general criminalistics knowledge examination, plus optional discipline-specific examinations. However, even within a specific discipline, forensic scientists may practice at different levels of expertise and responsibility. Some disciplines are typically part-time (e.g., odontology), whereas others are usually full-time. Unlike medicine, where every physician starts with a basic set of skills taught at an accredited medical school, forensic scientists, even within a given discipline, often have academic backgrounds that differ widely (e.g., chemistry, biology, genetics, physics etc). Training thereafter is usually at their workplace, supplemented by reading journals and by attending conferences and workshops. Developing a national consensus on what a particular forensic specialist should know will not be easy to accomplish.

I strongly believe that many of the problems surrounding accreditation and certification relate back to inadequate funding of forensic science. Governments, local or federal, have tremendous demands placed on them for funding from a wide range of interest groups and programs. Programs such as health care, education, defense and social security are top priorities, and the support of crime and death investigation agencies is normally given very low priority. As the forensic science profession, we are faced with the challenge of balancing the demands made of us by crime and death investigation agencies against the increasingly higher professional standards required by courts. A great deal has been accomplished in the past few years, but we still have a long way to go. Dramatically increasing the number of facilities accredited and forensic scientists certified is one way to help achieve the professional goal of providing forensic science of the highest quality and reliability.

References

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4. *United States* v. *Byron C. Mitchell,* Criminal No. 96-00407; July 7–13, 1999; Philadelphia, PA.
5. Lentini JJ. Standards impact the forensic sciences, *ASTM Standardization News,* February 2001.

[2] Several different TWGs and SWGs have been formed over the past few years under the auspices of either the FBI or National Institute of Justice (NIJ).

[3] CFSO is a consortium originally representing AAFS, ASCLD, ASCLD-LAB, NAME, the International Association for Identification (IAI), the National Center for Forensic Science (NCFS) and the National Forensic Science Technology Center (NFSTC).