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The Reliability and Admissibility of Forensic Science Evidence in Kentucky

Andrea Kendall
DPA Staff Attorney

In 2009, the National Academy of Sciences published *Strengthening Forensic Science in the United States: A Path Forward*.¹ This publication addressed the general state of forensic science education, challenges facing the forensic science community, and the reliability of evidence from specific forensic science disciplines. “The report finds that the existing legal regime—including the rules governing the admissibility of forensic evidence, the applicable standards governing appellate review of trial court decisions, the limitations of the adversary appellate process, and judges and lawyers who often lack the scientific expertise necessary to comprehend and evaluate forensic evidence—is inadequate to the task of curing the documented ills of the forensic science disciplines.”² Additionally, the report found that several specific disciplines lacked validation of their basic assumptions, research into the ability of examiners to make identifications, and statistics to support opinions about comparisons. Analysis of controlled substances identification³ and biological evidence – DNA Typing – received a clean bill of health and are admissible in Kentucky courts.⁴ However, Kentucky precedent continues to permit the admission of evidence from many other disciplines that were criticized in the NAS Report. What follows is a review of some of those disciplines.

Historically, analysts have claimed that hair from a crime scene can be compared to hair from a known individual.⁵ This evidence was deemed so reliable that the Supreme Court of Kentucky stated, in dicta, that courts could take judicial notice of its admissibility and were therefore not required to grant a *Daubert* hearing.⁶ However, at no time was **hair comparison** subject to rigorous scientific testing.⁷ The NAS Report gives further reason to doubt the reliability of hair comparisons. “No scientifically accepted statistics exist about the frequency with which particular characteristics of hair are distributed in the population. There appear to be no uniform standards on the number of features on which hairs must

¹ National Research Council of the National Academies, *Strengthening Forensic Science in the United States: A Path Forward* (hereinafter NAS Report).

² NAS Report at 85.

³ NAS Report at 133, *Miller v. Commonwealth*, 512 S.W.2d 941 (Ky.,1974).

⁴ NAS Report at 128. *Brown v. Commonwealth*, 313 S.W.3d 577 (Ky. 2010); *Fugate v. Commonwealth*, 993 S.W.2d 931, 937 (Ky. 1999); *Sholler v. Commonwealth*, 969 S.W.2d 706 (Ky. 1998); *Johnson v. Commonwealth*, 12 S.W.3d 258 (Ky. 1999) (stating, in dicta, that courts may take judicial notice of admissibility).

⁵ *Wilson v. Commonwealth*, 836 S.W.2d 872 (Ky.,1992) (overruled on other grounds)(Expert testimony that hairs found inside victim's car were similar in microscopic comparison to head and pubic hair samples taken from defendant was admissible.); *Wilhite v. Commonwealth*, 574 S.W.2d 304 (1978); *Sherley v. Commonwealth*, 558 S.W.2d 615 (1977); *Garr v. Commonwealth*, 463 S.W.2d 109 (Ky.,1971); *Mitchell v. Commonwealth*, 280 S.W.2d 189 (1955); *Acrey v. Commonwealth*, 312 Ky. 732, 229 S.W.2d 748 (1950).

⁶ *Johnson v. Commonwealth*, 12 S.W.3d 258 (Ky.,1999)

⁷ Saks, Michael J., JOHNSON V. COMMONWEALTH: HOW DEPENDABLE IS IDENTIFICATION BY MICROSCOPIC HAIR COMPARISON? THE ADVOCATE Volume 26, No. 1 Pg. 14. January 2004.

agree before an examiner may declare a ‘match.’”⁸ Science requires uniform standards to ensure examinations are repeatable – that different examiners can look at the same subject and have the same conclusion. Statistics give meaning to a conclusion. Without repeatability and statistics, analysis lacks the basic hallmarks of science. Furthermore, DNA has proven that hair analysis is often wrong. “An FBI study found that, of 80 hair comparisons that were “associated” through microscopic examinations, 9 of them (12.5 percent) were found in fact to come from different sources when reexamined through mtDNA analysis. This illustrates not only the imprecision of microscopic hair analyses, but also the problem with using imprecise reporting terminology such as “associated with,” which is not clearly defined and which can be misunderstood to imply individualization.”⁹ DNA analysis has proven that hair analysis is often unreliable. Hair analysis should not be admitted despite precedent.

Long considered infallible, **fingerprint evidence** is admissible in Kentucky.¹⁰ However, the NAS Report gives cause for concerns not known in 1939 when Kentucky courts began admitting fingerprint evidence.¹¹ “We have reviewed available scientific evidence of the validity of the [method of comparing fingerprints] and found none.”¹² The primary criticisms are that many of the assumptions underlying fingerprint comparisons – including the uniqueness and permanence of fingerprints – have not been scientifically validated and that comparisons are subjective.¹³ “The impression left by a given finger will differ every time, because of inevitable variations in pressure, which change the degree of contact between each part of the ridge structure and the impression medium. None of these variabilities—of features across a population of fingers or of repeated impressions left by the same finger—has been characterized, quantified, or compared.”¹⁴

Examiners should no longer be permitted to testify that fingerprints are an “exact” or “perfect” match.¹⁵ The NAS Report concluded by calling for additional research into assumptions underlying fingerprint comparisons, distribution of fingerprint features across the population, and how much information is necessary before an analyst can make an identification. Until such research is completed, courts should err on the side of caution when admitting testimony while allowing defense attorneys to present the limits of fingerprint comparison to the jury via experts, cross examination, and argument.

⁸ NAS Report at 160.

⁹ NAS Report at 160.

¹⁰ *Johnson v. Commonwealth*, 12 S.W.3d 258 (Ky.,1999) (stating, in dicta, that courts may take judicial notice of admissibility); *Smith v. Commonwealth*, 2004 WL 2364596 (Ky.,2004)(holding lifescan and independent verification admissible in light of *Johnson*).

¹¹ *Shelton v. Commonwealth*, 134 S.W.2d 653, 657 (Ky. 1939).

¹² NAS Report at 143 quoting L. Haber and R.N. Haber. 2008. *Scientific validation of fingerprint evidence under Daubert*. LAW, PROBABILITY, AND RISK 7(2):119.

¹³ “Some scientific evidence supports the presumption that friction ridge patterns are unique to each person and persist unchanged throughout a lifetime. Uniqueness and persistence are necessary conditions for friction ridge identification to be feasible, but those conditions do not imply that anyone can reliably discern whether or not two friction ridge impressions were made by the same person.” NAS Report at 143-44.

¹⁴ NAS Report at 144.

¹⁵ “Although there is limited information about the accuracy and reliability of friction ridge analyses, claims that these analyses have zero error rates are not scientifically plausible.” NAS Report at 142. Testimony permitted in *Blackford v. Commonwealth*, 2003 WL 22975282 (Ky. 2003).

The NAS Report also called into question the reliability of **pattern and impression evidence** generally. This includes shoe prints, foot prints, and tire tracks. Examiners look for characteristics ranging from the size of a shoe to imperfections in wear with the goal of making an identification. “However, there is no consensus regarding the number of individual characteristics needed to make a positive identification, and the committee is not aware of any data about the variability of class or individual characteristics or about the validity or reliability of the method.”¹⁶ Without guidelines, bias may lead to false identifications. Without data about the rarity of features, weight cannot be assigned to the testimony. Without a valid method, the discipline fails to meet the basic definition of science – that comparisons can be repeated and have the same results. “Without such population studies, it is impossible to assess the number of characteristics that must match in order to have any particular degree of confidence about the source of the impression. Experts in impression evidence will argue that they accumulate a sense of those probabilities through experience, which may be true. However, it is difficult to avoid biases in experience-based judgments, especially in the absence of a feedback mechanism to correct an erroneous judgment.”¹⁷ Unfortunately, courts admit such testimony,¹⁸ often without permitting defense challenges. In light of the limitations publicized in the NAS Report, courts should reexamine the admissibility, probative value, and risk of unfair prejudice of such testimony. At minimum, examiners must not state that an impression is consistent with, a match to, responsible for, or caused by an identified source.¹⁹

Firearm examiners assert that a projectile can be linked to the firearm which fired it.²⁰ The NAS Report called into question the ability of examiners to make this sort of conclusion. “**Toolmark and firearms analysis** suffers from the same limitations discussed above for impression evidence. Because not enough is known about the variabilities among individual tools and guns, we are not able to specify how many points of similarity are necessary for a given level of confidence in the result.” If a discipline has an unknown level of confidence, the reliability has not been demonstrated.²¹ Prior to the NAS Report, Kentucky courts have admitted this type of testimony without requiring a *Daubert* hearing.²² “Sufficient studies have not been done to understand the reliability and repeatability of the methods [of toolmark

¹⁶ NAS Report at 149.

¹⁷ NAS Report at 149.

¹⁸ [Chumbler v. Commonwealth, 905 S.W.2d 488 \(Ky. 1995\).](#)

¹⁹ NAS Report at 149.

²⁰ [Morris v. Commonwealth, 208 S.W.2d 58, 60 \(1948\).](#)

²¹ “A fundamental problem with toolmark and firearms analysis is the lack of a precisely defined process. . . It says that an examiner may offer an opinion that a specific tool or firearm was the source of a specific set of toolmarks or a bullet striation pattern when “sufficient agreement” exists in the pattern of two sets of marks. It defines agreement as significant “when it exceeds the best agreement demonstrated between tool marks known to have been produced by different tools and is consistent with the agreement demonstrated by tool marks known to have been produced by the same tool.” The meaning of “exceeds the best agreement” and “consistent with” are not specified, and the examiner is expected to draw on his or her own experience.” NAS Report at 155.

²² [Johnson v. Commonwealth, 12 S.W.3d 258 \(Ky.,1999\)](#) (stating, in dicta, that courts may take judicial notice of admissibility).

and firearm examination].”²³ Until studies demonstrate the reliability of firearm examination, this evidence should be challenged before being admitted.

Similar limitations exist in **fiber analysis**. When two items come into contact, fibers may be transferred from one item to another. Examiners claim to be able to identify the source of fibers based upon their chemical composition.²⁴ However, “a “match” means only that the fibers could have come from the same type of garment, carpet, or furniture; it can provide only class evidence.”²⁵ Class evidence or characteristics demonstrate only that it belongs to a manufactured group; it cannot identify a specific source. No studies support any stronger conclusion. Therefore, analysts should not be permitted to testify that a particular item is the source of fibers.

Handwriting analysis is currently admissible without a *Daubert* hearing.²⁶ However, that has been called into question. “The scientific basis for handwriting comparisons needs to be strengthened.”²⁷ The NAS Report cites many studies useful for litigants with handwriting cases and gives reason to pause before admitting this evidence without pretrial challenges.

Much like fiber evidence, **paint** may be transferred from one substance to another. By analyzing the chemical properties of the paint chips and painted item, analysts work to determine if they have common source. This has been deemed admissible in Kentucky.²⁸ However, analysts cannot testify that an item is the source of paint chips unless the chip physically fits into the item.²⁹ Additionally, “the community has not defined precise criteria for determining whether two samples come from a common source class.”³⁰ This leaves discretion to analysts and may lead to conclusions not supported by science. Additionally, there is little guidance about the wording analysts may use. Litigants should press for language fully supported by science through motions in limine and clarify the limits of the analysis through cross examination.

Arson investigators often send samples to be analyzed for the presence of chemicals. The NAS Report reveals the strong scientific underpinning for such testimony.³¹ Investigators often testify to more than just the presence or absence of accelerants. As to this type of testimony, the NAS Report concluded “much more research is needed on the natural variability of burn patterns and damage characteristics and how they are affected by the presence of various accelerants.”³² Instead of relying on science, investigators use information passed down through apprenticeship-style training. Investigators have

²³ NAS Report at 154.

²⁴ *Garr v. Commonwealth*, 463 S.W.2d 109 (1971); *Johnson v. Com.* 12 S.W.3d 258 (Ky.,1999) (stating, in dicta, that courts may take judicial notice of admissibility).

²⁵ NAS Report at 163.

²⁶ *Florence v. Commonwealth*, 120 S.W.3d 699 (2003).

²⁷ NAS Report at 166.

²⁸ *Thompson v. Commonwealth*, 298 S.W.2d 16 (Ky. 1957).

²⁹ NAS Report at 168.

³⁰ NAS Report at 170.

³¹ NAS Report at 170.

³² NAS Report at 173.

based their conclusions on – and testified to – information proven to be false.³³ Investigators often go beyond the science to opine about whether a fire is purposefully set.³⁴ “Despite the paucity of research, some arson investigators continue to make determinations about whether or not a particular fire was set.”³⁵ Litigants must carefully examine the opinions offered by investigators to ensure they are scientifically sound.

Certain dentists claim to be able to match features of a **bite mark** to a person’s teeth. This is referred to as bite mark identification or forensic odontology. However, “bite marks on the skin will change over time and can be distorted by the elasticity of the skin, the unevenness of the surface bite, and swelling and healing. These features may severely limit the validity of forensic odontology.”³⁶ Within the scientific community, “there is continuing dispute over the value and scientific validity of comparing and identifying bite marks.”³⁷ Given these concerns, bite mark comparisons should be thoroughly examined and potentially excluded.

Bloodstain pattern analysis is often offered to explain the placement of blood on a crime scene.³⁸ However, the NAS Report identified several limitations to such testimony. “Scientific studies support some aspects of bloodstain pattern analysis. One can tell, for example, if the blood spattered quickly or slowly, but some experts extrapolate far beyond what can be supported.”³⁹ The NAS Report advised “extra care must be given to the way in which the analyses are presented in court. The uncertainties associated with bloodstain pattern analysis are enormous.”⁴⁰ Litigants and judges must work to ensure only testimony supported by science is admitted.

The NAS Report also examined the new field of **digital and multimedia analysis**.⁴¹ While no appeals court has discussed this type of evidence, litigants continue to challenge its admissibility and weight.⁴²

³³ “[M]any of the rules of thumb that are typically assumed to indicate that an accelerant was used (e.g., “alligatoring” of wood, specific char patterns) have been shown not to be true.” NAS Report at 170.

³⁴ *Harris v. Commonwealth*, 342 S.W.2d 535 (Ky.,1960) (holding question of whether a fire was of incendiary origin is for the jury in prosecution for arson, and ordinarily opinion evidence as to the cause is inadmissible, but expert testimony is admissible where witness has stated the reasons for his conclusion.).

³⁵ NAS Report at 170.

³⁶ NAS Report at 174. “More research is needed to confirm the fundamental basis for the science of bite mark comparison. . . .the scientific basis is insufficient to conclude that bite mark comparisons can result in a conclusive match. In fact, one of the standards of the ABFO for bite mark terminology is that, “Terms assuring unconditional identification of a perpetrator, or without doubt, are not sanctioned as a final conclusion.” *Id.* “A standard for the type, quality, and number of individual characteristics required to indicate that a bite mark has reached a threshold of evidentiary value has not been established.” *Id.* at 175.

³⁷ NAS Report at 174. “[T]here is considerable dispute about the value and reliability of the collected data for interpretation. Some of the key areas of dispute include the accuracy of human skin as a reliable registration material for bite marks, the uniqueness of human dentition, the techniques used for analysis, and the role of examiner bias.” *Id.* at 176.

³⁸ *Wines v. Commonwealth*, 2009 WL 1830805 (Ky.,2009).

³⁹ NAS Report at 178.

⁴⁰ NAS Report at 178-79.

⁴¹ NAS Report at 179-82.

Although the NAS Report was released in 2009, courts and litigants have been slow to respond. All parties in a criminal case must work to ensure court rulings reflect the experience of the general scientific community. The NAS Report – authored by the nation’s top scientists in consultation with forensic discipline practitioners – demands courts, lawyers, and law enforcement reexamine the use of forensic evidence and work to ensure only reliable evidence is admitted.

⁴² *Davis v. Commonwealth*, 2007-CA-002305-MR, 2008 WL 4531372 (Ky. App. Oct. 10, 2008) (denying a motion for ineffective assistance of counsel because appellant failed to demonstrate prejudice in trial counsel’s failure to retain an expert to challenge Commonwealth’s computer expert).

EXTRAORDINARY BEDFELLOWS: THE HAIR MICROSCOPY REVIEW PROJECT

Linda Smith

Supervising Attorney - Kentucky Innocence Project

Beginning in July 2012, the Innocence Project, National Association of Criminal Defense Lawyers, (NACDL) the United States Department of Justice, (DOJ) and the Federal Bureau of Investigation (FBI) partnered in the Hair Microscopy Review Project (hereinafter HMRP) to review the hair comparison testimony given by FBI examiners in over 21,000 cases. In the July 2013 issue of NACDL's *The Champion*, Executive Director Norman L. Reimer writes that the HMRP indicates the "commendable recognition by the FBI and the Department of Justice that there is an affirmative duty to correct when events establish that the evidentiary value of a scientific opinion has exceeded the limits of science."⁴³

What is Microscopic Hair Comparison Analysis?

Microscopic hair comparison is a pattern recognition technique the FBI laboratory and local state laboratories have used to evaluate whether trace evidence of a hair recovered at a crime scene can be "positively associated" with either the suspect's or the victim's hair. The examiner uses a comparison microscope to see both the known hair and the unknown hair found at a crime scene simultaneously. The examiner studies patterns and characteristics of the known hair and determines whether or not these same characteristics are also present in the unknown hair. The FBI recognizes that the conclusion of the examination is ultimately a subjective interpretation of what weight to assign characteristics identified by the examiner. "The subjective component of hair examination almost dictates that two different examiners will place slightly different weight on individual characteristics or may describe these characteristics using slightly different words."⁴⁴

Limitations of the "Scientific" Underpinnings of the Technique:

The FBI asserts that proper training, standardized procedures and experienced examiners ensure that agreement can be reached as to any associative conclusion. The training, procedures and experience are supposed to make up for the lack of any statistical data concerning the frequency of hair characteristics, published error rates, validation studies, proficiency testing and the dearth of independent research subjected to peer-reviewed published studies verifying the technique. Insisting that the data and research cannot be ascertained, the FBI states, "[t]he limitation of the science is that there is always the possibility of a coincidental match. The possibility of this event should not be construed as an error. Simply put, some people can share the same microscopic characteristics. One should not construe that a probability statement equates to reliability. Simply because the statistical probability of hair evidence cannot be calculated does not make the comparison unreliable. To ensure proper weighting of an association, it is essential that the limitations of microscopic hair comparisons be understood by the examiner and conveyed to all interested parties."⁴⁵

⁴³"The Hair Microscopy Review Project: An Historic Breakthrough for Law Enforcement and a Daunting Challenge for the Defense Bar", Norman L. Reimer, NACDL's *The Champion*, pgs. 16-21 July 2013. The article consists of four pages and omits page 19.

⁴⁴ *Forensic Science Communications*, April 2009 - Volume 11 - Number 2 "Forensic Hair Comparison: Background Information for Interpretation" Cary T. Oien, Unit Chief, Trace Evidence Unit, FBI Laboratory, Quantico Virginia;

⁴⁵ Id. http://www.fbi.gov/about-us/lab/forensic-science-communications/fsc/april2009/review/2009_04_review02.htm/

The difficulties arise when examiners declare a “match”, “positive association” or “similarity of appearance” of a particular hair to a particular person. The certainty with which these matches are pronounced in reports and in court, is the focus of the collaborative HMRP. But is this the type of reliable “scientific” technique that should be admitted in criminal trials to begin with? Does the technique, given its admitted problems, pass muster pursuant to [Daubert v. Merrell Dow Pharmaceuticals, Inc.](#), 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993)?⁴⁶

In the landmark National Academy of Sciences Report (NAS Report) *Strengthening Forensic Science in the United States: A Path Forward*, a Committee on Identifying the Needs of the Forensic Sciences Community sponsored by the National Research Council in 2009 found serious deficiencies in the nation's forensic science system.⁴⁷ The authors called for major reforms and new research in all known forensic science techniques currently employed, except DNA testing. Rigorous mandatory certification programs for forensic scientists were found lacking, as were standards and protocols for analyzing and reporting conclusions regarding the evidence. Further, the authors found an alarming dearth of peer-reviewed, published studies establishing the scientific basis and/or reliability of many forensic methods. In addition, the NAS Report noted the fact that many forensic science labs were underfunded, understaffed, and without effective oversight.

As to microscopic hair comparison analysis, the report declared:

No scientifically accepted statistics exist about the frequency with which particular characteristics of hair are distributed in the population. There appear to be no uniform standards on the number of features on which hairs must agree before an examiner may declare a “match.” In one study of validity and accuracy of the technique, the authors required exact agreement on seven “major” characteristics and at least two agreements among six “secondary” characteristics.⁴⁸ The categorization of hair features depends heavily on examiner proficiency and practical experience.

An FBI study found that, of 80 hair comparisons that were “associated” through microscopic examinations, 9 of them (12.5 percent) were found in fact to come from different sources when reexamined through mtDNA analysis. (M.M. Houk and B. Budowle, 2002. Correlation of Microscopic and Mitochondrial DNA Hair Comparisons, *Journal of Forensic Sciences* 47(5):964-967.)

This illustrates not only the imprecision of microscopic hair analyses, but also the problem with using imprecise reporting terminology such as “associated with,” which is not clearly defined and which can be misunderstood to imply individualization.

In some recent cases, courts have explicitly stated that microscopic hair analysis is a technique generally accepted in the scientific community. But courts also have recognized that testimony linking microscopic hair analysis with particular defendants is

⁴⁶ *Mitchell v. Commonwealth*, 908 S.W.2d 100, 101–02 (Ky.1995) (adopting *Daubert* in Kentucky), *overruled in part on other grounds by Fugate v. Commonwealth*, 993 S.W.2d 931, 937 (Ky.1999).

⁴⁷ The report was sponsored by the National Institute of Justice at the request of Congress. The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies. They are private, nonprofit institutions that provide science, technology, and health policy advice under a congressional charter. The Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering.

⁴⁸ (R.A. Wickenheiser and D.G. Hepworth. 1990. “Further Evaluation Of Probabilities In Human Hair Comparisons.” *Journal of Forensic Sciences* 35(6):1323-1329.)

highly unreliable. In cases where there seems to be a morphological match (based on microscopic examination), it must be confirmed using mtDNA analysis; microscopic studies alone are of limited probative value. ***The committee found no scientific support for the use of hair comparisons for individualization in the absence of nuclear DNA.*** Microscopy and mtDNA analysis can be used in tandem and may add to one another's value for classifying a common source, but no studies have been performed specifically to quantify the reliability of their joint use.⁴⁹

Some have theorized that what makes microscopic hair comparisons highly susceptible to inaccuracies is the suggestibility of the examiner and the lack of uniform standards as to how similar two hairs must be to be declared a match.⁵⁰ Perhaps the most telling indication of the unreliability of the technique is the fact that of the first 225 convictions overturned due to DNA testing, 45 of them involved invalid or incorrect hair analysis (20%).⁵¹ While most of the errors have been the inclusive type—*i.e.*, that the hair matches a particular person microscopically, but when DNA tested, it does not match that person; there are at least two documented exonerations in which the true perpetrator was erroneously excluded by microscopic hair comparison.⁵²

The 2012 Hair Microscopy Review Project:

In a press release issued July 2012 entitled "*FBI Clarifies Reporting on Microscopic Hair Comparisons Conducted by the Laboratory*," the Bureau defended the science of microscopic hair comparison, but admitted to its concern about the testimony of its hair examiners and the limits of the science; especially those conducted prior to the advent of DNA testing:

The FBI Laboratory still conducts microscopic hair comparisons. There is no reason to believe the FBI Laboratory employed "flawed" forensic techniques. The validity of the science of microscopic hair comparison is not at issue; however, based on recent cases, the FBI and Department of Justice are committed to undertaking a review of historical cases that occurred prior to the regular use of mitochondrial DNA testing to ensure that FBI testimony at trial properly reflects the bounds of the underlying science. In 1996, the FBI implemented mitochondrial DNA (mtDNA) analysis to be used in conjunction with microscopic hair

⁴⁹ 2009 "Strengthening Forensic Science in the United States: A Path Forward" Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council, pgs. 160-161(*emphasis added and citations omitted*)

⁵⁰ Paul C. Giannelli, *Microscopic Hair Comparisons: A Cautionary Tale*, 46 CRIM. L. BULLETIN 7 (Summer 2010).

⁵¹ See Innocence Project, *Wrongful Convictions Involving Unvalidated or Improper Forensic Science that Were Later Overturned Through DNA Testing*, http://www.innocenceproject.org/docs/DNA_Exonerations_Forensic_Science.pdf.

⁵² Dennis Fritz and Ron Williamson's murder cases were overturned in Oklahoma. The real perpetrator, Glen Gore, was a suspect during the initial investigation but, was excluded as a contributor of the hair at the crime scene. "The most stunning error involved Glen Gore, the prosecution 'witness' who implicated Williamson. Mitochondrial DNA tests in 1999 linked Gore to two hairs found around the victim's savagely beaten body. Fifteen years earlier, the state hair examiners said they had checked Gore's hair. He was excluded as the source of what appears to be his own hair." (page165) *Actual Innocence: Five Days to Execution, and Other Dispatches From the Wrongly Convicted*, Barry Scheck, Peter Neufeld, and Jim Dwyer, February, 2000, Doubleday, These cases were later the subject of the book, *The Innocent Man: Murder And Injustice In A Small Town*, by John Grisham. New York: Doubleday, 2006.

comparisons. Both the microscopic hair technique and mtDNA testing can contribute valuable information and, when combined, provide a stronger analysis.⁵³

The “recent cases” referred to in the press release are the increasing number of DNA exonerations of individuals convicted on the basis of hair microscopy.⁵⁴ As the FBI noted, the use of mtDNA analysis used in conjunction with the technique presumably leads to a far more trustworthy result. In the wake of this admission by the FBI, and the disturbing number of exonerations, a remarkable agreement was reached between the parties involved in the HMRP as to what constitutes acceptable testimony by a laboratory technician. The agreement specifies exactly what can be reliably concluded using hair microscopy analysis alone. Reimer recites the precise wording of the formal agreement reached by NACDL, the Innocence Project and the FBI:

...that an examiner’s testimony concerning the relationship between two hairs is appropriate if it reflected the fact that hair comparison could not be used to make a positive identification. Instead, it could indicate, at the broad class level, that a contributor of a known sample could be included in a pool of people of unknown size, as a possible source of the hair evidence (without in any way giving probabilities, as an opinion to the likelihood or rareness of the positive association, or the size of the class) or that the contributor of a known sample could be excluded as a possible source of the hair evidence based on the known sample provided.⁵⁵ (*Id.*, at p. 17)

The Review Process:

The HMRP is reviewing cases which included testimony by FBI hair examiners from the early 1980’s to December 31, 1999.⁵⁶ Three types of examiner testimonial error have been identified regarding the manner in which examiners characterized the reliability of the hair comparisons, and form the basis for

⁵³ <http://www.fbi.gov/news/pressrel/press-releases/fbi-clarifies-reporting-on-microscopic-hair-comparisons-conducted-by-the-laboratory>

⁵⁴ Please see *The Washington Post* series of articles by Spencer S. Hsu, *et. al.* published between Apr 16, 2012 and July 17, 2013 http://www.washingtonpost.com/local/crime/convicted-defendants-left-uninformed-of-forensic-flaws-found-by-justice-dept/2012/04/16/gIQAWTcgMT_story.html;
http://www.washingtonpost.com/local/crime/2012/04/16/gIQAbndgMT_story.html
http://www.washingtonpost.com/local/crime/doj-review-of-flawed-fbi-forensics-processes-lacked-transparency/2012/04/17/gIQAFegIPT_story.html
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http://www.washingtonpost.com/local/crime/kirk-l-odom-officially-exonerated-dna-retesting-cleared-him-in-dc-rape-robbery/2012/07/13/gJQAUH3piW_story.html
http://www.washingtonpost.com/local/crime/dc-judge-exonerates-santae-tribble-of-1978-murder-based-on-dna-hair-test/2012/12/14/da71ce00-d02c-11e1-b630-190a983a2e0d_story.html
http://www.washingtonpost.com/local/crime/review-of-fbi-forensics-does-not-extend-to-federally-trained-state-local-examiners/2012/12/22/b7ef9c2e-4965-11e2-ad54-580638ede391_story.html
http://www.washingtonpost.com/local/crime/fbi-errors-prompt-retrial-in-1981-md-killings/2013/05/08/da697384-a14d-11e2-be47-b44febada3a8_story.html
http://www.washingtonpost.com/local/crime/us-reviewing-27-death-penalty-convictions-for-fbi-forensic-testimony-errors/2013/07/17/6c75a0a4-bd9b-11e2-89c9-3be8095fe767_story.html

⁵⁵ See footnote 1, at p. 17.

⁵⁶ The time period is due to the fact that in 1996 the FBI began using MtDNA testing in combination with microscopic analysis in all cases.

the review of the identified 21,700 cases the HMRP will assess. The first type of error occurred when the examiner testified the “positive association” found to an individual (either defendant or victim) was to the exclusion of all others. The second type of error involved the examiner bolstering the analysis with remarks as to the probability, rarity or statistical weight to be given a positive association. The third type of error encompassed instances in which examiners alluded to the number of cases they themselves analyzed or the particular lab analyzed, as a way of giving a “predictive value” to the conclusion drawn by an examiner in the case at bar.⁵⁷

The FBI screens the identified cases for the three recognized errors, seeking transcripts and additional information from local law enforcement authorities. The Innocence Project and the NACDL then review the case and testimony, also seeking additional information in the identified cases, in order to complete a meaningful review of the evidence presented to the court. The NACDL and the Innocence Project have indicated their initial emphasis is focused on reviewing capital cases.⁵⁸ 15,000 cases have been reviewed thus far. Lab reports claiming a “positive association” of hairs have been discovered in approximately 2,100 of the 15,000 cases. Reimer reports that “120 trial transcripts have been reviewed with at least one type of error present in most of them.”⁵⁹

Once a determination is made that an error exists in a specific case, DOJ will send letters of notification to prosecutors, defense attorneys, or directly to the defendants themselves. “The letters will either indicate that there is agreement as to the types of error, or will provide the FBI finding and note the contrary position of NACDL and the Innocence Project.”⁶⁰ The letters will also specify that upon the request of the prosecution, or by order of a court, the FBI will conduct DNA testing on the hair or other biological samples still in existence. The letters stipulate that the review does not determine the materiality of the error committed by the examiners in the case. In another historic first, the DOJ has agreed to waive statutes of limitations or any other procedural-default bars in federal post-conviction proceedings, “in order to permit the resolution of legal claims arising from the erroneous presentation of microscopic hair examination laboratory reports or testimony.”⁶¹

HMRP in Action:

This summer the value of the FBI’s commitment to the mission of the HMRP was dramatically demonstrated in the Mississippi double-murder case of Willie Jerome Manning.⁶² In post-conviction pleadings, defense attorneys requested DNA testing of evidence and the opportunity to re-examine fingerprint evidence, citing the recantation of a jailhouse informant and racial bias in jury selection.⁶³ The Court overruled the motion and the decision was upheld on appeal. As the execution date loomed, the Mississippi Attorney General’s office, the Governor’s General Counsel, and defense attorneys in the

⁵⁷ *Id.* At pg. 17;

⁵⁸ *Id.* At pg. 17;

⁵⁹ *Id.*, at pg. 17;

⁶⁰ *Id.* at pgs. 17-18;

⁶¹ *Id.* at Pg. 21

⁶² *The Atlantic*, Andrew Cohen, May 7, 2013 “Hours before execution, a state court grants Willie Manning a Stay” <http://www.theatlantic.com/national/archive/2013/05/hours-before-execution-a-state-court-grants-willie-manning-a-stay/275631/>

⁶³ *The Atlantic*, Andrew Cohen, May 2, 2013 “A Ghost of Mississippi: the Willie Manning Capital Case” <http://www.theatlantic.com/national/archive/2013/05/a-ghost-of-mississippi-the-willie-manning-capital-case/275442/>

case received three letters from Special Counsel for the U.S. Justice Department that acknowledged misleading exaggerations in the testimony of the FBI Laboratory examiners concerning the ballistics and hair evidence.⁶⁴ A scant four hours before Manning was scheduled to be executed, the Mississippi Supreme Court voted 8-1 to grant an abrupt stay pending further orders of the court.⁶⁵ The case is ongoing.

State Crime Laboratory Microscopic Hair Analysis Cases:

Regrettably, the HMRP does not review cases in which flawed hair microscopy evidence was presented by state or local hair examiners. In April 2013, the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) issued an advisory to its members calling attention to the HMRP. Noting its ethical obligation to correct miscarriages of justice, the advisory stated:

It has recently been brought to ASCLD/LAB's attention that the FBI and the USDOJ are jointly in the process of reviewing pre-1999 microscopic hair comparison cases. ... The purpose of this notification is not intended to highlight the events taking place in the FBI laboratory, but to raise awareness within the forensic science community and the criminal justice system that there may be a broader need for review of reports and testimony provided in microscopic hair comparisons made prior to the routine implementation of DNA technology in hair comparisons.⁶⁶

Reimer notes that the Texas Forensic Science Commission has taken steps to commence a review of hair microscopy cases conducted by the local Texas laboratories. "It remains to be seen whether and to what extent local prosecutors will follow the model set by the FBI and DOJ and similarly embrace a duty to correct."⁶⁷ NACDL and the Innocence Project have concluded that they will assist counsel to correct the wrongs done to clients, although no funding is currently earmarked to assist with mounting post-conviction challenges to the erroneous scientific opinions or conclusions found by HMRP.⁶⁸

Kentucky Case Law and Statutes:

In 2004, Professor of Law Michael Saks wrote a prophetic article for the *Advocate* critical of the holding in *Johnson v. Commonwealth*, 12 S.W.3d 258 (Ky. 1999).⁶⁹ Professor Saks reasoned the Kentucky Supreme Court had misapplied the *Daubert* standard for admissibility of the microscopic hair

⁶⁴ <http://www.scribd.com/doc/139932883/DOJ-Letter-Manning-ballistics>
The Atlantic, Andrew Cohen, May 6, 2013 "Feds Acknowledge Scientific Errors in Willie Manning's Case"
<http://www.theatlantic.com/national/archive/2013/05/feds-acknowledge-scientific-errors-in-testimony-in-willie-manning-case/275559/>; See also <http://www.scribd.com/doc/139767216/DOJ-Letter-Manning-case> ;
<http://www.scribd.com/doc/139768317/DOJ-Letter-in-Manning-Case-May-2nd>

⁶⁵ <http://www.scribd.com/doc/140011413/60367803-v1-Order-Granting-Stay>;
http://www.innocenceproject.org/docs/Manning_Stay_of_Execution.pdf

⁶⁶ *Id.* At pg. 18

⁶⁷ *Id.* At pg. 21

⁶⁸ *Id.* at pg. 21;

⁶⁹ "*Johnson v. Commonwealth*: How Dependable is Identification by Microscopic Hair Comparison?" *The Advocate*, Vol. 26, No. 1, January 2004, pgs. 14-19;

comparison technique. In *Johnson*, the Court deemed identification by microscopic hair comparison as a scientific technique so dependable and reliable as to allow the proponent to move for judicial notice of its trustworthiness--effectively bypassing the *Daubert* test altogether. Pursuant to KRE 201 Courts are:

...right to admit or exclude much evidence without “reinventing the wheel” every time by requiring the parties to put on full demonstrations of the validity or invalidity of methods or techniques that have been scrutinized well enough in prior decisions to warrant taking judicial notice of their status...Although we have never specifically addressed the scientific reliability of this method of hair analysis, we must assume that it at least satisfied the *Frye* test of general acceptance; for otherwise, the evidence would never have been admitted in the first place. The absence in our previous opinions of any in-depth analysis under the “general acceptance” test was probably due to the overwhelming acceptance of this procedure as a reliable scientific method for the past fifty years.⁷⁰

Professor Saks disputed that reasoning:

What is most paradoxical about the opinion is that, pursuant to new law which plainly conditions admission of expert evidence on a scientific-minded appraisal (that is, a look at the relevant empirical data) of the expertise at issue, the conclusion that hair comparison is “scientifically reliable” is arrived at without any judge at any time having to look at any studies or data whatsoever. Nothing could be more at war with the letter or spirit of *Daubert*...⁷¹

In a contemporary case, the Court appears ready to double down on the flawed *Johnson* premise. In 2011, in Fayette County Circuit Court, defendant Timothy Meskimen’s defense team requested a pre-trial hearing, citing, *inter alia*, the 2009 NAS report’s conclusions regarding microscopic hair comparison. The motion was summarily denied by the trial court. Meskimen testified that he killed the victim in self-defense and in defense of another. The jury found him guilty of Manslaughter in the First Degree. During the trial, two hairs were used against Meskimen: one pulled from a large piece of wood that the prosecutor concluded hit the victim in the back of the head, and one located on the toe of the Defendant’s boot. The prosecution implied to the jury that the hair was located on the boot because the Defendant stomped on the victim’s face. The KSP Forensic Laboratory examiner testified that the recovered hairs were similar to the victim in color and microscopic characteristics. She then testified that the hair from the wood appeared to be Caucasian, while the facial hair from the boot appeared be of mixed race. Meskimen’s appeal was decided in April 2013, however, a petition for rehearing was filed by the defense on other grounds, thus, the case is not yet final. The opinion issued by the Kentucky Supreme Court, as it stands currently, upheld the trial court’s taking of judicial notice and agreed with the refusal to grant a *Daubert* hearing regarding hair comparison analysis. However, the Court advises trial courts to be aware that forensic science is ever changing,

It is up to the trial courts to stay abreast of currently accepted scientific methods, as they are the gatekeepers for the admissibility of evidence. Therefore, even though case law may be in acceptance of a certain method of analysis, it is the trial court's duty to ensure that method is

⁷⁰ (*internal citations omitted*) *Johnson v. Commonwealth*, 12 S.W.3d 258, 261,262 (Ky. 1999) ;

⁷¹ *Id.* at pg. 18;

supported by scientific findings, or at least not seriously questioned by recent reputable scientific findings, before taking judicial notice of its acceptability. That of course was not the case here, thus, we find no error.⁷²

Kentucky Innocence Project Cases:

Ironically, roughly six months after the *Johnson* decision, the first DNA exoneration by the national Innocence Project in Kentucky involved a mistaken hair microscopy finding in the Jefferson County case of William Gregory. Hair was recovered in a stocking cap left behind by the assailant in a rape, attempted rape and burglary case of two victims. After a KSP Forensic Laboratory microscopic hair examiner testified that the hair belonged to Mr. Gregory, he was convicted and sentenced to 70 years. MtDNA testing revealed that Mr. Gregory was not the source and he was released in 2000 after serving 7 years. Mr. Gregory received a settlement of \$4.6 million after it was revealed that detectives withheld exculpatory evidence of two other comparable rapes in the same area at the same time period.⁷³

In 2009, the Kentucky Innocence Project moved for DNA testing of all the hairs found at the scene of a murder, several of which were found clutched in the victim's hand. The autopsy revealed that the victim had been stabbed multiple times, and had defended herself in close combat. The request to conduct DNA testing was denied by the prosecution and the trial court.⁷⁴ In its ruling on the appeal of the denial of testing, the Kentucky Supreme Court noted the circumstantial nature of the case and the importance of the hair evidence at the trial. "The hairs were analyzed using the available technology at the time, *i.e.*, microscopic comparison to hair standards taken from the victim, Hardin, and Clark."⁷⁵ This spring, a unanimous Kentucky Supreme Court acknowledged that defendants Jeff Clark and Keith Hardin were entitled to DNA testing of hairs that had been analyzed only by the use of a microscope in 1992. The ruling once again upheld a post-conviction process for defendants to have previously untested biological evidence DNA tested.

Conclusion: Microscopic Hair Comparison Analysis--On its way to Obsolescence, Junk Science, or Simply More Prejudicial than Probative?

As noted above, the failure rate of microscopic hair analysis found *in the FBI's own study* is 12.5%; or put another way, one out of every eight comparisons is simply wrong. Unfortunately, cases involving the death penalty and or lengthy prison sentences are still determined based upon this faulty technique. The HMRP may find yet more cases of outright mistakes in the testing of hairs, just as they have found error in the overreaching testimony of examiners. Looking at the *über* cautious guidelines for testimony agreed upon for use in the HMRP, is microscopic comparison of hair evidence even probative enough to be admissible or is it simply well-intentioned quasi-scientific opinion testimony whose time has passed?

⁷² Footnotes omitted. *Meskimen v. Commonwealth*, 2011-SC-000709-MR, 2013 WL 1777089 (Ky. Apr. 25, 2013)

⁷³ <http://dpa.ky.gov/kip/ca.htm>;

http://www.innocenceproject.org/Content/William_Gregory.php;

<http://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=3263>

⁷⁴ In 2009, post-conviction DNA testing was statutorily limited to only those defendants sentenced to death. In the spring of this year, the Kentucky General Assembly passed HB 41 expanding access to post-conviction DNA testing under KRS 422.285. The Bill was signed into law by Governor Beshear on March 22, 2013. The bill was sponsored by Representative Johnny Bell (D-Glasgow) and supported by Senator John Schickel (R-Union), who had advocated a related bill in the Senate.

⁷⁵ *Hardin v. Commonwealth*, 396 S.W.3d 909, 911 (Ky. 2013).

The general consensus is that identifications supported by the use of DNA testing possess greater reliability. This leads to the conclusion that microscopic hair analysis, standing alone without DNA corroboration, is simply obsolete. Ultimately, more research is necessary to say whether it is safe to use as a way to discern which hairs are worthy of the more costly DNA testing. Bullet Lead Comparison Analysis was discredited and then discarded by our courts when the FBI determined it would no longer conduct examinations of bullet lead.⁷⁶ We may just be witnessing the last gasps of hair microscopy as a recognized method and if this is true, what will its demise portend for the other suspect forensic science techniques revealed by the NAS Report?

The KSP Crime Laboratory continues to perform microscopic hair comparisons. Whether a hair that is determined to be similar or different is followed up with DNA testing, either nuclear or mitochondrial, is case-specific.⁷⁷ When asked about the HMRP, the KSP Forensic Laboratory responded, “The Kentucky State Police Laboratories are reviewing testimony in death penalty cases where forensic hair examinations were conducted by employees of the agency. KSP will continue working with the prosecution and defense in an impartial manner to ensure that KSP adheres to scientifically accepted standards in forensic analysis in all cases.”⁷⁸

Currently, there are no identified and published error rates for the microscopic hair comparisons conducted by the KSP Crime Laboratory, nor has the testimony of Kentucky examiners been reviewed for the errors identified by the FBI and the HMRP. This is all the more troubling in light of the fact that our own Kentucky Supreme Court is poised to keep the burden shifted onto the shoulders of the Defendant to prove that the “scientific” evidence against him or her is unreliable.

Nevertheless, the collaborative, transparent process envisioned by the parties involved in the HMRP promise a better tomorrow for those committed to accurate convictions based on best evidence standards. Maybe at the end of this historic HMRP, the results given to concerned parties will prompt an analysis of all microscopic hair comparison cases conducted by the Kentucky State Crime laboratory, in conjunction with the Kentucky Department of Public Advocacy, the Kentucky Innocence Project, the Kentucky Association of Criminal Defense Lawyers and the Kentucky Department of Justice.

⁷⁶ <http://www.fbi.gov/news/pressrel/press-releases/fbi-laboratory-announces-discontinuation-of-bullet-lead-examinations>.

⁷⁷ May 24, 2013 Email from KSP Crime Laboratory Hair Technical Leader Trace Evidence Unit, Kentucky State Police Central Forensic Lab

⁷⁸ November 11, 2013 Email from KSP Forensic Laboratory Director.