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REPORT OF FINDINGS

People v. Gary Leiterman
No. 04-2017-FC

This report is being submitted in my capacity as an expert on behalf of Gary Leiterman in connection with his appeal in *People vs. Gary Leiterman.*

Attorney Mark Satawa requested my review of the laboratory's testing procedures, results, and conclusions, in connection with the above referenced matter. In addition, it was requested that I review all hearing and trial transcripts from the proceedings. Ultimately, Attorney Satawa asked that I provide him with an opinion regarding the reliability of testing in the case. Further, he requested my comments regarding the defense's effectiveness in establishing and conveying throughout the proceeding the reliability of the DNA analysis performed by the Michigan State Police's Forensic Science Division.

I. GENERAL OVERVIEW OF FINDINGS AND CONCLUSIONS

Jane Mixer, a 23-year-old University of Michigan law student, was murdered in March of 1969. While attempts were made through the years to investigate and solve this crime, no significant leads towards the identification of suspects in the case were made until early 2002 when evidence from the case was subjected to DNA analysis.

Initially, testing performed by Dr. Steven Mulligan at the MSP laboratory detected two different and distinct profiles on items of evidence. Ultimately, these profiles were uploaded to the Combined DNA Indexing System (CODIS) for comparison to profiles of previously convicted offenders.

In December of 2003, a routine cross-indexing search of the CODIS database revealed an association between a profile detected on evidence taken from the victims left hand (a drop of blood) and a profile on record for John Rueles. Mr. Rueles had previously been convicted of murdering his mother based in part on the results of DNA testing performed by the MSP in early 2002. As a convicted offender, his profile was later placed on recorder in the CODIS database.

The following year in August of 2004, an additional search of CODIS produced an association between other evidentiary items in the Mixer case and Gary Leiterman, the defendant

here. Mr. Leiterman's DNA profile was on record with CODIS having previously been convicted of fraud involving prescription drugs. A known DNA reference sample from the defendant was submitted to the MSP for testing and submission to CODIS in early 2002, coincidentally the same period of time in which evidence in the Mixer case was being analyzed.

Perhaps of greater significance, a review of the MSP testing records reveals that Mr. Rueles, the individual detected on evidence from the victim's hand, was 4 years old at the time of the crime in 1969. By all investigative measures, no connections were ever established between Mr. Rueles, the crime scene, or the case, except one. Samples tested in connection with the murder of Mr. Rueles' mother contained his DNA. Remarkably, these samples had also been tested contemporaneously with evidence in the Mixer case.

Only three possibilities can account for the finding of Mr. Rueles' profile on the victim's hand: *i*) at the age of four, Mr. Rueles was at the scene of the crime, *ii*) an individual with the same DNA profile as Mr. Rueles was at the scene of the crime, *iii*) a cross contaminated event involving samples from two separate cases occurred.

With respect to the first explanation, the record shows that an exhaustive effort was undertaken to explore this highly unlikely proposition, however no connection was ever made. In the case of the second possibility, the record shows that the probability of another individual sharing the same DNA profile as Mr. Rueles' vastly exceed 1 in 6 billion, the earth's population. However, in light of the concurrent processing of evidence in the Rueles and Mixer cases within the lab, a contamination event clearly seems the most logical explanation for the unexplained finding of Mr. Rueles' DNA on evidence in the Mixer case.

A laboratory's results, and by extension conclusions, are only as good as its ability to account for unexpected results. More often than not, the failure to detect the unexpected ultimately leads to the reporting of false positive results. The record clearly shows that the laboratory never proffered a reasonable explanation for the finding of Mr. Rueles' profile on evidence in the Mixer case because they could not. The testing controls, which they claim were designed to alert them to such unexpected results or contamination events, did not detect this event, and the quality control and assurance systems the laboratory had in place were willfully inadequate. The laboratory's detection and recognition that Mr. Rueles' profile represented an unexpected result only occurred by virtue of one fact, Mr. Rueles' age in 1969. He was four years old at that time.

It is my opinion that the coincidental presence of Mr. Leiterman's DNA in the lab during the same period of time as the processing of evidence in the Mixer case represents a highly unexpected event as well, one I believe the laboratory chose to ignore to the benefit of the State's theory of events. In the absence of a rational explanation for the unexpected and presumably false-positive finding involving Mr. Rueles, it is my opinion that the results of the DNA testing performed in connection with this case, including those results used to implicate Mr. Leiterman, are unreliable. Further, following a review of the laboratory's testing data, case file materials, and proceedings transcript, it is my opinion that the defendant's counsel, Attorney Gary Gabry, failed in his efforts to effectively establish these facts at trial.

II. QUALIFICATIONS

I am a former faculty member, employee, and student of the Johns Hopkins University, Departments of Immunology and Infectious Diseases, Molecular Microbiology and Immunology, and Pathology. Currently I serve as principal of Applied DNA Resources.

Over the past 22 years I have had the opportunity to design, utilize, and review a wide range of DNA typing technologies utilized in the research, medical, and forensic communities.

In conjunction with my former and present positions, I have extracted the DNA from thousands of specimens and performed an equal number of Polymerase Chain Reaction (PCR) procedures. In addition, I am familiar with the electrophoretic assays associated with the detection steps of such tests, having utilized and witnessed these procedures on numerous occasions. I am also familiar with the interpretation of data generated in association with such methodologies, having reviewed the testing and case file information associated with more than 225 cases involving forensic DNA testing, including 38 cases in the State of Michigan.

I have been qualified more than 35 times at both the State and Federal levels as an expert in the use and application of DNA typing, notably the use of PCR based detection of Short Tandem Repeats (STR). Attached you will find my Curriculum Vita, which is hereby made a part of this affidavit (Appendix 1).

III. DOCUMENTS EXAMINED AND REVIEWED.

Attorney Satawa provided me with the following items for my review:

Case File Materials

- Case file materials, reports, and testing data generated by the Michigan State Police's Forensic Science Division in connection with their testing in the case.
- Case file materials and reports generated by ReliaGene Technologies in connection with their testing in the case.
- Case file materials and reports generated by Bode Technologies in connection with their testing in the case.
- Additional case file material - State and Defenses motions, stipulations, original investigative reports, and meeting summaries.

Transcripts

- 05/10/05 pretrial and motion hearing
- 06/27/05 evidentiary hearing
- 07/05/05 pretrial and motion hearing
- 07/06/05 evidentiary hearing
- 07/12/05 trial transcript
- 07/13/05 trial transcript
- 07/14/05 trial transcript

- 07/15/05 trial transcript
- 07/16/05 trial transcript
- 07/19/05 trial transcript
- 07/20/05 trial transcript
- 07/21/05 trial transcript
- 07/22/05 trial transcript

IV. BACKGROUND - FORENSIC DNA IDENTIFICATION UTILIZING PCR-BASED DETECTION OF STRs

1) Deoxyribonucleic Acids: DNA found within living cells encodes all the information necessary for the structural and functional processes we call life. With respect to humans, DNA can be found in the nucleus of cells in a double stranded form that is made up of approximately 3 billion chemical units termed nucleotide bases. Stored in structures called chromosomes, DNA is made up of only four of these bases (A, C, G, and T), which repeat in a seemingly random manner.

The term Loci designates a location or address somewhere along the DNA molecule. A locus can be used to describe the location of a particular gene or a region in which a particular DNA sequence resides.

The testing performed in this case relies on the identification and typing of regions of DNA termed Short Tandem Repeats (STR). Within these regions, or loci, specific repeats of the genetic alphabet can be found. For example, an STR could be composed of seven repeats of the following DNA sequence:

1 2 3 4 5 6 7

ATG (bases A, T, and G) --**ATG|ATG|ATG|ATG|ATG|ATG|ATG**--

Approximately 60,000 to 80,000 STRs are thought to exist in human genome. What makes STRs attractive as a tool in human identity testing is the fact that many STRs are polymorphic or vary between individuals.

For example, the STR outlined above may exist in the Human population in 5 different forms, each varying by one additional repeat of the sequence "ATG" (Example below). Some individuals may carry a form that has 7 repeating elements, and other individuals the form with 10 repeats.

Repeats

(7) **--ATG|ATG|ATG|ATG|ATG|ATG|ATG--**

(8) **--ATG|ATG|ATG|ATG|ATG|ATG|ATG|ATG--**

(9) **--ATG|ATG|ATG|ATG|ATG|ATG|ATGATG|ATG--**

(10) **--ATG|ATG|ATG|ATG|ATGATG|ATG|ATG|ATG|ATG--**

(11) **--ATG|ATG|ATG|ATG|ATG|ATG|ATGATG|ATG|ATG|ATG-**

Each varying form of the STR is termed an Allele. With respect to the nomenclature employed in forensic DNA testing each possible allele at each of the STRs tested is assigned a number representing the number of repeats present at that STR. In the example above, five possible alleles exist and they are given the numbers 7 through 11.

2) Polymerase Chain Reaction: The testing in this case utilizes an exquisitely sensitive methodology referred to as the Polymerase Chain Reaction (PCR). PCR allows for the *en mass* copying of DNA *in vitro.* Frequently analogized as a process akin to "genetic Xeroxing", PCR turns small amounts of DNA into easily testable quantities.

In general, DNA testing utilizing this methodology involves four basic steps: DNA extraction, PCR amplification, Detection, and Analysis. While DNA extraction and PCR have been in existence for many years at the research level, the application of Capillary Electrophoresis, utilized in the detection step, is a relatively newer advent, as is the use of computer software for the analysis.

V. GENERAL ISSUES EFFECTING ACCURACY AND RELIABILITY

1) Contamination and Precautions Utilized to Avoid its Occurrence: In the research setting, PCR allows investigators to genetically amplify the DNA contained in as little as five to ten cells into analyzable quantities. The technique's extreme sensitivity, however, is its Achilles Heel, a fact that all scientists using the technique would agree upon. Inadvertent introductions (contamination) of small amounts of exogenous DNA into a sample can just as easily and efficiently be amplified as the DNA truly associated with the sample.

From PCR's inception, those utilizing the method have understood this limitation and the need to take great care in the design of one's laboratory and handling of samples. In this regard,

all scientists using the technique would agree that separate processing of samples of known and unknown origins with respect to time and space is essential. This is to say that samples of known and unknown origin should never be worked upon during the same period of time and / or in the same physical space. Equally important, unknown samples should always be processed from the beginning to the end of the procedure before any operations are performed on the known samples.

In addition to these precautions, universally accepted safeguards that should be in place include: utilizing validated approaches, establishing stringent chain of custody rules, practicing good laboratory technique, processing samples in biological safety hoods, separating pre- and post-PCR processing, and allowing only the unidirectional movement of specimens through the lab. The extent to which all of these precautions, and others, have been taken is therefore highly relevant when considering the reliability of results generated in any particular case.

2) Controls: Perhaps one of the most important components in detecting the occurrence of contamination events is the use of negative controls. Negative controls by definition are laboratory prepared samples that contain no DNA, are run in parallel with the samples in a test, and expected not to produce any detectable results at the conclusion of the analysis.

While controls are a necessary ingredient in the detection of contamination, they are by no means perfect given the fact that contamination events associated with PCR-based testing come in two forms, global and sporadic.

Global contamination events involve the inadvertent introduction of DNA into a component of the testing that is common to all the specimens being tested. In practice, negative controls detect this form of contamination in an almost flawless manner.

With respect to sporadic contamination, however, the effectiveness of negative controls becomes as random as the contamination itself. Because every sample in a test, including the controls, is performed in a separate test tube, events that effect one sample are largely mutually exclusive of the events occurring in other samples. For example, one can introduce extraneous DNA into one testing specimen without affecting another. In the same way, a contamination event involving a piece of evidence can occur without involving the negative control sample. In the lab, such events typically occur as a result of sample-to-sample transfers of DNA within a batch of evidentiary items being tested. It is quite possible for such transfers to occur without the affecting the control samples.

3) Proficiency: In 1994, Congress passed the DNA Identification Act. A portion of this Act established a requirement that forensic laboratories undertake "Blind External" proficiency testing on a regular basis. The DNA Advisory Board (DAB) was also established under this act and charged with the responsibility of issuing standards for forensic DNA testing in the United States (Appendix 2).

The DNA Identification Act defined blind external testing as being proficiency tests administered to laboratory personnel by an outside agency with the appearance of being routine casework. Testing performed in this manner differs from "open" proficiency testing where the examiner knows in advance that they are to be tested.

While originally calling for blind proficiency testing, the Act also allowed members of the DAB to determine if such testing was feasible or not. And while Congress' original intent was testing performed in a blind fashion, the DAB ultimately chose to opt for implementing testing in an open format.

4) Error Rates: In the forensic setting, DNA testing results are always associated with the reporting of statistics involving match probabilities. A report may read, for example, that the profile of the suspect and that seen on the evidence match, and that the probability of selecting a random person from the population with the same profile is "X", typically a very large number.

In this context, the reporting of such statistics is a form of error rate and courts have long required the reporting of such statistics in order to establish the meaningfulness of the term "match" when reporting results. While the reporting of such statistics attempts to establish the probability that an individual has been wrongly associated to evidence in a case, it neglects the very real possibility of a procedural laboratory error.

Today, the random match probability statistic reported in the typical forensic case often exceeds the population of the Earth. Given the complex nature of DNA testing and its susceptibility to all manners of human mistakes, it's reasonable to conclude that the probability of procedural errors must be larger than the typical case associated random match probability. Because the potential for laboratory error, by any measure, must be larger than that of mistakenly implicating an individual, it is my opinion that laboratory error rates should be determined and reported with the goal of truly establishing the reliability of any reported match.

One subset of information that could assist in establishing such error rates is proficiency test results. Regrettably, because such tests are performed in an open manner, they cannot be used to establish a reliable measure of error.

A second subset of data that can be utilized to establish an individual laboratory's propensity for error can be found in the Error and Discrepancy logs mandated by the DAB Standards (Appendix 2, section 14.1.1).

Sometimes referred to as Corrective Action files, this information forms an important part of a laboratory's quality control and assurance programs by mandating the documentation and maintenance of records related to errors occurring within the lab (Appendix 3 - Example of such documentation). The centralized collection of such data allows laboratory management to quickly and efficiently identify and address systematic problems effecting the reliability of testing results. Further, this information also allows accreditation auditors to easily establish the dependability of the laboratory's work product.

Because forensic laboratories are frequently large organizations comprised of many individuals working separately, the collection and maintenance of such data is not only necessary but also essential to ensuring the reliability of the conclusions proffered in Courts. In its absence, the ability of a laboratory to ensure that mistakes are detected and correct is diminished.

5) Errors - Unexpected and Undetected: Since the introduction of DNA identification technologies in the late 1980's, forensic laboratories have implemented a variety of standards and safeguards to protect the reliability of test results. As one would predict, these efforts have resulted in the discovery of a wide variety of detectable errors.

Detectable errors range from the minor to the major and typically involve human error, and less often malfeasance. Common errors such as sample mix-ups, mislabeling, interpretive and statistical errors have been reported in Arizona, Kansas, North Carolina, Pennsylvania, and Virginia (Appendix 4).

On a more serious level, problems involving wrongdoing or alleged wrongdoing have been reported in Florida, Indiana, Michigan, and Texas (Appendix 5). Similar problems have been reported at Army and FBI laboratories, and also at the private organization such as Cellmark Diagnostics (Appendix 5). The types of incidence reported here typically involve

issues ranging from the failure to run negative control samples to the falsifying of data to hide testing errors.

While the detection of human error is always challenging, current strategies for the detection of errors associated with the extreme sensitivity of PCR take the approach of attempting to detect unanticipated or unexpected results.

Examples of such successes include the detection of serious errors in laboratories in Florida, Illinois, Minnesota, and Washington State (Appendix 6). The types of incidences reported here include examples of the detection of contamination events involving evidentiary samples and the DNA of laboratory employees or from unrelated casework. With respect to the latter, investigation of such events has almost always revealed that the root cause of such problems stems from the processing of known and unknown samples in the same time and space.

It must be noted however that contamination errors have been documented where no direct processing link between sample and contaminant have been established, raising the specter that a source of contamination can linger in a laboratory for some time.

One example of such is the detection of two laboratory employee's profiles in a case processed by the Minnesota Bureau of Criminal Apprehension (BCA). In this case, DNA from these employees was demonstrated in two separate instances despite the fact that these individuals had no relationship to the processing of any evidence in the case. Remarkably, a second error can be seen in the corrective action documentation of this event. Here the reviewer notes that one of these employees is excluded as a contributor to the contamination samples, when in reality the are not (Appendix 7).

A second example of this sort was reported in Australia and involved the detection of an individual's DNA on evidence in connection with the brutal murder of a toddler (Appendix 7). Following a long investigation of this suspect, who could not be connected to the crime by either proximity or circumstance, it was determined that samples of this woman's DNA had previously been processed by the laboratory in connection with a rape in which she had been the victim. Here it was ultimately determined that a contamination event most likely explained the detection of her DNA on the evidence.

Similarly, a case not unlike the one my report deals with here, was reported in New Jersey. Here, the laboratory had performed testing in a connection with the 1968 rape and murder of a 13-year-old girl (Appendix 7). In this case, the laboratory initially identified a suspect following a comparison of a DNA profile detected on the evidence to the CODIS database.

During its preparation for trial, the laboratory revealed to the State that the suspect's CODIS reference sample had been tested during the same period of time as the testing of evidentiary samples. As a result of this revelation, the State dropped its charges against this individual, acknowledging that this remarkable coincidence more than likely represented the detection of a laboratory error, which ultimately affected the reliability of any conclusion concerning this individual's role in the crime.

V. CASE SPECIFIC OBSERVATIONS IN SUPPORT OF FINDINGS AND OPINION

REVIEW OF LABORATORY TESTING

1) Contemporaneous Processing of Samples in the Mixer and Rueles Cases

Rueles Case: Because the defense did not request the laboratory's case file associated with the Rueles matter, it is difficult to establish an exact timeline of events in this case. Here I have relied upon the 7/14/05 trial testimony and reports provided by Sarah Thibault, the laboratory technician responsible for this testing

Ms. Thibault testified (7/14/05, pg. 163, line 16) that she received items in the Rueles case on 1/29/02 and processed these for analysis on 2/21/02 (pg. 175, line 1). Further, her report indicates that she initiated DNA testing on these items on 2/27/02. The items of evidence here included a shirt, one sock, and a reference sample from the victim, Mr. Rueles' mother.

Ms. Thibault completed her analysis of these samples on 7/3/02, however, the bulk of her handling of the samples occurred in between the month of March and the first week of April 2002 (7/15/05, pgs. 24- 28).

The results of this testing indicate that a profile consistent with the victim was detected on the defendant's (Mr. Rueles) socks and shirt. With respect to the shirt, a mixture of two individuals was detected, one associated with the profile of the victim and the other later determined to be associated with the defendant.

Mixer Case: Laboratory records show that Dr. Steven Milligan received evidentiary items associated with the Mixer case on 10/24/01, at which time he examined the evidence for processing at a later date. These items included: finger nail clippings from the victim, head hairs, pubic hairs, blood from the victim's hand, a pair of panty hose, and a towel.

On 3/26/02, Dr. Milligan began processing for DNA analysis samples taken from all of the above items of evidence with the exception of the fingernail clippings, head hairs, and pubic hairs. Dr. Milligan completed this initial round of the analysis on 4/9/02.

The results of the testing here indicated profiles consistent with the defendant on the panty hose and towel. It's important to note that many of the profiles detected on these items were partial profiles, with anywhere from 2 to 7 out of 13 genetic markers yielding results. Equally important is the low probative value of the statistical significance attached to the consistency between the profiles detected here and Mr. Leiterman's profile.

With respect to the sample of blood taken from the victim's hand, these results clearly demonstrated a profile consistent with John Rueles.

Rueles and Leiterman CODIS Reference Sample: The record indicates that Mr. Rueles' reference sample for inclusion into the CODIS database was submitted to the laboratory on 7/19/02 It was then outsourced to a private laboratory for testing in August of 2002 (Trial transcript, 7/14/05, pg. 136, line 23 through pg. 137, line 8).

Mr. Leiterman's CODIS reference sample was received by the laboratory 2/22/02, just prior to the testing in the Mixer case. It was then processed by the MSP lab between 7/17/02 and 7/23/02 (7/14/05, pg. 145, line 18). Interestingly, the lab was unable to generate a result on its

first attempt at testing this sample. A second successful attempt at generating a profile from this sample was performed on 1/20/04.

The record clearly shows that samples from the Mixer case where processed during the same period of time as those in the Rueles case. It also shows that Mr. Rueles' DNA was detected on evidence in the Mixer case. Further, a known DNA sample belonging to Mr. Leiterman's was also shown to be present in the lab during this time frame. The unexpected and never accounted for finding of John Rueles' profile on evidence in the Mixer case clearly demonstrates the proposition that contamination can and does occur between samples from different cases.

2) Testing Failure Involving Mr. Leiterman's CODIS Sample

As previously mentioned, Mr. Leiterman's CODIS reference sample was received by the laboratory on 2/22/02, a period of time that testing in the Mixer case was also being performed. In July of 2002, the laboratory tested his CODIS sample but failed to obtain a result. While the lab eventually generated a profile in connection with his sample in January of 2004, only two possibilities can account for this initial testing failure: *i*) tests do occasionally fail from time to time, *ii*) the original sample was in some way depleted of DNA suggesting at least the possibility that a portion of the original sample had undergone some form of transfer.

At trial Julie French, CODIS administrator, explained that the buccal swabs taken from convicted offenders are pressed onto a special form of chemically treated paper called FTA paper for storage. FTA paper has the ability to bind and preserve DNA (Trial transcript 7/14/05, pg. 129, line 7). When placed in contact with FTA paper, cells in a sample are supposed to burst open with the result being the binding of their DNA to the paper. There is no guarantee however that all cells applied to such paper will burst open. There also is no guarantee that all of the buccal sample will be directly deposited onto the FTA treated regions of the CODIS submission form. Such cells would still be capable of being transferred.

The testing failure associated with Mr. Leiterman's CODIS sample and the indication that a portion of the sample could have possibly undergone some form of transfer represents an additional coincidence in this case, one which in my opinion casts further doubt on the reliability of the testing.

3) Degraded Samples Suggest Contamination from an Outside Source

With respect to the victim's panty hose and a drop of blood found on her left hand, one would reasonably expect to find the victim's DNA on these items since the transfer of cells containing her DNA is almost certain to have occurred.

In the case of the panty hose, one would expect the deposit of considerable numbers of the victim's cells (and DNA), given the fact that: *i)* the victim was wearing the panty hose for some period of time prior to the crime and *ii)* additional cells and DNA, deposited as a result of sweat and friction, were more than likely to have been left on this item in the course of her abduction and murder. Similarly, skin cells belonging to the victim would have been transferred during the collection of the drop of blood from her left hand.

Remarkably, the record shows the victim, at best, to be a minor contributor of DNA to these items. Testing data shows her profile as barely detectable to absent. While this might seem problematic, degradation of the DNA deposited on these samples is not unexpected over the course of nearly 35 years. Not surprisingly, review of the testing data reveals such degradation of the DNA associated with the minor DNA profile detected here, presumably the profile of the victim.

What is surprising however, is the finding of DNA from major contributors on these items in vast excess to that likely to have been contributed by the victim. In the case of the panty hose, a profile consistent with that of Mr. Leiterman's was detected, while a profile matching Mr. Rueles was demonstrated on the drop of blood. Interestingly, the State's theory of events requires the DNA from these two individuals to have been deposited on theses evidentiary items at the time the crime was committed, more than 35 years ago.

Ignoring Mr. Rueles for the time being, one would at the very least expect Mr. Leiterman and Miss Mixer to have deposited their DNA to these items in somewhat equal quantities. Any argument that the victim could only have contributed a small amount of DNA to the panty hose has not been shown. If Mr. Leiterman and the victim contributed DNA to this item in 1969, then one would expect their DNA to degrade at similar rates. This however is not what the testing data shows. A profile consistent with that of Mr. Leiterman's is clearly present on some portions of the panty hose.

Even if Mr. Leiterman had contributed more DNA to this item than Miss Mixer, the results of the testing show his contribution vastly outweighs that of the victim. Judging from the testing records, at least a 100-fold excess of Mr. Leiterman DNA was detected in comparison to the minor contributor, again most likely the victim's DNA.

For the State's theories to be supportable, the testing data would have to demonstrate here that: *i)* Mr. Leiterman left copious amounts of DNA on Miss Mixer's panty hose as a result of simply carrying her body, *ii)* the victim left very little DNA on her own panty hose, and *iii)* over time, degradation left the victim's profile nearly undetectable, yet not Mr. Leiterman's. In my opinion the data does not support any of these proposition, further pointing to the unreliability of the testing. Instead the data suggests the very real possibility that Mr. Leiterman's DNA came to be on the panty hose at a more recent point in time.

With respect to the detection of Mr. Rueles' profile on the victim's hand, the same situation exists. Mr. Rueles' DNA is present in vast excess to that of the minor contributor, again presumably the victim since the sample was scraped from her hand. One must also consider the fact that the record shows the victim and Mr. Rueles both had type (A) blood, the same blood type as that detected on the victim's hand. In addition, we know that Mr. Rueles' DNA here is apt to be a contaminant since no better explanation has been offered. Further, degradation involving the minor contributor's profile appears to be present in this sample as well. Given these facts, one could reasonable conclude that this blood is not Mr. Rueles' but the victim's own, having originated from the wound that killed her.

It is therefore my opinion that the blood on the victim's hand is likely to be her own, and that Mr. Rueles' DNA came to be in this sample via a laboratory contamination event.

4) Lack of Centralized Corrective Action Files and Error Log: During the period of time testing was performed in this case, the laboratory policy, as born out by the testimony of Ms.

Thibault, Dr. Milligan, and Mr. Nye, was to document testing errors only within the individual case file in which an error had occurred.

As previously mentioned, Corrective Action files and Error logs form an important part of a laboratory's quality control and assurance programs by centralizing the documentation of errors within the laboratory. Mandated by the DAB Standards (Appendix 2, section 14.1.1), such data allows laboratory management to quickly and efficiently identify and address systematic problems that affect the reliability of testing results.

Given the thousands of samples, hundreds of cases, and number of people handling casework within this laboratory, the lack of a centralize system to track errors and discrepancy indicates that the lab had no mechanism in place to identify and deal with systematic problems such as contamination events. The lack of any mention in the record as to how the laboratory dealt with such problems indicates that the laboratory management team was most likely relying on a "collective memory" approach to dealing with such issues. At the time of the testing in this case, the duty of establishing such safeguards would have fallen to the DNA unit's director at the time, Charles Barna.

5) Other Practices Impacting the Reliability of the Testing: During the course of my review, I encountered several instances where samples of known and unknown origins were processed in the same time and space. Having reviewed 38 cases involving testing performed by the MSP, I have observed this practice by the laboratory in the past in numerous times. In fact, it was the testimony of Ms. Thibault that she routinely processes samples from multiple cases at the same time given the labor-intensive nature of the testing (Trial transcript 7/14/05, pg. 197, line 9).

Ms. Thibault also alluded to this practice when she described the processing of the known reference sample of the victim in the Rueles case. Here she stated that she processed the known reference sample of the victim in the same time and space as the evidence, a shirt and a sock (Trial transcript 7/15/05, pg. 25, line 14). Qualifying her description of this practice, Ms. Thibault went to some lengths in her testimony to validate this approach as acceptable by describing that she processed one of these samples in the morning and the others in the afternoon. In my opinion the fact remains that this is a dangerous practice which goes against the recommendations of the National Research Council and the SOP's of most laboratories in this country (Appendix 8).

Given the unexplained results involving Mr. Rueles in this case, one can clearly imagine the potential for problems when known reference samples and unknown evidentiary samples from multiple cases are processed at the same time in the same space. In my opinion such practices further undermine the reliability of the testing in this case.

6) Limited Value of Repeat Testing and Failure to Test Other Items of Significance

Several items of evidence where subjected to additional testing by outside private laboratories in connection with this case. These included the blood found on the victim's hand, (sent to Reliagene Technologies) and a stocking (sent to Bode Technologies).

In both instances, the specimens tested by these labs were not primary samples directly taken from the original evidence. Instead, testing was performed on the DNA extracts originally prepared by Dr. Milligan from the evidentiary samples.

In my opinion this clearly impacts the reliability of the results generated by these laboratories since it's reasonable that these samples may have already been contaminated. In the case of the evidence showing Mr. Rueles' this proposition clearly seems to be the case. Unfortunately, repeating a test on an extract that has already been contaminated will yield nothing more then the same contaminated result.

Further compounding the limited probative value of this retesting is the fact that Dr. Milligan shipped the extract from the previously tested stocking together with Mr. Leiterman reference sample to Bode Technologies. Bode performed an exceedingly more sensitive form of PCR testing, Y-STR testing. Again, as previously referenced, the reliability of any result is diminished if known and unknown samples are processed together.

Despite all this additional retesting, the laboratory failed to request the testing of several other items of probative significance. These included the fingernail taken from the victim, and head and pubic hairs found on her body. With respect to these items, the lab could have easily sent the hairs out to be tested for maternally inherited mtDNA, and the fingernails could have been outsourced for testing of paternally inherited Y-STR DNA. Testing of these items could have helped establish the identity of a perpetrator, in addition to determining the significance of Mr. Rueles' and Leiterman's DNA on the other evidence.

7) Unreported Contamination in Connection with the Testing

On 4/3/02 Dr. Milligan prepared a sample from the panty hose for analysis (Appendix 9 - Evidence received worksheet, sample 1428.02A). Several weeks later on 4/19/02 he performed PCR analysis on this sample (Appendix 9 - Profiler Plus worksheet, sample 1428.02A). As a required part of this process, Dr. Milligan included a negative control sample labeled "NEG 041902". Following the detection and analysis steps, Dr. Milligan printed out the electropherograms associated with this testing on 5/7/02.

Review of the electropherograms associated with this negative control sample (NEG 041902) reveals that it was contaminated, a fact that cannot be disputed since Dr. Milligan himself labeled it with a note indicating as much (Appendix 8 - Electropherogram sample NEG 041902).

Remarkably, Dr. Milligan stated in his 7/15/02 testimony that no contamination events had occurred during the course of his testing and that if any had, he would have documented them in his reports (pg. 141-21 and 142-4). Equally difficult to rectify here is the fact that when asked if he had ever committed an error, Dr. Milligan's replied he could never recall making one. (pg. 162, lines 1-5)

A review of the laboratory's protocol indicates that samples containing such contaminates must be reported (Appendix 10 - Section 2.4.3.1.3). The protocol also states that if the profile detected in a contaminated control shares the same genotype(s) as that of samples that demonstrate an inclusion (Mr. Leiterman in this case), then the data from these related samples is void.

Dr. Milligan's failure to report this problem is in direct violation of the laboratory's protocol. Surprisingly, Dr. Milligan went to great lengths in his testimony (pg. 142, line 12 and pg. 161, line 20) to point out that following the laboratory's protocol is the means by which reliable results are generated and error eliminated.

It is my opinion, however, that faced with another extraordinary coincidence, Dr. Milligan's silence here about the occurrence of yet another problem ultimately effected the Jury's

perception regarding the reliability of the testing and the credibility of those performing the test. Whether or not he consciously choice to remain silent here is unknown, however the effect was the same. The Jury was undoubtedly left with the impression that no unexpected results had occurred in the course of his analysis, with the exception here being the finding of Mr. Rueles' profile on the victim's hand. It is my opinion, therefore, that the results here should have been voided as the SOP directs.

REVIEW OF HEARING AND TRIAL TESTIMONY

Following a review of all testimony given during the proceedings in case, it is my opinion that the defendant's counsel, Attorney Gary Gabry, failed in his efforts to effectively identify, establish, and argue the following issues and facts at trial.

1) Failure to Identify and Establish the Relevant Issues: Review of the transcripts and testing performed by the laboratory reveals that defense counsel Gabry, with the assistance of his expert, failed to identify and effectively argue those issues most relevant to establishing the unreliability of the testing, namely laboratory error and sample contamination. Attorney Gabry's main focus instead centered on a theory involving the secondary transfer of the defendant's DNA to items of evidentiary significance in the distant past.

Ultimately, Attorney Gabry failed to convey the true significance of laboratory error in relationship to the reliability of the analysis performed by the MSP and the State's theory of events.

2) Failure to Establish the Laboratory Lacked Adequate Quality Controls: Defense counsel, with the assistance of his expert, failed to establish and effectively argue that the laboratory lacked an adequate quality control and assurance (QC /QA) system, a direct violation of the principles and spirit of the DNA Advisory Board's (DAB) Standards for Forensic DNA testing and good laboratory practices in general (Appendix 2). In doing so, Attorney Gabry allowed the laboratory to portray such oversight mechanisms (centralized error logs, discrepancy log, and corrective action files), as optional.

Defense counsel also failed to establish the role the DNA laboratory's supervisor, Charles Barna, played in the set up and maintenance of the laboratory's QC /QA program. As laboratory director during the period testing occurred, Mr. Barna ultimately left his position and the MSP under the cloud of a scandal involving his falsifying of proficiency test results.

Because no centralized error documentation system existed in the laboratory, Counsel should have easily recognized and effectively argued that Mr. Barna represented the central repository of such vital information. Mr. Barna and his knowledge of such information should have part of these proceedings, since it was relevant to the arguments defense counsel should have been making toward establishing the testing was unreliable.

3) Failure to Request and Review Requisite Discovery: Review of the record reveals that the defense's expert, through counsel, failed to seek and / or obtain discovery commensurate with that necessary to perform a due diligent review of the testing in this particular case. Most striking was defense counsel Gabry's stipulation to this inadequate base of information. Defense

counsel's failure to request or even argue for the requisite discovery severely limited the range of pursuable arguments associated with establishing the true reliability of the testing.

4) Failure to Challenge the Admissibility of the DNA Testing: Defense counsel Gabry failed to challenge the general acceptability and admissibility of the DNA testing result offered by the State. The laboratory's results, conclusions, and practices were never subjected to any type of hearing before the Court.

This fact alone is especially troubling since neither the laboratory nor the State was able to proffer a reasonable explanation for presence of DNA from a four-year-old male on an evidentiary item. No logical connection was ever made between Mr. Rueles and the murder of Jane Mixer. The sole exceptions here being that samples containing Mr. Rueles DNA were coincidentally present in the laboratory during testing in the Mixer case. Just as remarkable, Mr. Leiterman's DNA was also coincidentally present in the laboratory during this period of time in conjunction with an unrelated matter.

In addition, defense counsel never challenged the admissibility of any laboratory conclusions based on the findings of partial DNA profiles, or the statistical significance ascribed to such results. Further, Counsel neglected to challenge the general acceptability of results involving Y-STR testing, a relatively new form of DNA testing.

5) Failure to Challenge the Outside Testing of Evidentiary Items: Defense counsel Gabry, with the assistance of his expert, failed to argue and effectively establish that the re-testing of evidentiary items by private outside testing laboratories was of limited probative value.

6) Failure to Request Testing of Evidentiary Items of Significance: Counsel, with the assistance of his expert, failed to request the additional testing of evidence of potentially probative value. Such items would have included samples of the victim's fingernails and pubic hairs found on her body.

7) Failure to Identify and Establish Laboratory Practices Impacting the Reliability of the Testing: Defense counsel Gabry, with the assistance of his expert, failed to argue and establish a variety of potential problems associated with the laboratory's general and case specific testing practices. This finding indicates an incomplete review of what discovery was obtained. Most critical here was the defense's failure to establish that contamination had occurred in the testing controls.

Further, Counsel never argued or established that the practices of the laboratory, in comparison to the recommendations of the National Research Council, the SOPs of the FBI, and other laboratories across the Country, violated generally acceptable principles with respect to the handling of reference and evidentiary samples in the same time and space (Appendix 7).

8) Failure to Challenge or Rebut Inaccurate Testimony offered by the State's Witnesses: Defense counsel Gabry failed to recognize and subject to cross-examination, or rebuttal, the inaccurate testimony of two of the State's witnesses. Both witnesses made the unchallenged representation that if a test's negative controls are free of any signs of DNA then one can assume no contamination of any other samples has taken place (Trial transcript 7/14/05, pg. 198, line 13 and 7/15/05, pg. 142, line 12). Attorney Gabry's failure to impeach such misrepresentations clearly had the potential of leaving the Jury with the impression that the testing in the case was

reliable, when in fact evidentiary samples can be cross contaminated without involving the controls.

9) Failure to Challenge or Correct Inaccurate Testimony offered by a Defense Witness: Defense counsel allowed his own expert, Dr. Krane, to provide unsupportable testimony favorable to the State' case without challenge or opportunity to clarify. Attorney Gabry never effectively challenged his own witness's assertion that the negative controls associated with the testing in the case appeared to be free of DNA, thus indicating the tests were free of contamination. (Trail transcript 7/21/05, pg. 155) Remarkably, it is common knowledge that sample to sample cross contaminations can occur without any indication of such in the negative controls. Given this reality, one must assume that the defense's expert either misspoke or is unaware of this fact.

Lastly, Counsel never challenged Dr. Krane's assertion that the laboratory's results indicated a match between the evidence and the defendant's profile (Trial Transcript 7/21/05, pgs. 157 through 158 and pgs. 165 through 166). What Attorney Gabry failed to elicit and allow his expert an opportunity to clarify was whether or not this match represented a true positive or a false positive result. In the absence of such clarification, the Jury was undoubtedly left with the impression that Dr. Krane agreed with the State's premise that the testing was reliable. Indeed, in closing arguments the State referenced Dr. Krane's statements for the Jury.

VI. SUMMARY

The occurrence and detection of errors in any analytical test represent mistakes that have been caught. While those responsible for such tests may argue that the detection of errors indicates the system is working, one has to be ever mindful of the effectiveness of such systems.

Error detecting systems, like those employed in forensic DNA testing, rely solely on the detection of unexpected results. Defining what an unexpected result verses an expected result is therefore becomes key to establishing the reliability of any conclusions.

Results that exhibit attributes that warn of such unexpected results are typically viewed as unreliable. In the case of results that lack such properties, false positives can be mistakenly accepted as reliable results.

In my opinion, the testing in this case mirrors this situation. Gary Leiterman, John Rueles, and evidence from Jane Mixer's murder were all present in the lab during a shared point in time. The laboratory and the State viewed the finding of DNA consistent with John Rueles as either an unreliable, or perhaps inconsequential, result given the attribute of his age. Lacking such attributes to identify his result as an unexpected error, the finding of DNA consistent with Gary Leiterman was viewed as reliable. It is my opinion that this latter result must instead be considered unreliable and the defendant's counsel failed to effectively convey this argument.