

Case management issues – from crime scene to courtroom

A perspective from the FBI
Laboratory

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**TRACE
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AUGUST 13-16, 2007
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Case management issues

- How is trace evidence viewed in the FBI Laboratory?
- What are the past versus future applications of trace evidence analyses?
- Flow of evidentiary items
- How do we in the FBI Laboratory relate to the crime scene?
- How does the court system view trace evidence examinations?
- How can we grow trace evidence analyses



How is trace evidence viewed in the FBI Laboratory?

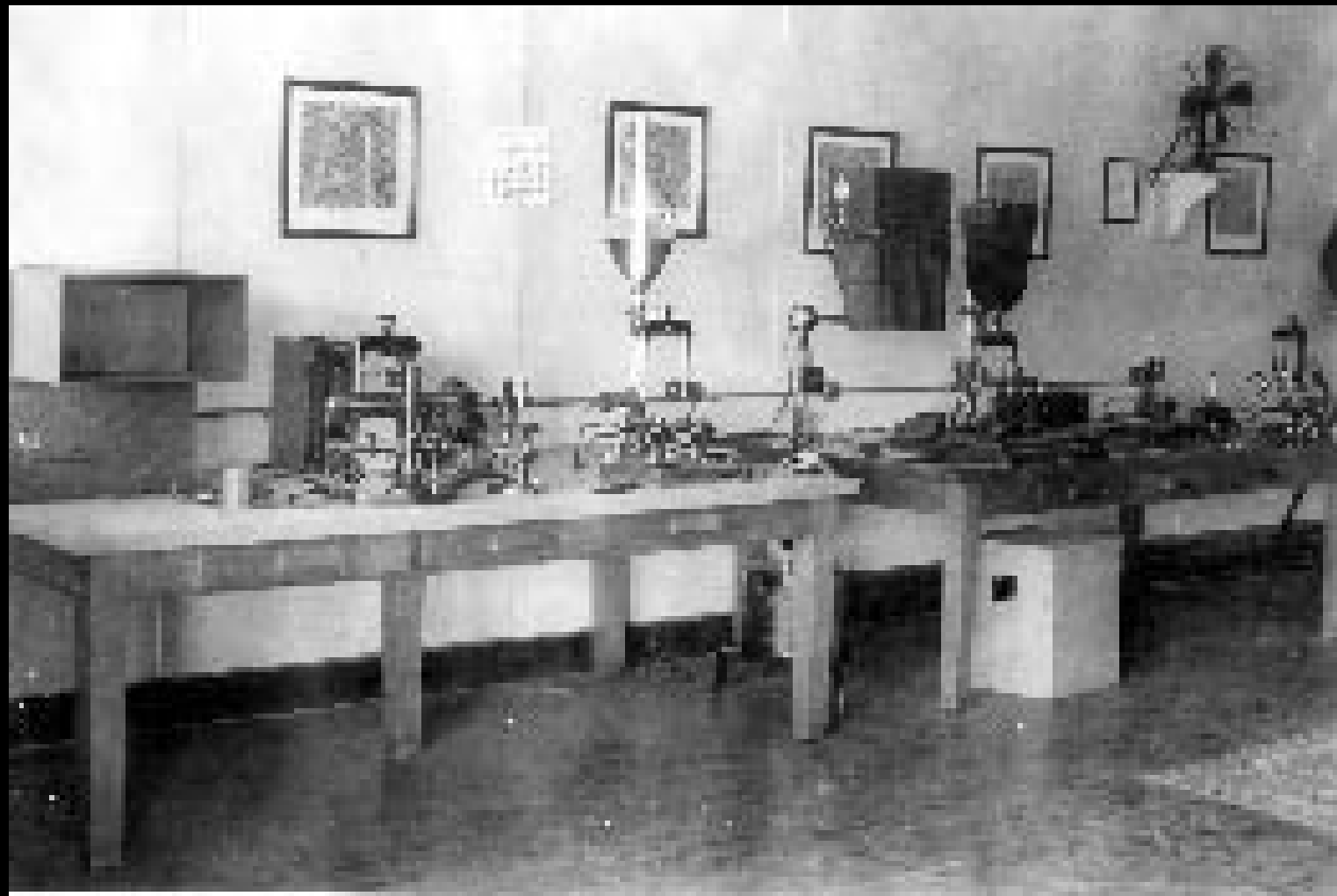
- Seventy-five years ago this November, the Bureau of Investigation created a Technical Laboratory
 - Housed in a railway building in Washington, D.C.
 - Equipped with a microscope, UV light equipment, a helixometer and a drawing board
 - Trace evidence examinations were part of this initial charter





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How is trace evidence viewed in the FBI Laboratory?

- Since that time, trace evidence examinations have evolved and expanded to encompass at least 28 people (depending on what your definition of trace evidence is) in four different units
 - Trace Evidence
 - Explosives documents
 - Chemistry
 - Questioned documents



How is trace evidence viewed in the FBI Laboratory?

- **Trace Evidence Unit**
 - 18 personnel total
 - 1 Unit Chief
 - 14 personnel examining hair, fiber, fabric, cordage
 - 3 personnel examining mineralogy (soil, glass and building materials)
- **Chemistry Unit**
 - three personnel assigned to paint, tape and polymer examinations



How is trace evidence viewed in the FBI Laboratory?

- In calendar year 2006, approximately 11,000 cases were received in the lab
- Of these, approximately 4,000 were received and examined in the Trace Evidence Unit
- In addition, approximately 170 cases were received and examined in the Chemistry Unit for “trace evidence”
 - That is more than **one out of three** cases that are subjected to trace evidence analyses



How is trace evidence viewed in the FBI Laboratory?

Laboratory?

- Trace evidence examinations are the first examinations conducted
- If the nature of the evidentiary item is such that Trace Evidence is likely to be found, they will likely be examined (even if no specific request is made)
- This is typically discussed in the initial phone call with the contributor



How is trace evidence viewed in the FBI

Laboratory?

- Conducted on most of the “major cases” received in the lab
 - Unabomber
 - Attack on the USS Cole
 - Oklahoma City bombing
 - 9/11 attacks
 - Anthrax letters
 - Collar bomb



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How is trace evidence viewed in the FBI

Laboratory?

- Has played a major role in some high profile violent crime cases
 - Wayne Williams
 - Polly Klaas
 - Melissa Brannen
 - OJ Simpson
 - Washington, D.C. sniper case



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Flow of evidentiary items

- Whenever possible, trace evidence is fully exploited in conjunction with all other forensic examinations
- Evidence flow through the laboratory is dictated by the examination scheme in order to maximize all types of evidence on (most) every case



Flow of evidentiary items

- For example, a bombing case (hoax device or real) would routinely be handled in the following manner
 - Photography
 - Latent prints (CA only)
 - Trace Evidence (tape removal and/or partial disassembly)
 - Latent prints (remainder of analysis)
 - mtDNA analysis of hairs
 - Explosives Unit analysis of device
 - Chemistry (tape examination)



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Flow of evidentiary items

- On a threat letter case, the following examination scheme is routinely used:
 - Trace Evidence (under stamp, flap and tape)
 - Questioned Documents
 - DNA (stamp and/or flap)
 - Chemistry (if powder is present)
 - Trace Evidence (on powder if necessary)
 - Latent prints



Flow of evidentiary items

- On a case involving a knife, the following examination scheme is routinely used:
 - Trace Evidence (debris recovery)
 - DNA
 - Latent prints
 - Trace Evidence (cut and tear examinations)



Flow of evidentiary items

- The FBI Laboratory is actively involved in the exploitation of evidence recovered from the war in Iraq and Afghanistan.
- The IED's recovered from both areas are being fully exploited as outlined previously, again with Trace Evidence examinations being at the front end



Two case scenarios

- How would the following two cases be handled in the FBI Laboratory
 - Homicide case
 - Partially clothed female victim found on the shoulder of a highway, possibly strangled with a ligature and sexually assaulted
 - Carjacking case
 - Two male suspects used the carjacked vehicle during an armed robbery of a retail establishment one hour later



Two case scenarios

- **Homicide case**

- **Possible evidence from the case and typical evidence flow**

- **Victim's clothing**

- **Trace evidence (hairs and fibers), DNA, latent prints?**

- **Ligature**

- **Trace evidence (hairs and fibers, attempt to identify cordage manufacturer), DNA**

- **Victim's rape kit**

- **Trace evidence, DNA**



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Two case scenarios

- **Homicide case**

- **Possible comparisons if suspect is identified**

- **Hairs recovered from victim's items to suspect knowns**
- **Fibers recovered from victim's items to suspect knowns**
- **Look for similar ligature in suspect's environment**
- **Soil from suspect's vehicle to highway**
- **Comparison of "common" fibers, i.e. fibers found in both suspect and victim**



Two case scenarios

- **Carjacking case**

- **Possible evidence from the case and typical evidence flow**

- **Evidence from vehicle**

- **Vacuums – trace evidence (hairs and fibers)**

- **Latents**

- **Clothing items – trace evidence (hairs and fibers), DNA**

- **Evidence from suspects**

- **Clothing items – trace evidence**



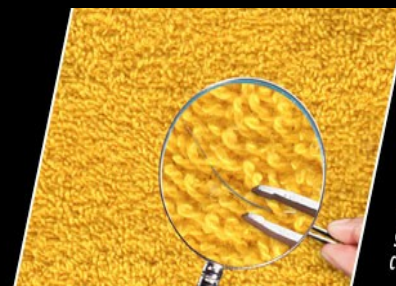
Two case scenarios

- **Carjacking case**
 - **Possible comparisons**
 - Hairs recovered from vehicle items to suspect knowns
 - Fibers recovered from vehicle items to suspect knowns
 - Fibers recovered from suspect's items to vehicle
 - Hairs recovered from suspect's items to owner of vehicle



How is trace evidence viewed in the FBI Laboratory?

- In summary, we try to fully exploit trace evidence whenever possible
- It is automatically added to the examination plan for every case when it is reasonable



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Past vs. future application of Trace Evidence

- As stated previously, these examinations have been conducted since the inception of the FBI Laboratory
- We continue to have very strong support from laboratory management, to include the development of new technologies



Past vs. future application of Trace Evidence

- In an effort to expand our capabilities with regard to hair, we initiated mtDNA analysis in the Hairs and Fibers Unit in 1996
- As caseload increased, this became a separate unit (comprised of 24 personnel) with responsibilities including:
 - Traditional casework
 - Missing persons cases
 - Regional mtDNA laboratories



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Past vs. future application of Trace Evidence

- Some of the current research projects that are being conducted by the FBI and its research partners
 - Development of pattern recognition software for MSP data
 - Environmental effects on textile fibers
 - Dye analysis utilizing CE/MS
 - Development of an automotive carpet fiber database
 - Interpretation of automated glass refractive index measurements
 - Variation in comparative measurements in manufactured glass projects
 - Forensic application of cathodoluminescence of geologic materials



Relevance to the crime scene

- This is probably the most difficult aspect of being in a Federal laboratory
- Since most cases come from a long distance (or overseas), we rarely develop a working relationship with crime scene personnel
- Typically our only contact with the contributor is once we start working the case, long after the crime scene has been processed



Relevance to the crime scene

- Our primary interaction with crime scene personnel is in lending assistance to FBI Evidence Response Team training
- We are always available telephonically as a resource when they have questions about a search
- We rarely respond to crime scenes ourselves, unless there is a need for specialized scientific personnel (geology, anthropology)



How the court system views Trace Evidence

- During 2006, trace evidence examiners testified 26 times in Federal and State courts across the United States
- This represents a significant decrease in the utilization of trace evidence examiners in the courtroom



How the court system views Trace Evidence

- We often have probative results and are not being asked to testify
- We are also seeing an increase in the number of requests for “negative” testimonies
 - No probative results
 - Prosecutors feel the need to show they “did everything they could” on the case



How the court system views Trace Evidence

- Some possible reasons for the under-utilization of Trace Evidence testimony
 - Over-reliance on nuclear DNA and latent fingerprint evidence
 - “If you have identification, why bother with the trace evidence?”
 - Over-reliance on mtDNA evidence
 - “We don’t need the trace evidence testimony on hair, we have the mtDNA result”



How the court system views Trace Evidence

- That being said, we routinely are still asked to testify, and rarely encounter “problems” associated with the science of trace evidence
- In the last ten years, there have been a total of four (4) Daubert hearings by trace evidence examiners
 - Hairs – 3 times
 - Fibers – 1 time
- All four resulted in the evidence being allowed

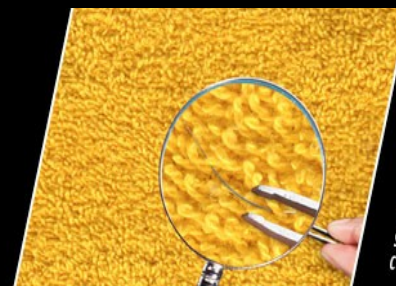


How can we grow Trace Evidence Analyses?

- Areas that we are either in transition to or are planning to do in the near future
 - Glass analysis – transition from ICP to ICP/MS
 - Future – laser ablation-ICP/MS
 - Fiber dye analysis - CE/MS or UPLC/MS
 - Additional databases – soil, glass, fibers, pollen...
 - Shared databases on the internet?



Questions?



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