Avoiding non-selective and destructive swabbing

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Sample collection by swabbing

Is the dominant sample collection mode, particularly for DNA samples….but:

- Is it actually always the best way to recover material for DNA analysis?
- Is it being applied correctly?

Selective?

- Can a swab target a specific stain on a surface ?
  - Depends on the size of the stain
  - Depends on the size of the swab
  - Depends on the proximity of other stains
  - Depends on the range of the swabbing motion

- Visible stains vs Latent stains
  - What surface are you swabbing and why?

Destructive?

- Stain morphology and pattern information is disturbed
  - Bloodstain pattern information
  - Stain surface pattern information
- If the stain itself is not homogenous
- Spreading of the stain material across the substrate
- Migration of the stain material into the substrate

Destructive?

- Potential for mixing between stains
- Potential for mixing between stain and contaminants on and in the substrate
- Swab may also collect background DNA and inhibitors
- Dilution of the material collected in the swab itself

Alternatives to swabbing

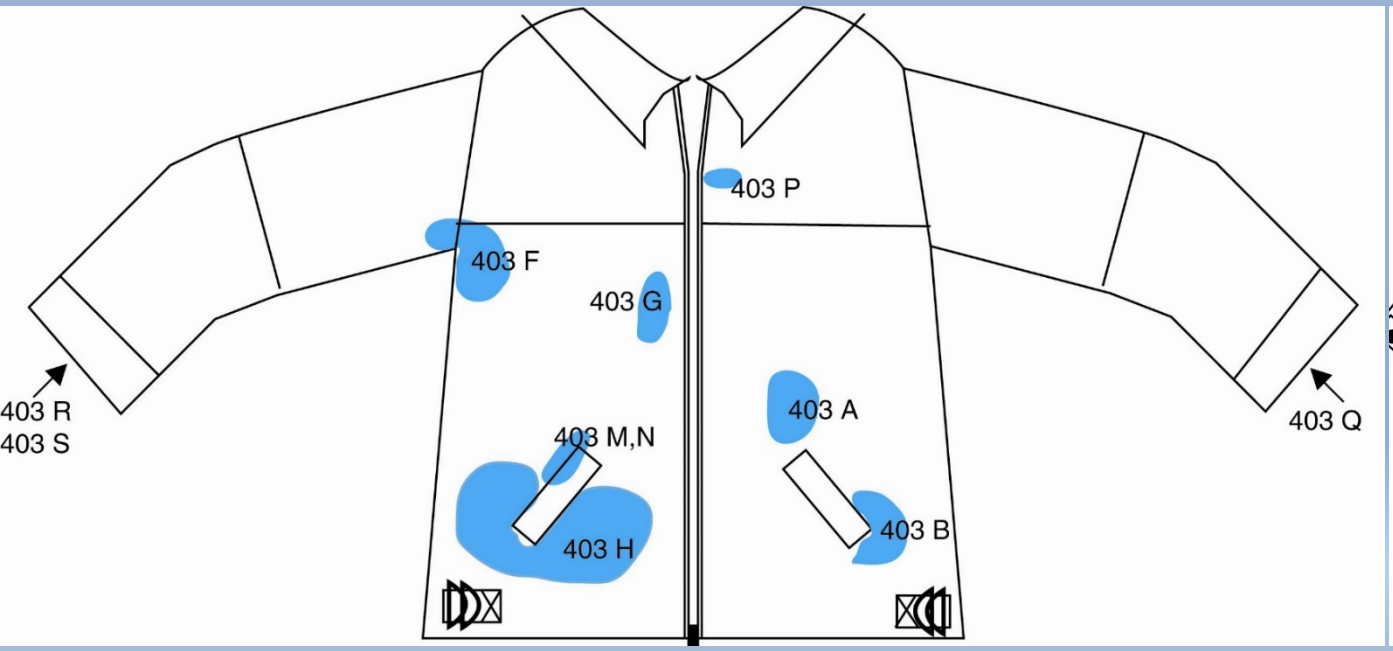
- Scraping with a tungsten point or razor
- Removal with tweezers
- Cuttings
- Tape lifting (for hydrophobic surfaces not transportable to the lab)
- Filter paper mapping

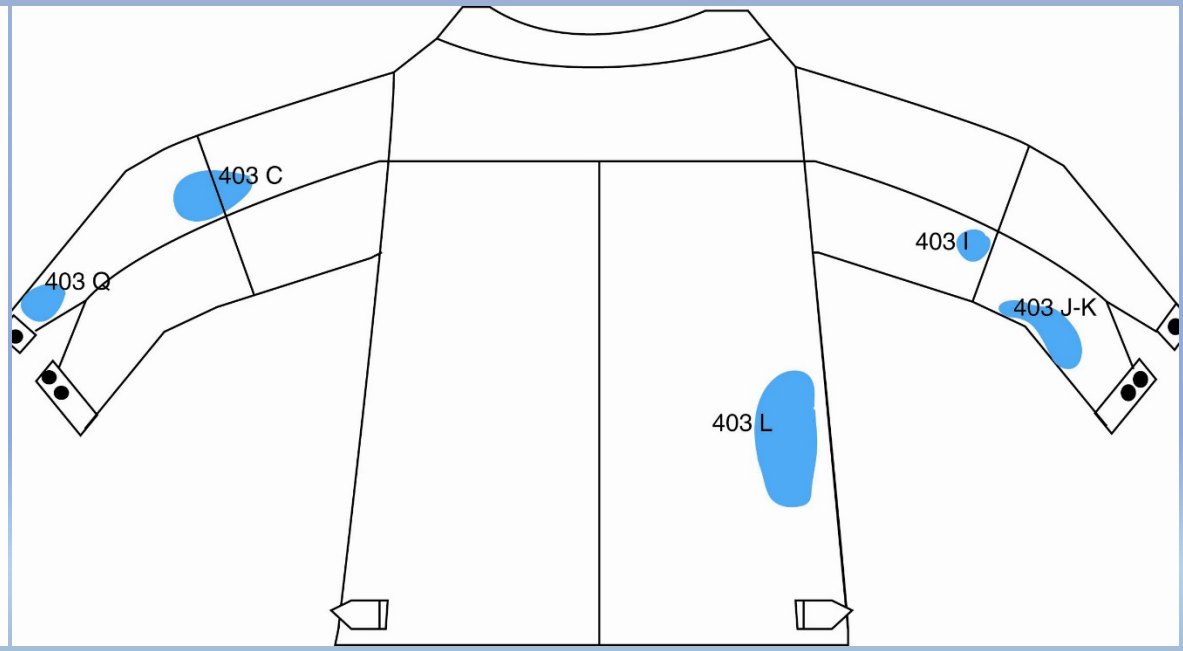
Case example: Blood on black leather jacket

- Father accused of stabbing daughter while wearing black leather jacket
- Black leather jacket submitted to the laboratory for testing

Case example: Blood on black leather jacket

- Numerous swabs collected
- Many swabs DNA tested





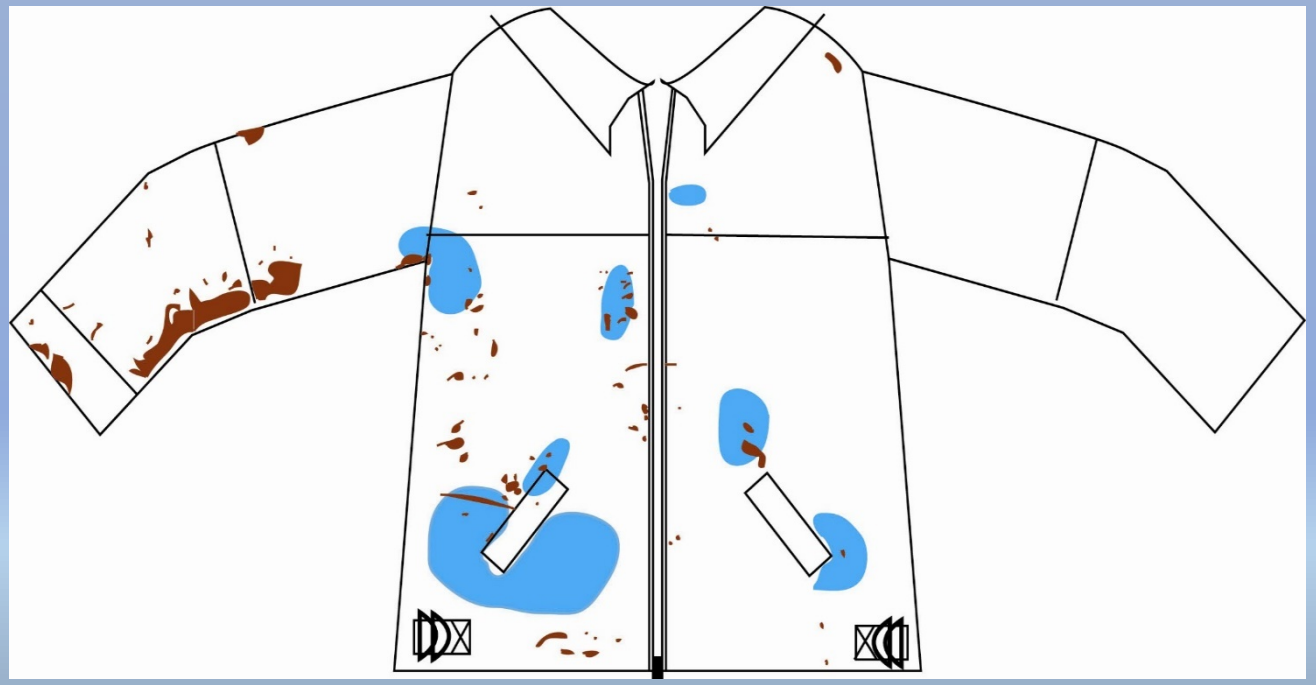
Case example: Blood on black leather jacket

- Results showed a mixture of the suspect’s and victim’s DNA
- Is this information alone helpful to the case?

Front Right Sleeve, Bottom

Back of Right Sleeve

Case example: Blood on black leather jacket



Case example: Blood on black leather jacket

- Stain pattern information was critical to the case:
  - Quantity of blood
  - Location of stains
  - Pattern of stains
- Fortunately, not all of that information was lost to the swabbing
- Mixed DNA profiles were contended with unnecessarily

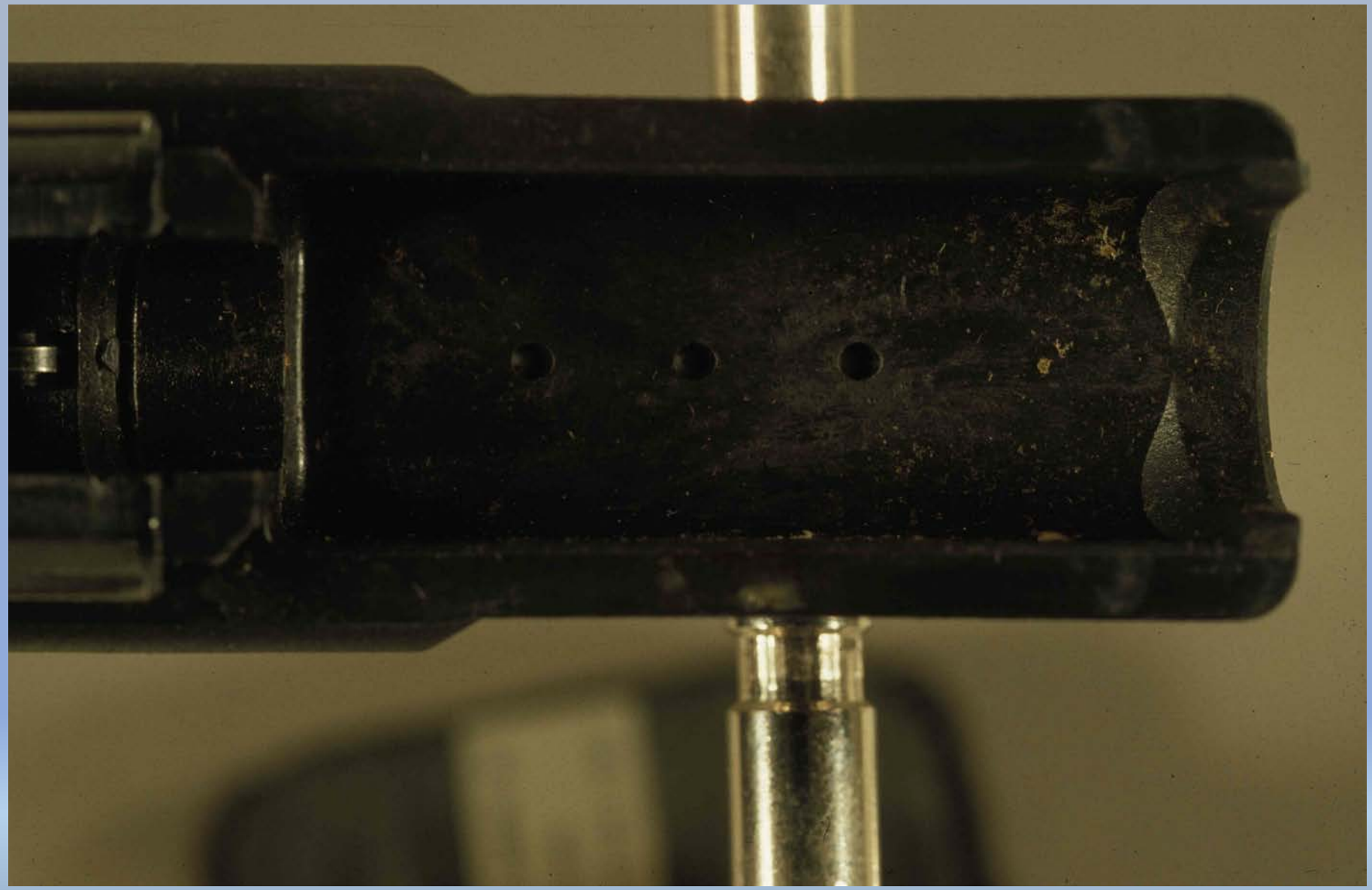
- How many fewer samples would have had to been tested in order to resolve the question had the blood stains and patterns been considered prior to DNA testing?

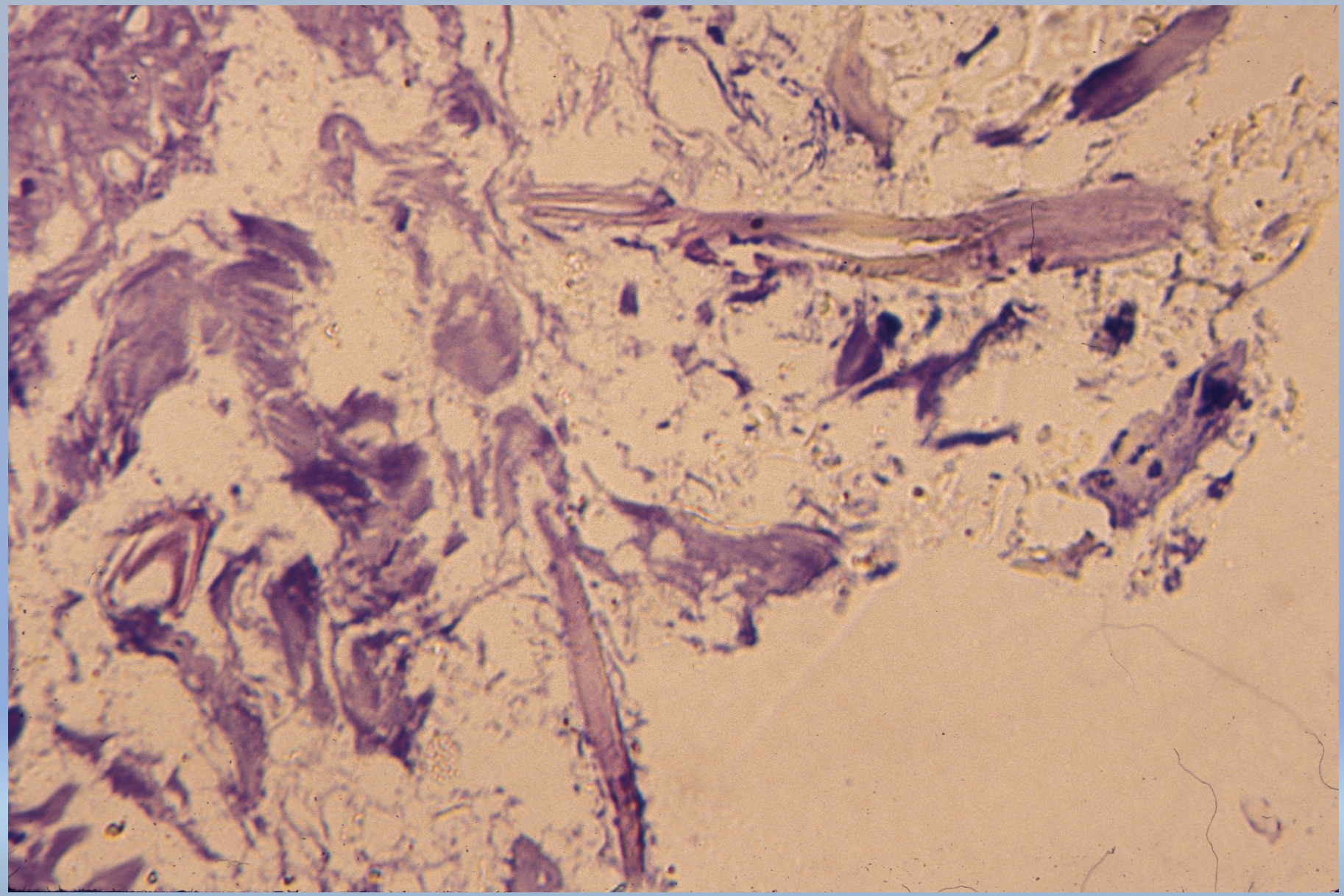
Mitigation strategy-Trace Evidence Approach

- Careful observation of submitted item/surface to be sampled
  - Magnification
  - Alternative Light Sources
  - Other enhancement methods
- Selection of stain to be targeted
  - What question needs to be answered?
- Documentation of stain and surrounding area
- Determination of most suitable sample recovery technique

Case Example: Shooting

- Exterior of Glock was swabbed by the lab
- Swab from exterior gave uninterpretable mixed DNA result
- Glock was not examined closely
- Crucial evidence in the form of tissue and hair was lodged in the recoil spring chamber





Case Example: Shooting

- Tissue and hair found in recoil spring chamber would have been more suitable for DNA testing than the swab of the exterior
- Round stain on forehead of one victim not recognized and potentially useful information for the reconstruction was lost

Research needs & Food for thought

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