Avoiding non-selective and destructive swabbing

Rebecca Bucht
Peter De Forest
Anna Duggar
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
Swabbing is the dominant sample collection mode, particularly for DNA samples...but:

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- Is it being applied correctly?