Technology Transition Workshop| *Robert Driscoll, M.F.S.*
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Role of LM and FISH in the Forensic Laboratory

Envisioning the Role of LM in the Forensic Laboratory

- **LM processing is not intended to be a high-throughput technique**
- **There is little need to utilize LM for standard high yield/non-mixture evidence**
  - **Normal laboratory procedures are already well suited and optimized for the handling of these samples**

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Envisioning the Role of LM in the Forensic Laboratory

- **LM should be employed when there is a known mixture sample located on items of evidence**
- **Incorporation of procedures of this type would provide alternative methods of sample processing for those labs utilizing LM technologies**
- **Techniques of this nature would also be ideal for labs attempting to process difficult evidence containing low copy number (LCN) cellular mixtures**

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Envisioning the Role of LM in the Forensic Laboratory

- **LM and FISH have proven to be effective techniques for the resolution of previously un-interpretable mixtures and LCN samples**
- **These are tools that should be considered a functional option when difficult and imperative evidence arrives in the laboratory**

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Normal Processing in the Forensic Laboratory – Green Pathway

- **Handling of standard high yield/non-mixture evidence for which LM is not necessary**

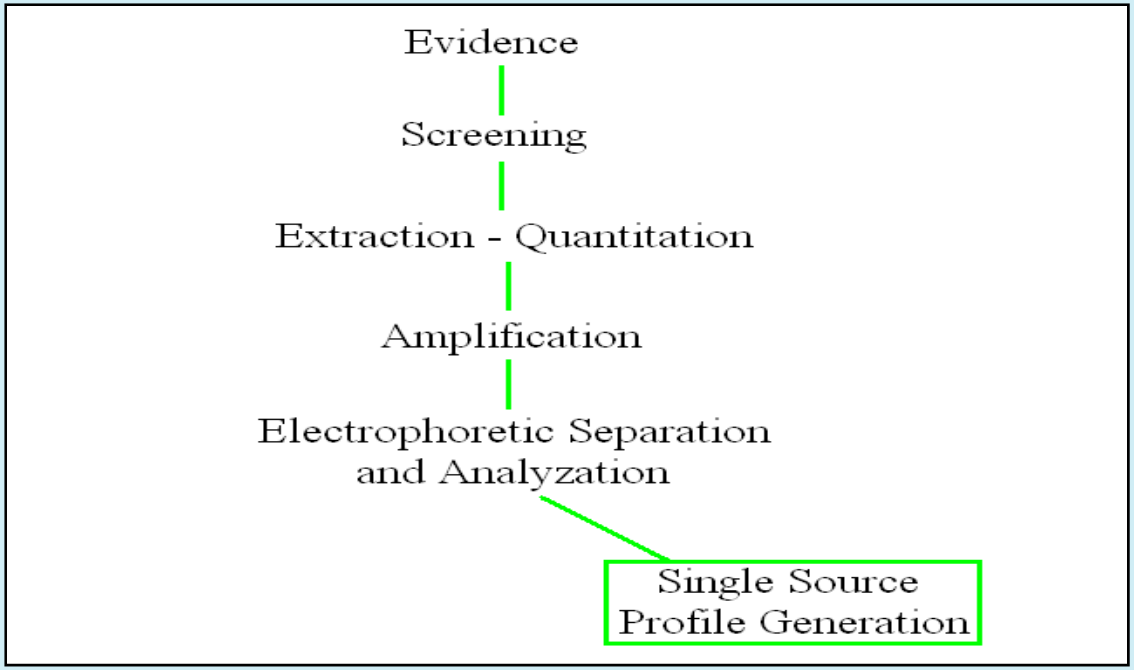

Image courtesy of Rob Driscoll

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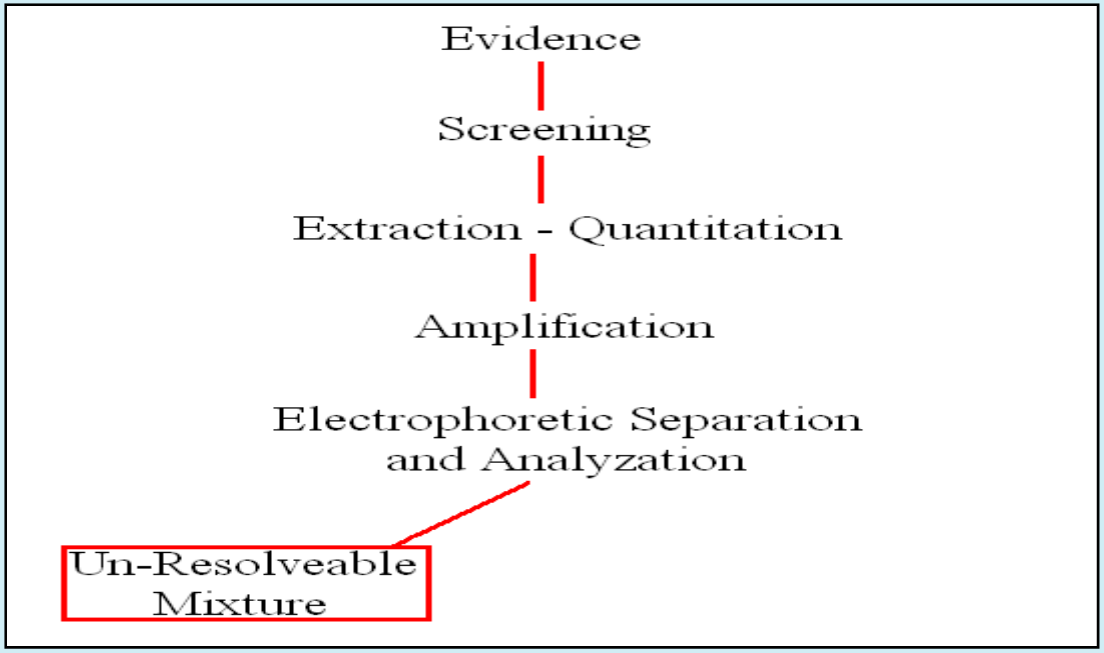
Mixture Sample Detection in the Forensic Laboratory – Red Pathway

- **Example of an instance when a piece of evidence is received on which an unknown mixture is present**



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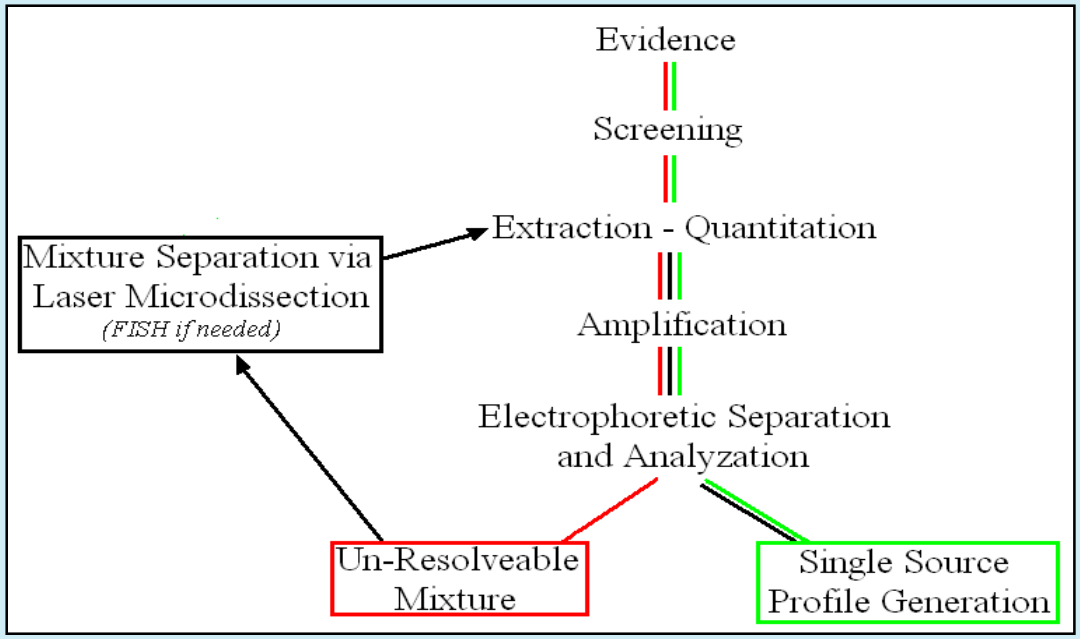
LM Implementation in the Forensic Laboratory – Black Pathway

- **Mixture sample is detected and processed using LM and possibly FISH techniques to obtain single source DNA profiles**



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LM: Processing Costs

- **Normal LM Processing:**
  - **Instrument purchase:**
    - **~ $175,000 – $275,000**
  - **Slides:**
    - **Glass slides – $0.25**
    - **PEN slides – $4.00**
    - **PET slides – $3.50**
  - **Collection vessels:**
    - **0.5 ml tubes – $0.15**
    - **Adhesive caps – $5.00**

Total LM additional costs:
~ $0.40 – $9.00 per slide

- **FISH LM Processing:**
  - **Probes:**
    - **~ $30.00 – $60.00 per slide**
  - **Buffers and reagents:**
    - **~ $5.00 – $10.00 per slide**

Total FISH additional costs:
~ $35.00 – $70.00 per slide

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LM Applications in Forensics

- **Sexual assault evidence**
  - **Separate sperm from epithelial cells**
  - **Identify and separate male from female epithelial cells based on FISH of X and Y chromosome sequences**
- **Other evidence**
  - **Male/female mixtures of blood/blood or blood/epithelial**
  - **Bone extraction: collect nucleated cells from bone matrix**
  - **Hair: collection of nucleated cells from hair**
  - **Aged slides**
  - **Botany**

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Evidence Scenarios for LM Utilization

- **Scenario #1**
  - **Bloody hand print**
  - **Male victim/male suspect**
- **Scenario #2**
  - **Ligature**
  - **Female victim/ two male suspects**
- **Scenario #3**
  - **Sexual assault slides**
  - **Low sperm numbers/unknown suspects**
- **Scenario #4**
  - **Female body swab**
  - **Low level male DNA from saliva**

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LM Techniques

Summary and Conclusions

- **LM processing is not intended to be a high-throughput technique**
- **These are tools that should be considered a functional option when difficult and imperative evidence arrives in the laboratory**
- **LM techniques provide a method of component separation from mixed samples in order to obtain single source DNA profiles**
- **Utilization of LM instrumentation and associated optimized techniques has allowed for the successful resolution of low copy number, sexual assault, and touch evidence cellular mixtures**

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Questions?

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