Taking a Bite Out of Crime: DNA Analysis of Property Crime Samples

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Presented by: Gary Harmor
Introduction

• Orange County District Attorney’s (OCDA) Office contracted the Serological Research Institute (SERI)

• CSI from two police departments collected and swabbed various items

• Majority of swabs/items were trace contacts
• Collection kits were provided by OCDA but proved a little cumbersome
• Brian Wraxall provided training in potential samples and collection techniques
• The investigator/CSI determined the numbers of samples to be collected and the suggested order of analysis

• Approximately 3 samples processed per case; the highest DNA concentration was taken to amplification

• Reference elimination standards processed
• Cases were triaged by the investigator and a Deputy DA
• Samples were shipped to SERI by overnight service (e.g. FedEx)
• Samples were expected to contain a low level of DNA
• Soil, grime, dyes and everyday dirt can inhibit our DNA analysis process
• Inhibition is therefore expected given the nature of the samples received
• Goal: remove inhibitors and maximize DNA yield
The Process

**Figure 1:** Flow chart summarizing the processing of samples from property crimes.
• Alternate Light Source (ALS) useful for identifying biological stains

• SERI developed a modified DNA IQ™ procedure to remove inhibition

• Microcon® concentration maximized possibility to obtain a DNA profile

• Inhibition decreased upon addition of DTT to extraction
Figure 2: Graphical representation of the breakdown of samples processed; 1116 samples originating from 437 cases. Saliva consists of samples such as: food, straws, beverage containers and cigarette butts. Touch samples include: tools, clothing, fingerprints, electronics, cords, vehicle swabs and points of entry/exit.
An Interesting Case Example…
Portions of the area around the apparent bite mark were sampled, extracted for DNA, quantified, amplified and subjected to genetic marker analysis.
• A remaining portion of DNA extract was subjected to a modified Promega DNA IQ™ procedure, concentrated with a Microcon® (100ul DNA IQ™ elution to ~10 to15ul), re-quantified, amplified and subjected to genetic marker analysis.

• The modified DNA IQ™ procedure, coupled with the Microcon® concentration, resulted in a cleaner profile and results at all markers tested.
Results

• As of the end of the project:
  • 437 cases were processed at SERI
  • 63 cases had known suspects
  • 212 cases were submitted for CODIS review
  • 202 profiles were uploaded to CODIS
    – Of these, there have been:
      » 116 single offender hits
      » 41 forensic hits
        ♦ 40 multiple hits to an offender
        ♦ 1 case to case hit to a homicide in AZ
Summary

- 57% of non-suspect cases contained an uploadable profile
- To date, there has been a 78% hit rate
- 69 cases have been filed; 64 defendants have plead guilty
- Six cases went to preliminary hearing
- (3 testimony & 3 Proposition 115)
- No cases went to trial – all pleaded guilty
• Violent crime & Property crime statistics in Santa Ana, CA

<table>
<thead>
<tr>
<th>Year</th>
<th>Violent</th>
<th>Property</th>
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</thead>
<tbody>
<tr>
<td>2008*</td>
<td>-11.4%</td>
<td>-10.4%</td>
</tr>
<tr>
<td>2009*</td>
<td>No Change</td>
<td>-2.6%</td>
</tr>
<tr>
<td>2010*</td>
<td>-12.5%</td>
<td>-3.2%</td>
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• From 2008 to 2010 Violent Crime Rate dropped 14.3% and the Property Crime Rate dropped 6% for Santa Ana.
Conclusions

- An increase in technological advancements allow profiles to be obtained from unusual samples from typically ‘low priority’ cases
- Novel strategies utilized to obtain results from challenging property crime samples
- Multiple items may need to be examined to generate an uploadable profile
- Elimination standards were necessary to assist in mixture interpretation
- This has proved a valuable exercise in reducing property crimes and violent crimes
Acknowledgements

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For Further Information...

on SERI and our services please visit our website www.serological.com or contact us at:

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In Memoriam
BRIAN WRAXALL
December 6, 1943 – May 11, 2012

Project Meeting in 1977
Nov. 1978 – First BAS Class at SERI
December 6th 2011 (68th Birthday)