Mid-Atlantic Association of Forensic Scientists

May 4-8, 2009

Hunt Valley Marriott

MAAFS

2009

BALTIMORE, MARYLAND

Local Arrangements Provided by

The Baltimore City Police Department Crime Laboratory

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Susan Blankenship, *Criminalistics Chair*	Univ. of Maryland Univ. College
Gabriel Watts, *QD Chair*	Federal Bureau of Investigation

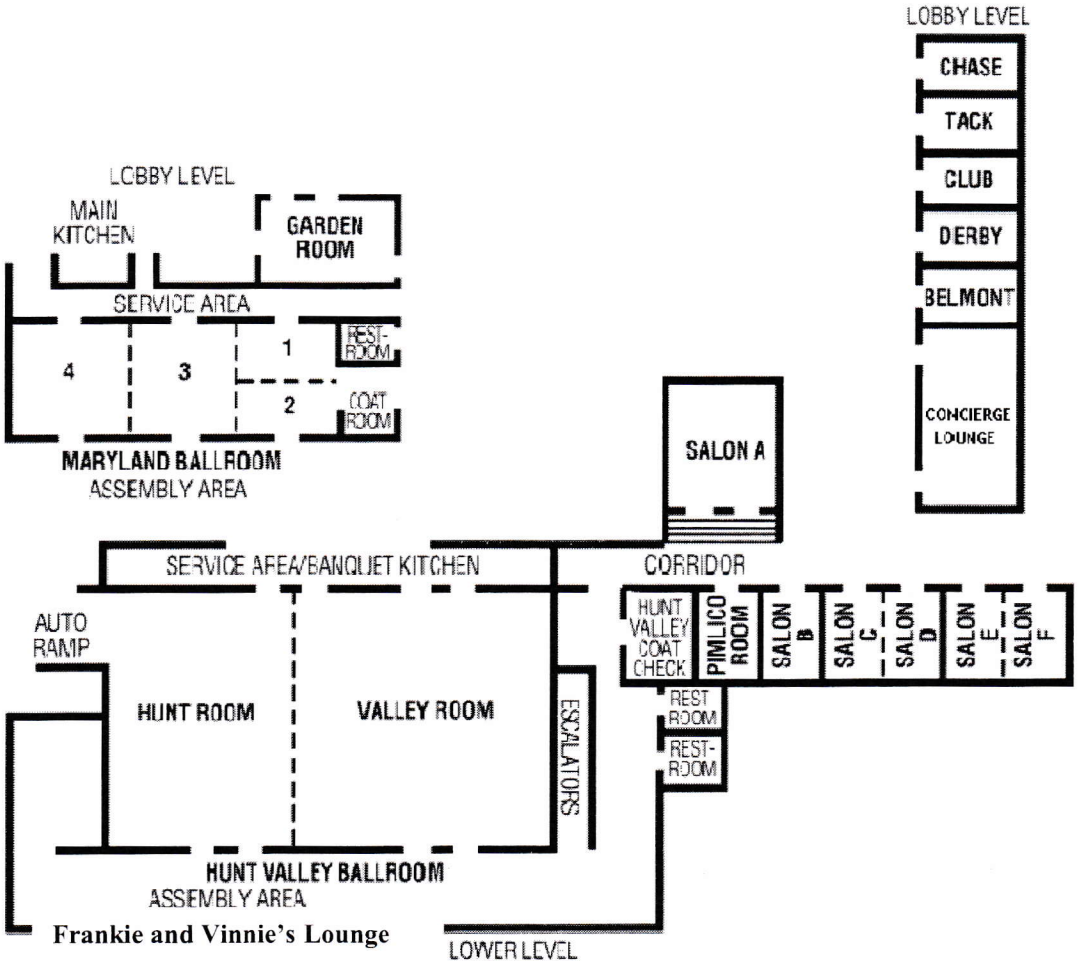
The MAAFS Meeting Planning Committee would like to thank all of the presenters, workshop instructors, volunteers and businesses that provided door prizes. These individuals and businesses are too numerous to thank individually in this space, but their work is the foundation of this meeting!

Vendors supporting MAAFS can be identified by Green Name Badge Holders. Please show your support to these vendors that have contributed to the success of the MAAFS annual meeting!

Agenda

245 Shawan Road, Hunt Valley, MD 21031
Phone 410-785-7000 Fax 410-785-0341

The hotel front desk can print boarding passes.
The hotel rooms and common areas have WiFi free of charge.



Activity Floor Plan Key:

Registration .....**Hunt Valley Coat Check**
Uncertainty of Measurements .....**Maryland Ballroom 4**
Forensic Science Educator .....**Salon E-F**
Advanced DNA Concepts .....**Maryland Ballroom 4**
Technology for QD .....**Maryland Ballroom 3**
Daubert & Research .....**Maryland Ballroom 1-2**
Exam of Garbage Bags .....**Salon C-D**
Familiar with ISO .....**Salon E-F**
GHB, GBL, & BD .....**Lobby**
Steroids.....**Salon C-D**
ABC Exam .....**Belmont**
MAAFS Office.....**Pimlico**

Breaks ... .**Maryland Foyer/Hunt Valley Ballroom**
Plenary Session.....**Maryland Ballrooms 1-4**
Criminalistics Session .....**Salon C-D**
Biology Session .....**Maryland Ballrooms 1-3**
Questioned Document Session .....**Salon E-F**
Wine and Cheese.....**Hunt Valley Ballroom**
FLEX Breakfast.....**Garden Room**
Luncheon .....**Frankie & Vinnie's Parking Deck**
Vendor Reception.....**Frankie & Vinnie's**
Business Meeting.....**Maryland Ballrooms 1-3**
Gala.....**Frankie & Vinnie's**
Hospitality.....McCormick Suite 2005

Agenda

Sunday, May 3rd

5:00-8:00 pm	Registration	Hunt Valley Coat Check

Monday, May 4th

7:00 – 5:00	Registration	Hunt Valley Coat Check
7:00- 8:00	**Breakfast** *Sponsored by ChemImage*	Maryland Foyer
8:00 – 5:00	Estimating the Uncertainty of Measurements: Compliance with ISO 17025	Maryland Ballroom 4
10:00 – 10:15	**Break with Refreshments** *Sponsored by Applied Biosystems*	Maryland Foyer
Noon – 1:00	**Lunch (on your own)**	
1:00 – 5:00	Forensic Science Educators Workshop	Salon E-F
3:00 – 3:15	**Break with Refreshments** *Sponsored by Waters Corporation*	Maryland Foyer
5:00	**Dinner (on your own)**	
5:15	**Boordy Vineyards Dinner, Tour, & Tasting** *Requires pre-registration, transportation provided*	Lobby

Agenda

Tuesday, May 5th

7:00 – 5:00	Registration	Hunt Valley Coat Check
7:00-8:00	**Breakfast**	Maryland Foyer
8:00 – 5:00	Advanced Forensic DNA Concepts	Maryland Ballroom 4
	Technology for QD courtroom presentations	Maryland Ballroom 3
	Blind Verification, Daubert & Research	Maryland Ballroom 1-2
8:00 – noon	Examination of Garbage Bags	Salon C-D
	Becoming Familiar with ISO	Salon E-F
7:00 - noon	Identification of GHB, GBL & BD	Lobby (7 am)
	Transportation provided to Baltimore City Lab, will return by Noon	
10:00 – 10:15	**Break with Refreshments**	Maryland Foyer
Noon – 1:00	**Lunch (on your own)**	
1:00 – 5:00	Steroids	Salon C-D
3:00 – 3:15	**Break with Refreshments**	Maryland Foyer
	Sponsored by Foster & Freeman	
5:00	**Dinner (on your own)**	
6:00	Executive Board Meeting	
8:00 – 2:00 am	**Hospitality**	McCormick Suite 2005

Agenda

Wednesday, May 6th

7:00 – 5:00	Registration	Hunt Valley Coat Check
7:00 – 8:00	**Breakfast**	Maryland Foyer
8:00 – 5:00	Plenary Session	Maryland Ballrooms 1-4
8:00 – noon	ABC Exam	Belmont
10:00 – 10:15	**Break with Refreshments** *Sponsored by Abacus*	Maryland Foyer
Noon – 1:00	**Lunch (on your own)**	
3:00 – 3:15	**Break with Refreshments** *Sponsored by Qiagen*	Maryland Foyer
5:00 – 7:00	**Wine & Cheese Welcoming Reception**	Hunt Valley Ballroom
7:00 – 8:30	**Dinner (on your own)**	
7:00 – 8:00	Vendor Reception *Reception for Vendors, MAAFS Executive Board & Meeting Committee*	Frankie & Vinnie's
8:30 – 2:00	**Hospitality**	McCormick Suite 2005

Thursday, May 7th

7:00 – 5:00	Registration	Hunt Valley Coat Check
7:30 – 8:30	**Breakfast** *Sponsored by The Computer Solution Company*	Hunt Valley Ballroom
7:30 – 8:30	**FLEX Breakfast** *(pre-registration required)* *Sponsored by Penn State*	Garden Room
7:30 – 5:00	**Vendor Area**	Hunt Valley Ballroom

Agenda

Thursday, May 7th (continued)

8:30 – 11:00	Criminalistics Session Biology Session Questioned Document Session	Salon C-D Maryland Ballrooms 1-3 Salon E-F
10:00 – 10:15	**Break with Refreshments**	Hunt Valley Ballroom
11:00 – 12:00	Keynote Speaker – Charlie Wilhelm	Maryland Ballrooms 1-3
12:00- 1:30 pm	**BBQ Luncheon** *Sponsored by Agilent*	Frankie and Vinnie's Parking Deck
1:30 – 4:30	Criminalistics Session Biology Session Questioned Documents Session	Salon C-D Maryland Ballrooms 1-3 Salon E-F
1:30 – 4:00	Fire Debris Roundtable	Derby
3:00 – 3:15	**Break with Refreshments**	Hunt Valley Ballroom
5:30 – 7:00	Business Meeting	Maryland Ballrooms 1-3
7:00 – 8:30	**Dinner (on your own)**	
8:30-2:00	**80's Gala** *Sponsored by Perkin Elmer*	Frankie and Vinnie's

Friday, May 8th

7:30 – 8:30	**Breakfast**	Valley Room
7:30 – Noon	**Vendor Area**	Valley Room
8:30 – Noon	Criminalistics Session Biology Session Questioned Documents Session	Salon C-D Maryland Ballrooms 1-3 Salon E-F
10:00 – 10:15	**Break with Refreshments**	Hunt Valley Ballroom
12:00 – 1:00	Door Prizes	Hunt Valley Ballroom

Agenda

Plenary Sessions — Maryland Ballrooms 1-4

8:00 Grant Writing Workshop
11:00 Strengthening Forensic Science in the United States: A Path Forward
1:00 Ethics in Forensic Science

Criminalistics Sessions — Salon C-D

Thursday	8:30	Metrology and Standards for Canine Olfactory Detection of Explosives
	9:05	The Development of PAH SPME Phases for Selective Absorption of Nitroaromatics
	9:30	Simultaneous quantitative determination of alcohol biomarkers ethyl glucuronide and ethyl sulphate in human urine using UPLC/MS/MS
	10:20	The "source" of the problem: Human Error in GC/MS Troubleshooting
	10:35	Overview of Black Powder and Black Powder Substitutes
	1:35	Factors Affecting Comparisons of Lubricating Oils
	2:00	A Procedure for the Forensic Chemical Analysis within Bacillus Spore Samples
	2:35	Rapid Analysis of Drugs of Abuse by Gas Chromatography-Time of Flight Mass Spectrometry
	3:00	Criminalistics Section Chair-Elect Vote
	3:20	Driving under the influence, but under the influence of what? An introduction to MDPV
	3:45	Detection of Phenethylamine, Amphetamine, and Tryptamine Imine By-products from an Acetone Extraction
	4:10	LA-ICP-MS: The Ideal Tool Trace Element Fingerprinting of Solid Forensic Materials
Friday	8:30	Computer Usage in Trace Evidence Unit
	8:55	The Hunt For A Most Dangerous Man: Apprehension Of A Serial Rapist
	9:30	Baltimore City Model for Jane Doe/Delayed Reporting Cases
	10:15	SWGDRUG Update 2009
	10:50	Buprenorphine; increasing use or abuse?
	11:25	Identification of gamma-hydroxybutyrate (GHB), gamma-butyrolactone (GBL) and 1,4-butanediol using trimethyl derivatization

Biology Sessions — Maryland Ballrooms 1-3

Thursday	8:30	Internal Validation of Quantifiler Duo and AmpFlSTR Yfiler
	9:00	Charaterization of 16 Mini-X Chromosomal Short Tandem Repeat Markers to Supplement Traditional Kinship Testing on Degraded DNA
	9:20	Development of the PowerPlex® 16 HS System
	10:15	Y-STRs: Investigations, Mutations, and Standardization
	10:35	Validation of a real-time, Alu-based PCR method with SYBR green detection as a human DNA quant method for use in a university laboratory setting
	1:30	Biology Section Chair-Elect Vote
	1:45	Implementing Expanded Functional Solutions for Forensic DNA
	2:15	Recovery and Visualization of Touch DNA, *Caitlin Muse*
	2:35	Traditional Multiplex STR Amplification of Low Template DNA samples with the Addition of Proofreading Enzymes
	3:15	How Low Can You Go? An Evaluation of Low Copy Number (LCN) DNA Testing
	3:40	Determining the Forensic Viability of DNA from Chewing Gum Undergoing Different Environmental Exposures

Agenda

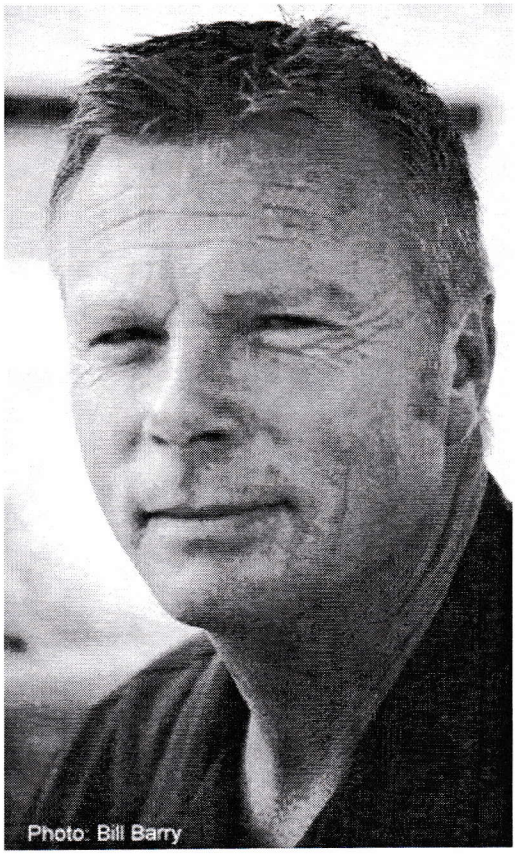
Biology Sessions (continued)

	3:50	Examination and Optimization of the PreCR™ DNA Repair Mix on Damaged DNA for Short Tandem Repeat and Mitochondrial DNA Analysis
	4:20	Applied Biosystems AmpFℓSTR® Identifiler® Direct PCR Amplification Kit
Friday	8:30	The New Stats: Calculations for low-level mixtures and for single parent paternity cases,
	8:50	The Analysis of Defined Data Sets of Mixture STR Profiles Using Several Mixture Deconvolution tools
	9:20	An Alternative Method for Estimation of PMI
	9:40	CR1 Elements Present In Forensically Important Blowflies
	10:15	Interpreting Difficult DNA Evidence
	10:35	A case of Amelogenin Y-null: simple primer binding site mutation or unusual genetic anomaly?
	10:50	Where it All Begins: Investigating property crimes and their impact on the DNA Lab

Questioned Documents Sessions — Salon E-F

Thursday	8:30	Counterfeit Motor Vehicle Documents
	8:55	Questioned Ident. Doc. (QID) System and Link Analysis Database, Optical Imaging Station, & Genuine Document Sys. Handheld Device
	9:20	Understanding the US Postal Barcodes for Information Purposes" Postal Codes
	9:45	Introducing the New Postal Money Order
	10:20	Safe-EXamination of Condom Wrappers
	1:30	Forensic Linguistics: Threat Assessment and Textual Analysis
	3:20	Paper Splitting: It's Use in Paper Conservation and Possible Alteration of Documents
	3:45	Analysis of Written Material from the United States Holocaust Memorial Museum
	4:10	AAMVA's Revised 'Fraudulent Document Recognition' Program
	4:30	Questioned Document Section Chair-Elect Vote
Friday	8:30	VSC 6000 Advanced Workstation: Avaluable Tool for Visual Examination of Documents
	8:55	What is the Basis for Elimination?
	9:20	Money to Burn
	9:45	The Importance of Validating and Verifying a Standardized Method: Envelope Examinations and the Anthrax Investigation
	10:20	Valuable Signature Analysis: Fall Workshop Summary
	10:40	Overcoming the Challenge of Selecting and Implementing a LIMS. Top 10 reasons Why LIMS Projects Fail: Tips to Avoid Wasting Time, Money and Resources

Featured Speaker



Charlie Wilhelm

Mr. Wilhelm is a career criminal who ended his life of crime the year he turned 40. Going to the FBI with no lawyer – and no criminal charges against him – he went undercover, wearing a wire to catch his life-long friends for drug dealing, bribery, loan sharking and murder - His story is the first to expose organized crime in Baltimore.

Arson, loansharking, drug dealing, extortion – it was all in a day's work for Charlie Wilhelm. In Baltimore, an organized crime syndicate of over 200 men took orders from him and his partner, strong arm enforcer Billy Isaacs. For over twenty years, Charlie lived the sweet life, making $10,000 a week in untaxed cash.

But everything changed in 1995, when Isaacs demanded that Wilhelm take out two men he suspected of cheating him. Charlie Wilhelm didn't want to kill – but he didn't want to die, either. Turning to FBI agent Bruce Hall – who'd grown up in the old neighborhood with Charlie – he became a double agent, working undercover against his former associates.

Danger lay everywhere, from suspicious hoodlums to dirty cops and even a Mob tipster working in the U.S. Attorney's office. One misstep could spell death not only for Charlie, but for his wife and children. Yet Wilhelm's efforts not only saved lives – they resulted in twenty convictions for offenses ranging from bribery and conspiracy to drug dealing and murder. Now, in his own words, Charlie Wilhelm tells his incredible true story of a wild life lived on both sides of the law.

Workshops

Estimating the Uncertainty of Measurements in the Modern Forensic Laboratory: Compliance with ISO 17025, *Bob Ollis, USACIL*

As ISO accreditation gains more significance to forensic science many laboratories are faced with the seemingly daunting task of determining Measurement Uncertainty (MU). This workshop will demonstrate how to establish a program to determine and monitor measurement uncertainty in all disciplines in forensic science. Included will be discussions of basic statistics, reporting measurement uncertainty, estimates of measurement uncertainty not based on rigid metrological determinations, and how measurement uncertainty affects the customer. This hands-on, no-nonsense approach to the application of the ISO standard will help the attendee realize that going ISO is easier than previously thought.

Forensic Science Educators Workshop

This workshop will count as training required to become an on-site FEPAC evaluator.

1:00 – 1:30 pm	Introduction to Forensic Science Education	Max Houck, WVU
1:30 - 2:00 pm	FEPAC Overview	Max Houck, WVU
2:00 – 3:00 pm	FEPAC Standards	Max Houck ,WVU
3:00 – 3:15 am	BREAK	
3:15 – 3:45 pm	Getting Started in Forensic Science Education	Max Houck, WVU
3:45 – 4:15 pm	Sustaining a Successful Forensic Science Program	Tracey Dawson Cruz, VCU
4:15 – 4:45 pm	Open Panel - Question & Answer session	

Updates on Advanced Forensic DNA Concepts

This workshop will include several short updates on cutting-edge topics and recent technological advances that are relevant to the discipline of forensic DNA. Topics will include recent advances in DNA *and* serology methodologies, mixture interpretation, low copy number analysis, microchip technologies, forensic SNPs, and the role of the DNA expert in mass disaster responses. An overview of each topic will be presented with a review-style presentation covering related current literature, commercial availability of supplies/instruments for analysis, and the anticipated impact on the forensic DNA community. Additionally, the advantages and disadvantages of each method will be addressed. Relevant case studies will be incorporated, where appropriate. Each topic will be presented by an expert from a local forensic laboratory. Reference lists, presentation notes, as well as other related handouts will be provided for each attendee. This workshop will be a unique opportunity for DNA examiners and trainees to get up-to-date on the status of recent advances that could soon impact their laboratories.

8:15 – 8:45	Fluorescent Sperm Detection	Karl Reich, Independent Forensics
8:45 - 9:30	Serological & Molecular Techniques for Body Fluid ID	Sarah Seashols, VCU
9:30 – 10:00	New Forensic Applications for qPCR	Tracey Dawson Cruz, VCU
10:15 – 11:00	LCN Analysis	Becky Hill, NIST
11:00 – Noon	Mixtures & Interpretation Software	Amy Decker, NIST
1:00 – 1:45	Proper Use of Reference Materials	Margaret Kline, NIST
1:45 – 2:30	Microfluidics & Microchip Analysis	Katie Horsman-Hall, VA DFS
2:30 – 3:00	Forensic SNPs	Pete Vallone, NIST
3:15 – 4:15	Missing Persons Resulting from Mass Fatalities	Amanda Sozer, Sozer, Niezgoda, &Assoc., LLC

Workshops

Leveraging Technology for QD courtroom presentations,
Gabe Watts, David Major, Gregg Mokrzycki, and Greg Bossert, FBI
Demonstrating questioned document examination conclusions and methodology can sometimes be challenging in a courtroom environment. Traditional means of demonstration, such as PowerPoint® and hardcopy charts can be inadequate in more complex cases. This workshop will concentrate on alternative presentation software to PowerPoint®, such as Flash® and Orator®, that give the presenter expanded resources for conveying information.

Blind Verification, Daubert & Research,
Melissa Giche, Katie Suchma & Toni Roberts, FBI
This 1-day workshop is designed for latent print examiners. In the morning session, students will review the legal history of challenges to expert scientific testimony, as well as discuss specific issues related to the latent print discipline. Through small group exercises, students will prepare responses to defense-related arguments. The afternoon portion of this workshop will focus on the scientific foundations and critical aspects of verification and blind verification. Different approaches to verification and blind verification will be discussed, including both benefits and limitations. Through small group exercises, students will develop policies to implement blind verification under different scenarios. By the end of the course, students will not only be better prepared to defend against admissibility challenges, but will also have an understanding of different ways to implement blind verification policies at their agencies.

The Forensic Examination of Plastic Garbage Bags,
Ted Schwartz, Westchester County Forensic Laboratory
Occasionally the Forensic Scientist is asked to compare one or more plastic garbage bags found at a crime scene to bags in an exemplar box of garbage bags. Fortunately, garbage bags possess several class characteristics that can be observed, measured and documented. These characteristics are due to the manufacturing process. In addition, individualizing characteristics can sometimes be observed, which could
help establish a positive link between the crime scene bag(s) and the exemplar bags.
In this half-day workshop, background information regarding plastic garbage bags will be presented and the manufacturing process will be discussed. In addition, case studies will be presented. The attendees will be asked to bring a box of large trash bags to the workshop. Hands-on exercises will be conducted to assess various class and individualizing characteristics and comparisons between bags will be conducted.
NOTE: Participants in this workshop should bring a box of garbage bags with them.

Becoming Familiar with ISO 17025, ***Anja Einseln, ASCLD/LAB***
This half day workshop will help attendees become more familiar with ISO 17025. The topics of presentation will include: the vocabulary of ISO, what does ISO bring to the table, where should I start, learning to calmly approach the accreditation process and not hyperventilate, and creating a network of understanding. This workshop will provide an introduction to the process – with the hopes that misunderstandings and apprehension regarding an ISO 17025 based accreditation program will be reduced. Open discussion sessions are planned as part of the workshop.

Workshops

Identification of γ-hydroxybutyrate (GHB), γ-butyrolactone (GBL) and 1,4-butanediol (BD) using trimethylsilyl derivatization,
Dr. M.A.Majid, Blair F. Laughlin, and Angela M. Ellis, Baltimore PD Crime Laboratory
A chronic problem in identification of the title compounds is that at high temperatures, in a typical gas chromatograph-mass spectrometer (GC-MS), γ-hydroxybutyrate (GHB) converts to γ-butyrolactone (GBL), making it impossible to identify them individually or collectively. To circumvent this problem, we have standardized the technique of trimethylsilyl derivatization of these compounds. The participants will get a practical experience on the derivatizatoin technique and hence the identification of these important drugs.
NOTE: **PARTICIPANTS IN THIS WORKSHOP WILL BE REQUIRED TO SUBMIT A BUCCAL SWAB TO BALTIMORE CITY POLICE DEPARTMENT, NO EXCEPTIONS.** ***Participants of this workshop will be bused from Hunt Valley Marriott to the Baltimore City Police Department Chemistry Laboratory. The bus will depart at approximately 7:00am from the hotel and return at approximately 12 noon.***

Steroids, ***Tamara Keller and Dr. Darrell Eubank, DEA***
This workshop will cover the basic terminology and fundamentals relating to anabolic steroids. Analysis techniques and ester salt form identification will be included as well as how to approach the analysis when faced with unknown compounds. Overall, the workshop will cover this class of substance which is widely abused yet not discussed on the same level as other controlled substances.

ABC Exam
Certification is a voluntary process of peer review by which a practitioner is recognized as having attained the professional qualifications necessary to practice in one or more disciplines of criminalistics. The ABC offers a certificate in criminalistics, as well as in the specialty disciplines of forensic biology, drug chemistry, fire debris analysis, and trace evidence.

Abstracts

Plenary Sessions

Grant Writing Workshop, *Chuck Heurich and Alan Spanbauer, NIJ*

NIJ Staff will briefly discuss the many funding programs available through the Institute. Along with these program descriptions will be presentations on Financial Do's and Don'ts, how to submit a successful application, and how to write good quality progress reports and Grant Adjustment Notice (GAN) language. Practical Advice from NIJ Program Managers and a question and answer session will round out the session.

Strengthening Forensic Science in the United States: A Path Forward
Pete Marone, VA Department of Forensic Science

In February, 2009, a congressionally mandated report from the National Research Council issued a report calling for major reforms and new research, mandatory certification programs for forensic scientists and strong standards and protocols for analyzing and reporting on evidence. It also stated that there is a dearth of peer-reviewed, published studies establishing the scientific bases and reliability of some of the forensic methods. Moreover, many forensic science labs are underfunded, understaffed, and have no consistent oversight. The report offers no judgment about past convictions or pending cases, and it offers no view as to whether the courts should reassess cases that already have been tried. Rather, the report describes and analyzes the current situation in the forensic science community and makes recommendations for the future. This presentation will discuss the origin of the study, its impetus and the resulting recommendations. Also discussed will be what the report says and also what it does not say.

Ethics in Forensic Science, *Robin Bowen, West Virginia University*

NOTE: This session will satisfy the Ethics training requirement for accreditation. Certificates will be issued to participants following this session. Participants can only pick up their own certificate. No participant will be allowed to pick up certificates for other members of their agency.

Criminalistics Sessions

Metrology and Standards for Canine Olfactory Detection of Explosives,
Stephanie Moore, National Institute of Standards and Technology

As part of a cooperative project with the Department of Homeland Security, The National Institute of Standards and Technology (NIST) has recently embarked on a project to develop reliable metrology for canine explosive detection. The goals of the project involve designing standardized testing materials and protocols to aid in rendering canine detection of explosives a more exact science. Canines have repeatedly proven their ability to detect explosives, providing the most mobile and a highly reliable source for field detection of trace explosives. In August 2008, the project began comprehensively characterizing the particulate and vapor phase of explosives including Semtex, Composition 4, TNT, Detasheet, and peroxides (TATP and HMTD) by means of liquid extractions, solid-phase microextraction, and headspace techniques. This process is crucial to identifying potential canine target odors. This presentation is a summary of those results, describing the rationale behind the compounds selected as key odorants and beginning to investigate their role in

canine explosive detection. With the target compounds established, prototype canine training aids prepared by coating inert silica particles and utilizing permeation tubes for odor release will be tested at an approved canine facility.

The Development of PAH SPME Phases for Selective Absorption of Nitroaromatics, *Jana James, Penn State University*

Solid-phase micro-extraction (SPME) has found widespread use in the extraction of volatile and semi-volatile compounds from environmental matrices. SPME uses a small-diameter fused silica fiber coated with an approximately 30 to 80-micron thick layer of polymer or resin. The basis for SPME is the strong affinity of the target analytes for the coating: Once analytes are bound to the coating, removal requires chemical or thermal desorption. As such, SPME is typically coupled with either gas chromatography or high-pressure liquid chromatography for the separation and quantitation of adsorbed analytes. SPME is a rapid, environmentally-benign and low-cost field sampling technique. There are two potential drawbacks for the use of SPME technology as a real-time, field-based detection device: 1) the inherent lack of target specificity with common and commercially-available coatings, and 2) the need for thermal or chemical desorption of the analytes from the coating surface typically requires laboratory-based instrumentation - although there have been recent advances in the development of coupled SPME-ion mobility spectrometry systems with field portablility. Our work focuses on the development of new poly aromatic (PAH) silane phases for HPLC and SPME applications. The PAH phases exhibit a high-degree of selectivity towards nitroaromatic compounds. Furthermore, the selectivity of these phases towards nitroaromatics is a sensitive function of the synthetic route – providing a mechanism to "tune" the selectivity of the phase for this and other potential target analytes. The PAH silane-based SPME fibers serve a dual purpose: 1) fluorescence quenching of the PAH silane by nitroaromatics can be monitored by attaching the fiber to a field-portable fluorimeter allowing real-time quantitative detection of nitro aromatics in ambient air, and 2) the analytes can be thermally or chemically desorbed from the fiber upon return to the laboratory and undergo "normal" chromatographic analysis. The principal aim of the research has been to develop a suite of silane coatings with a high-degree of selectivity towards specific nitro aromatics and/or develop a mixed-mode phase with broad selectivity and use multiple component analysis to recover individual analyte species.

Simultaneous quantitative determination of alcohol biomarkers ethyl glucuronide and ethyl sulphate in human urine using UPLC/MS/MS, *Peter Harrsch, Waters Corp.*

This method provides a simple solution for the simultaneous quantification of EtG and EtS in 5 minutes. The developed method has shown to be accurate, precise and linear over the desired analytical range. The dual sample analysis approach gave results for all samples in one batch analysis and eliminated the need to perform a repeat analysis of the samples which were above the highest calibrator.

The "source" of the problem: Human Error in GC/MS Troubleshooting, *Raquel Avelar, Anne Arundel County Crime Lab*

In December 2008, our 5973 GC/MS failed to autotune. After refilling the PFTBA calibration vial and replacing the source, the instrument still failed to tune. Overall, two work weeks were spend troubleshooting. This presentation highlights some simple errors in reassembly of the source that contributed to the problem.

Abstracts

Overview of Black Powder and Black Powder Substitutes,
Gui-hua Lisa Lang, Ph.D., Bureau of Alcohol, Tobacco, Firearms and Explosives

For many years, black powder has been one of the most common propellants used in improvised explosive devices (IEDs) in the U.S. Black powder contains 75% potassium nitrate (KNO_3), 10% sulfur (S) and 15% charcoal. However, its formulation has recently been modified by various companies, replacing sulfur with various organic compounds such as carboxylic acid or its derivatives. These modified black powder formulations are known as black powder substitutes, which have been encountered more often in recent years in ATF explosive cases. One group of black powder substitutes, such as Jim Shockey's Gold™ and Goex Pinnacle Replica black powder, utilizes ascorbic acid as a replacement fuel for sulfur. Another group, which includes Pyrodex® and Triple Seven® manufactured by Hodgdon Powder Company, uses the sodium salt of benzoic acid and dicyandiamide (DCDA) as fuels. Sulfur is absent in the formulation of Triple Seven, but still present in Pyrodex. This presentation will provide an overview of the history of black power and its substitutes and the analytical techniques used to identify them.

Factors Affecting Comparisons of Lubricating Oils,
Michelle Reardon, Bureau of Alcohol, Tobacco, Firearms and Explosives

The analysis and comparison of lubricating oils can provide important information in a variety of forensic investigations, including cases where oil was transferred from a suspect vehicle to the crime scene or victim. Forensic investigators and scientists should be aware of factors that could potentially affect the outcome of comparisons between known and questioned lubricating oil samples, so that the misinterpretation of data can be avoided. High-temperature gas chromatography-mass spectrometry was used in this study to evaluate the potential affect of various factors on the comparison of lubricating oils, including collection substrates, oil mixtures, and oil changes over time.

Absorbent pads, cotton-tipped swabs, gauze pads, and paper towels were used to gather oil from asphalt and concrete. The collection materials did not hinder the analysis or alter the oil composition. Mixtures of two oils were prepared in varying concentrations and showed potential for identifying the individual oils. Lubricating oils from 18 automobiles were monitored over a two-month period and did not demonstrate significant changes in the chromatographic data. Chemometric analysis of the mass spectral data also confirmed that the oils did not vary over time. A final facet of this research included examining a type of lubricating oil, power steering fluid (PSF), from a naturally-occurring leak. The PSF collected from several locations was consistent with PSF in the automobile's reservoir and was found to remain unchanged over time.

A Procedure for the Forensic Chemical Analysis within Bacillus Spore Samples,
Dr. Michael Rickenbach, Federal Bureau of Investigation

There have been different ways in which spore material, such as Bacillus anthracis, has been purified after growth. One method involved the use of a compound, RenoCal-76, which was commonly used in the radiographic field. Even though the use of such product aided in the isolation of pure spores, traces of meglumine diatrizoate, the active ingredient within RenoCal-76, could lead to information regarding how unknown spore material was processed. After the terrorist attacks of September 11, 2001, letters containing anthrax began appearing in the mail. Soon after, one of the

largest investigations in FBI history, code-named 'Amerithrax,' began. One of the tasks within the FBI Laboratory was to aid investigators in trying to determine how the B. anthracis spores were purified. A novel procedure using liquid chromatography/mass spectrometry with electrospray ionization was created and validated to detect both the cation and the anion within meglumine diatrizoate. Not only was the development of the assay of high importance, but the procedure was required to be both sensitive and as non-destructive as possible so that other examinations could be performed.

Rapid Analysis of Drugs of Abuse by Gas Chromatography-Time of Flight Mass Spectrometry , *Joe Binkley, LECO Corporation*

This presentation demonstrates the capabilities of Gas Chromatography-Time of Flight Mass Spectrometry to provide positive identification for drugs of abuse in criminal investigations. This highlights a method which has been developed to positively identify ten drugs of abuse in less than 5 minutes. Through the use of an automated peek fin algorithm, the amount of analyst time required to make positive identifications of various drugs of abuse has also been significantly reduced.

Driving under the influence, but under the influence of what? An introduction to MDPV, *Josh Yohannan, Howard County Police Department*

The Howard County Police Department responded to a vehicle that had run off the road and found a disoriented driver. A search of the vehicle yielded multiple foreign pharmaceutical preparations, some currently unavailable in the United States. Also seized was a bag labeled "1-(3,4-methylenedioxy-phenyl)-2-pyrrolidin-1-yl-pentan-1-one," also known as MDPV. Presented are some of the analysis and case notes.

Detection of Phenethylamine, Amphetamine, and Tryptamine Imine By-products from an Acetone Extraction, *Mary Yohannan, Drug Enforcement Administration*

The formation of imine by-products from phenethylamines, amphetamines, and tryptamines upon an acetone extraction is presented. Theses imine by-products were characterized using GC/MSD, and exhibited preferential cleavage on the α-carbon of the alkyl chain. Further characterization of the imine by-products of phenethylamine and tryptamine was done using IR and NMR.

LA-ICP-MS: The Ideal Tool Trace Element Fingerprinting of Solid Forensic Materials, *Steve Shuttleworth, Varian, Inc.*

Laser ablation is the ideal sample introduction tool for the ICP-MS analysis of forensic materials. The coupling of laser ablation and ICP-MS provides the opportunity for spatially resolved elemental analysis of even the smallest amount of forensic material with a minimum of invasive sample preparation. The very fact that matrix to matrix effects impact the ablation efficiency of all materials provides a unique situation for the forensic analyst; if the elemental and isotopic fingerprints match, there's a very high probability that the samples come from the same source material. In this work the technique of LA-ICP-MS will be illustrated by coupling the Varian 820-MS with a commercially available laser ablation system. A variety of sample types will be analyzed including physical crime scene materials such as glass. The Varian 820-MS represents the next generation of ICP-MS technologies. The Patented 90 degree ion mirror and low noise double off-axis quadrupole provide

industry leading sensitivity. This coupled with Varian's CRI (Collision Reaction Interface) for interference removal make the 820-MS the ideal information rich detection system for laser ablation sample introduction.

Computer Usage in Trace Evidence Unit, *Sandy Hartsock, Maryland State Police*

Ever-changing technology has provided forensic science with a multitude of new techniques and equipment that have proven beneficial to the analyst by providing new information in addition to saving time and energy in the analysis of casework. This presentation concentrates on the utilization of computers in Trace Evidence, but for the most part could apply to other disciplines as well. From the use of computers for inventory and case tracking through the lab, to the actual analyses, to the use of instrumentation, to comparison with databases, to aiding in writing a report and all the other communications associated with the investigation, computers come into play. They can also be used in conjunction with the Internet as a resource for information about products, techniques and procedures, guidelines, as well as online trainings. Where will the future take us?

The Hunt For A Most Dangerous Man: Apprehension Of A Serial Rapist,
Jeff Kercheval, Hagerstown Police Department

In the fall of 2006 a female reported a most unusual rape incident. The information she provided to police raised instant concerns about the modus operandi of the perpetrator. His actions were purposely designed to safeguard against leaving physical evidence at the scene. Other victims were to follow before the police and forensic manhunt finally paid off. The subsequent search of the suspect's home yielded a hoard of pornography along with home-made videos of his exploits. The overwhelming forensic and physical evidence obtained during the investigation resulted in a guilty plea prior to trial.

Baltimore City Model for Jane Doe / Delayed Reporting Cases,
Terri Labbe, Baltimore City PD and Debbie Holbrook RN, Mercy Medical Center

Cities and counties throughout the United States are scrambling to meet Federal mandates in compliance with January, 2009 Violence Against Women Act requirements. Delayed Reporting (or Jane Doe) cases encompass victims of sexual crimes who choose not to report their crime or cooperate with prosecution, but will still be able to have evidence collection and medical treatment by trained forensic medical personnel effective January 5, 2009. The Violence Against Women Act (VAWA) Reauthorization Forensic Compliance Mandates states "Nothing in this section shall be construed to permit a state…to require a victim of sexual assault to participate in the criminal justice system or cooperate with law enforcement in order to be provided with a forensic medical exam, reimbursement for charges incurred on account of such exam, or both." (42 USCA S. 3796gg-4.b.3.D.d.) Essentially what this means for patients who are victim of sexual crimes is that they may still be entitled to evidence collection, prophylactic treatment for sexually transmitted infections and pregnancy, and crisis intervention, without charge, by trained Forensic Nurse Examiners (FNE). Where this authorization does not mandate that states must be in compliance, it does hold the power to withhold STOP Violence Against Women Formula Grant Program funds to any state which is not in compliance by January 5, 2009. As most states are greatly dependent on these funds for initiatives benefiting women victimized by violent crimes, this is certainly incentive to comply with this federal authorization. It is important to note that this mandate does not articulate the method of compliance, nor does it override a state's mandatory reporting laws for crimes against children or

special populations. In addition, if a state requires mandatory reporting of crimes committed with a weapon such as a firearm, the state law would supersede anonymous reporting. Military personnel also have separate and distinct policies and procedures for reporting sexual crimes as defined by the Department of Defense. Baltimore City has adopted a stellar process by which kits are collected and held for one year in a secured Evidence Locker on site at Mercy Medical Center. Corresponding complaint numbers are obtained from police with no identifying information exchanged. When and if patients decide to report, they are given contact information for the Sex Offense Unit and a release may be signed. This release is brought to Mercy for release of all collected evidence. Advocacy is utilized to contact these patients prior to the destruction of the evidence to make them aware that they still may choose to report, but that not doing so may mean that there is a loss of vital trace and biological evidence. To date 40% of Jane Doe cases in Baltimore City have converted to reporting to police. This presentation will assist agencies who are not in compliance with formulating Sexual Assault Response Teams, providing procedures and options for kit storage, and adopting reporting structures for release of evidence.

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SWGDRUG Update 2009, *Linda C. Jackson, Virginia Department of Forensic Science*

The mission of SWGDRUG is to recommend minimum standards for the forensic examination of seized drugs and to seek their international acceptance. SWGDRUG has previously published recommendations pertaining to Education and Training, Quality Assurance and Analytical Methods. These recommendations were published after seeking input from the forensic community.
The most recent SWGDRUG recommendation, "Quality Assurance/Uncertainty" was accepted in July 2008. Key components of the this recommendation will be presented. Current projects of SWGDRUG subcommittees will be presented which include:
• Uncertainty Subcommittee - Developing supplemental documents with real-world examples of the estimation of measurement uncertainty for drug weights and quantitations
• Education and Training Subcommittee – Devising a comprehensive training program for drug analysts
• Editorial/Communications Subcommittee - Revising/editing current SWGDRUG Recommendations
SWGDRUG recommendations and minutes from SWGDRUG meetings can be found on the SWGDRUG website (www.swgdrug.org). The website also provides links to resource materials which are referenced in SWGDRUG documents and a mechanism to provide comments to the core committee.

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Buprenorphine; increasing use or abuse?, *Savitri Sharma, Baltimore City PD*

Buprenorphine hydrochloride is a semi synthetic narcotic used for opiate addiction therapy. It is a derivative of thebaine with analgesic effect that is up to 50 times more potent than morphine and LAAM. First marketed in 1980 by Reckitt and Colman (Reckitt Benckiser) as an analgesic sublingual tablet with a very long half-life. Buprenorphine binds strongly with μ receptors with a partial agonist effect. This unique characteristic gives it advantage over its predecessors (such as Methadone) making it the only opioid that can be prescribed legally for the treatment by trained and certified physicians. In October 2002, FDA approved buprenorphine in 2 formulations for opiate addiction therapy- Suboxone® (4parts buprenorphine and 1 part naloxone) made only for the U.S. market and Subutex® (contains buprenorphine only). Buprenex ®, a third form of this drug, is used as an analgesic only. Although, designed to be diversion proof, reports of increasing street-demand of the drug led the DEA in 2002 to reassess the potential of diversion of and addiction to buprenorphine and reschedule it from a schedule V drug to a schedule III drug. In U.S., there have

been reports of abuse and illegal distribution primarily in the Northeastern region where heroin abuse and methadone therapy are very common. Data submitted in SAMHSA summit in February 2008 rank the state of Maryland (NFLIS data) as the 3rd highest in the country for laboratory exhibits. The City of Baltimore leads in the number of submissions that increased from 187 cases in 2007 to 488 in 2008. Baltimore City Health Department along with Baltimore Buprenorphine Initiative (BBI), Baltimore Health Care Access Inc and Baltimore Substance Abuse Systems Inc have worked diligently to treat an increasing number of patients, 380 till June 30, 2007. According to the Baltimore Substance Abuse Systems Inc, Robert Wood Johnson Foundation awarded a 2-year $360 K grant to Baltimore Buprenorphine Program in February 2008 to support these efforts. In November 2008 BBI earned the National Recognition for reducing the number of drug-of-abuse or alcohol-associated deaths in the second quarter 2008.

Identification of gamma-hydroxybutyrate (GHB), gamma-butyrolactone (GBL) and 1,4-butanediol using trimethyl derivatization, *Dr. M.A. Majid, Baltimore City PD*

Gamma-hydroxybutyrate (GHB) has been in literature since 1874. In the 1960's, it was developed as an anaesthetic in the field of medicine. In addition, this four-carbon molecule is purported to have anabolic properties and also induce sleep. This and several other reasons prompted Food and Drug Administration in 1990 to issue a warning against the use of GHB. A decade later, sale and synthesis of GHB was stringently controlled and the drug was placed in Schedule I of the Controlled Substances Act. This in turn led to an increase in illegal synthesis. Recently, it been increasingly used as a date rape drug. With the robust increase in GHB seizures, crime laboratories are under increasing pressure from investigator for the rapid identification and analysis of the drug. Hence, the need for the standardization of the technique of methysilyl derivatization of GHB.

Biology Sessions

Internal Validation of Quantifiler Duo and AmpFISTR Yfiler

Maria Jose Illescas[*1], Carmen Tirado Neris[2], Fernando Mercedes Fernandez[2], Tracey Dawson Cruz[1], Jose Orengo[2], and Jose Bloom[21]VCU, [2]Puerto Rico Instituto de Ciencias Forenses*

The goal of this research was to validate two amplification kits with male specific components, Quantifiler® Duo DNA Quantification Kit and AmpFISTR® YFiler™ PCR Amplification kit, for routine forensic casework at the Institute of Forensic Science of Puerto Rico. Internal validation studies were conducted at the Institute of Forensic Science of Puerto Rico for in-house use of two commercial kits: Quantifiler® Duo DNA Quantification and AmpFISTR® YFiler™ PCR Amplification. YFiler™ was validated for two capillary electrophoresis instrument models, ABI PRISM® 3130xl and ABI 3100Avant Genetic Analyzers. Internal validation studies included reproducibility, precision, accuracy, sensitivity, and mixture analysis, as well as analysis of forensic casework samples. Additionally, a Y-STR population database was created for Puerto Rico using samples from male volunteers. Half-reaction volumes for both kits were also tested in an effort to maximize the number of reactions available per kit. Quantification with Quantifiler® Duo quantification was reproducible using full and half-reaction volumes. The assay is a reliable procedure for quantitation for total human and male human DNA with a wide sensitivity range (200ng-25pg), and allows accurate calculation of male:female ratios improving the workflow of DNA analysis in the forensic field. Use of this information allows the examiner to select the most appropriate STR chemistry suitable for each type of sample being analyzed. AmpFISTR® YFiler™ was found to be a robust system for

amplifying Y-STRs. The half-reaction volume was found to be more sensitive in terms of average peak height and allele detection success than the full reaction volume. The amplification is highly sensitive, allowing full profiles to be obtained with only 60pg of DNA input using a half-reaction volume. Mixture studies demonstrated that full profiles can be obtained even in presence of an excess of female DNA. Strong partial profiles were obtained for the minor contributor in male:male mixtures. Both kits were determined to be reliable and robust tools for analysis of forensic casework.

Charaterization of 16 Mini-X Chromosomal Short Tandem Repeat Markers to Supplement Traditional Kinship Testing on Degraded DNA, *Toni M. Diegoli* and Michael D. Coble, AFDIL*

The multiplex detection and analysis of STR markers is a common tool used for genetic identity testing in the forensic setting. Numerous publications have characterized genetic markers located throughout the autosomes and male-specific Y chromosome. More recently, markers located on the X chromosome have emerged as additional tools in this forensic arsenal. Markers located on the X chromosome, however, have thus far been relatively rarely used in forensic identity testing within the United States. At the Armed Forces DNA Identification Laboratory (AFDIL), kinship testing is routinely used to identify skeletal remains. In cases where maternal reference individuals are unavailable or where the unidentified individual has one of the most common mitochondrial DNA (mtDNA) haplotypes, mtDNA testing is insufficient for establishing human identity. Sufficient statistical power must then result from fewer, smaller STR loci or low copy number analyses. In such cases, markers on the X chromosome may provide additional information. Consequently, the characterization of candidate X chromosomal markers and the development of selected markers into mini-STR multiplexes offers the potential to supplement both traditional STR testing and mtDNA sequencing.

At AFDIL, 16 X chromosomal markers have been characterized and two mini-STR multiplexes have been developed including 15 of these markers. A primary multiplex consists of markers DXS6795, GATA172D05, DXS10147, DXS8378, DXS7132, DXS6803, HPRTB, DXS7423, DXS9902, and SRY. This multiplex incorporates four markers used in the European X-STR kits Mentype® Argus X-8 and X-UL (Biotype AG, Dresden, Germany) as well as five other highly informative markers. A supplementary multiplex consists of markers DXS6789, DXS7130, DXS9902, GATA31E08, DXS7424, GATA165B12, DXS101, and SRY. Designed to provide additional information in complex cases, this multiplex includes the highly informative marker DXS101. SRY and DXS9902 were included in both multiplexes for concordance and gender confirmation (SRY). In addition to a discussion of marker selection and discriminatory power, our study will present frequency data for several U.S. populations, including several previously unpublished alleles.

The opinions and assertions contained herein are solely those of the authors and are not to be construed as official or as views of the United States Department of Defense or the United States Department of the Army.

Development of the PowerPlex® 16 HS System
Martin G. Ensenberger, David Johnson, Melissa Schwandt, and Patricia M. Fulmer Promega Corp.*

Short tandem repeat (STR) analysis remains the primary method for human identification. Forensic typing, criminal databasing and relationship testing laboratories in the US and many other regions of the world use a standard set of 13 STR markers selected by the US Federal Bureau of

Investigation for the Combined DNA Indexing System (CODIS). The PowerPlex® 16 HS System co-amplifies these 13 loci (D18S51, D21S11, THO1, D3S1358, FGA, TPOX, D8S1179, vWA, CSF1PO, D16S539, D7S820, D13S317 and D5S818) plus the low-stutter Penta E and Penta D markers and the gender-determining Amelogenin locus. One primer for each of these loci are labeled with fluorescein, carboxy-tetramethylrhoamine (TMR) or 6-carboxy-4',5'-dichloro-2',7'-dimethoxy-fluorescein (JOE). Amplicon size is determined by comparison with the Internal Lane Standard 600 (ILS 600) labeled with carboxy-X-rhodamine (CXR). This four-color chemistry can be analyzed on the ABI PRISM® 310, 3100 and 3100-*Avant* Genetic Analyzers and Applied Biosystems 3130 and 3130*xl* Genetic Analyzers using existing dye matrix standards. The PowerPlex® 16 HS System provides a hot-start *Taq* DNA polymerase in a modified master mix to provide increased ease-of-use and performance over previous PowerPlex® systems. This assay has increased tolerance to common forensic sample inhibitors known to reduce genotyping success rates. The presentation will share results from sensitivity and inhibitor studies along with developmental validation results.

Y-STRs: Investigations, Mutations, and Standardization

Amy E. Decker and John M. Butler, NIST, Biochemical Science Division*

Y-chromosome STRs are important and useful in a wide variety of fields including human identity, paternity testing and evolutionary studies. Y-STRs can provide additional information beyond autosomal STR testing in forensic investigations such as mass disasters or sexual assault cases. NIST has been involved with Y-STR research in all aspects from evaluating and testing loci available in commercial kits and beyond, to determining and standardizing Y-STR nomenclature, to providing Y-STR locus information for database development. Adoption of commercially-available Y-STR kits, such as Yfiler (Applied Biosystems) in forensic DNA laboratories necessitated additional studies with these loci in order to assist in interpretation. Mutation rates, duplications and deletions all have an impact on the interpretation of a Y-STR profile. Duplications can lead to difficulty in deciphering whether or not a mixture is present [1] and mutations play a factor in profile comparisons. We have about 400 father:son sample pairs from Caucasians, African Americans, Hispanics and Asians obtained anonymously from a paternity testing facility. A study of mutation rates using the 17 Y-STR loci in the Yfiler kit was recently summarized [2]. Additional loci beyond those available in commercial kits have also been investigated for the ability to resolve common haplotypes [3]. Our study found that with the 656 NIST population samples representing the 3 major U.S. population groups, 95% of the haplotypes were not previously observed with the 17 Y-STRs in the Yfiler kit. These results are comparable to worldwide population studies with these loci found in the literature. Another area of focus involves Y-STR nomenclature. The genetic genealogy community is constantly adding more Y-STR loci which has lead to a need for increased standardization. A recent publication describes how nomenclature is determined, issues with nomenclature and how results can be more consistent between laboratories with standard reference materials [4]. REFERENCES [1] Butler, J.M., Decker, A.E., Kline, M.C., Vallone, P.M. (2005) Chromosomal duplications along the Y-chromosome and their potential impact on Y-STR interpretation. J. Forensic Sci. 50(4): 853-859. [2] Decker, A.E., Kline, M.C., Redman, J.W., Reid, T.M., Butler, J.M. (2008) Analysis of mutations in father-son pairs with 17 Y-STR loci. FSI Genetics 2(3): e31-e35. [3] Decker, A.E., Kline, M.C., Vallone, P.M., Butler, J.M. (2007) The impact of additional Y-STR loci on resolving common haplotypes and closely related individuals. FSI Genetics 1:215-217. [4] Butler, J.M., Kline, M.C., Decker, A.E. (2008) Addressing Y-chromosome short tandem repeat (Y-STR) allele nomenclature. Journal of Genetic Genealogy 4(2): 125-148.--see also editorial: http://www.jogg.info/42/files/editorial.pdf and interview: http://www.jogg.info/42/files/Interview.pdf

Abstracts

Validation of a real-time, Alu-based PCR method with SYBR green detection as a human DNA quantitation method for use in a university laboratory setting

Michelle Hite, Nicole Unger, Tracey Dawson Cruz, and Sarah Seashols, VCU*

Highly accurate human- specific quantification of DNA is essential for optimal short tandem repeat (STR) DNA profiling and is required by FBI quality assurance standards. Virginia Commonwealth University's Forensic Science program currently employs the Quantiblot® slot- blot technique from Applied Biosystems for the majority of instructional laboratory sessions focusing on human- specific DNA quantification. In an effort to expose students to more current techniques used in forensic DNA laboratories, VCU is working to switch to real-time PCR DNA quantitation methods for all forensic DNA quantitation instructional laboratory sessions. However, human- specific real- time PCR quantification kits such as Quantifiler® or Plexor® tend to be considerably more expensive than academic laboratory budgets will allow. In 2003, Nicklas and Buel proposed an Alu-based human-specific real-time PCR quantitation method using SYBR® Green detection. The purpose of this study was to modify and validate the Alu-based real- time PCR procedure using the Applied Biosystems 7500 Real-Time PCR instrument and ABI Power SYBR® Green Master Mix. Once the method was optimized for use with the ABI Prism 7500, several replicate standard curves were analyzed for both between- and within-run precision analysis. Data produced were shown to be reliable and reproducible over a large range of template quantities tested. Species specificity was tested utilizing several species, and all non-primate samples yielded results consistent with negative (blank) samples. Mock casework, low copy number, degraded and inhibited samples were tested and found to yield results consistent with Quantifiler® data from the same samples. Overall, the Alu-based quantitation method as originally reported by Nicklas and Buel and validated herein is a reliable, accurate, and cost-effective technique for use in the academic forensic laboratory.

Implementing Expanded Functional Solutions for Forensic DNA

Mark Guilliano, Mario Scherer, and Helge Lubenow, QIAGEN Inc.*

Purification of DNA from samples encountered in human and animal DNA forensic applications requires sufficient high quality DNA yields; often from samples containing very small amounts of DNA. In addition, these samples are commonly degraded and/or contain inhibitors. High performance DNA is essential for sensitive and reliable qPCR detection and STR analysis. Standardized processing and elimination of handling errors are key factors for forensic sample preparation to ensure reliable results. Automated nucleic acid extraction has offered many advantages compared to manual extraction methods: minimal hands-on time, further reduction of operator-dependent variation, and maximal safety in handling of samples. Silica based DNA extraction protocols have offered users the ability to extract high quality DNA, and QIAGEN has strived to enable customers to automate as many processes as possible across the entire forensic workflow. QIAGEN's offerings have recently expanded to include an updated, higher throughput EZ1 model (EZ1 Advanced XL), a small, cost-effective liquid handler (QIAgility) and a unique realtime cycler (RotorGene-Q). With QIAGEN's support, proven validation strategies will initiate the efficient and relevant implementation of these new solutions in your lab. This presentation will demonstrate QIAGEN's commitment to providing ongoing support and improvement of the forensic DNA process. Leveraging current resources and employing appropriate automation at key steps will provide a custom, lab-specific solution sure to maximize efficiency. QIAGEN: Dedicated to your success.

Recovery and Visualization of Touch DNA

Katie M. Horsman-Hall[1], Caitlin E. Muse[2], Lisa Schiermeier-Wood[1], Bradford C. Jenkins[1], and Susan A. Greenspoon, [11]Virginia DFS, [2]VCU*

The ability to locate and collect "touch" DNA on clothing evidence can greatly aid an investigation in identifying a perpetrator as well as help corroborate or challenge statements from the suspect, victim or witnesses. This study sought to optimize a method for visualizing and recovering touch DNA that would allow more genetic information from clothing evidence to be obtained. In the first phase of this study, water-soluble tape (Scotch®, St. Paul, MN) was compared to swabbing for collection of DNA from porous substrates. In the second phase of this study, fingerprint visualization techniques were examined as a method to visualize touch DNA transfer on clothing. Alternate light sources (ALS) and ninhydrin staining are commonly used by latent fingerprint examiners to visualize latent prints on porous items. While neither indicates the presence of DNA directly, fingerprints are enhanced using both. An ALS is used to detect luminescent compounds, including those contained in fingerprint residues such as some amino acids, lipids, and vitamins (1). Ninhydrin reacts with α-amino acids, peptides, polypeptides, and proteins (2,3), thereby indicating areas where epithelial cells may be found for DNA profiling. This study examined both methods for identifying areas of potential perpetrator contact on clothing. To assess the effectiveness of ninhydrin-staining to indicate areas of touch transfer of DNA, mock casework samples were prepared in which a volunteer ("victim") wore a new shirt, while another volunteer ("perpetrator") grabbed the back of her shirt and pulled forcefully.

No significant difference in DNA yield was found between swab and tape samples. Capillary electrophoresis analysis showed significantly reduced peak heights in tape samples as compared to swab samples. Inhibition was evident as a contributory factor in the peak height reduction for tape samples, but was not observed for the swab samples. However, no difference was observed in peak heights between ninhydrin-stained and unstained blood stain card samples. Results for the mock casework samples ranged from complete or strong partial profiles of the perpetrator to a low-level mixture or no alleles observed. The intensity of the ninhydrin staining was proportional to the intensity of the alleles observed in the STR profile. In this study, the combination of employing ninhydrin staining to detect potential touch DNA and sample collection with swabs gave optimal DNA yield for this type of evidence. Ninhydrin staining did not affect downstream DNA typing. As a result, ninhydrin staining of clothing evidence may prove useful to the DNA analyst by indicating the area of the evidence that may be most likely to result in a STR profile that is related to the case scenario. Utilizing other means of detection of DNA and biological material may be considered for future studies.

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Improving Traditional Multiplex STR Amplification of Low Template DNA samples with the Addition of Proofreading Enzymes

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Touch or trace DNA evidence, including fingerprints, saliva, hairs, and miniscule drops of blood and other bodily fluids are sometimes the only evidence found on a crime scene. This type of evidence

can often contain less than 100 pg of DNA (~15 diploid cells or less) and is referred to as low template DNA evidence. With <100pg of template DNA, stochastic effects often prevail, including allele dropout, inter- and intra-locus peak imbalance, and high stutter, which can prevent the acquisition of a full or even strong partial profile. To overcome these limitations, some researchers have investigated preamplification methods that include the addition of proofreading enzymes to the PCR cocktail. Proofreading enzymes have 3'-5' exonuclease activity, allowing them to correct bases that were misincorporated by the traditionally used Taq polymerase. Typically, the addition of an enzyme that has proofreading capability results in longer fragments, although the exonuclease activity reduces the overall processivity of the reaction. Previous studies have shown that combining these proofreading enzymes with Taq polymerase for preamplification is the best approach for increasing fragment length and STR genome coverage, without compromising the speed of the reaction. However, preamplification techniques, such as whole genome amplification (WGA), are often labor intensive and more costly than traditional STR analysis. Thus, this project will seek to determine if combining proofreading enzymes with Taq directly into the standard STR amplification reaction mixture will improve the fidelity of the reaction when little template DNA is available. This is vital for STR multiplex reactions because if longer products can be obtained, then the number of STR copies generated would increase, decreasing allele drop out and increasing the probability of obtaining a complete STR profile. For this project, a series of STR amplifications were conducted using input DNA quantities from 7.5 pg – 62 pg (from pristine reference samples) and various ratios of Taq:proofreading enzymes. Two enzyme combinations were tested including Invitrogen's Platinum Taq High Fidelity polymerase (a Taq:Deep Vent combination) and ABI's GeneAmp High Fidelity polymerase (consisting of Taq Gold and an unknown proprietary enzyme(s)). These enzyme mixtures were used in place of Taq Gold for multiplex STR amplification using the Profiler PlusTM PCR amplification kit. Resulting STR products were separated and analyzed via capillary electrophoresis using the ABI 3100Avant Genetic Analyzer. STR success was measured by percentage of alleles present, intra-locus heterozygous peak balance, and the occurrence of other stochastic effects; all STR results were compared to those obtained using traditional STR amplification (with Taq Gold alone). STR amplification using GeneAmp High Fidelity polymerase resulted in a significant reduction in both STR allele recovery and data quality, regardless of the ratio used. Overall, STR allele recovery and peak quality from samples amplified with Platinum Taq High Fidelity were comparable to those amplified with only Taq Gold. However, multiplex STR amplification with Platinum Taq High Fidelity consistently improved STR allele success at very low input levels (7.8 pg). While the use of this Taq:proofreading enzyme may improve STR analysis from low copy number samples, it will be necessary to carefully assess its performance using mock and/or non-probative casework samples before recommending it for routine use.

How Low Can You Go? An Evaluation of Low Copy Number (LCN) DNA Testing

Carolyn R. Hill and John M. Butler, NIST, Biochemical Science Division*

The term Low Copy Number (LCN) DNA is typically used when there is less than 100 pg of genomic DNA present, which is approximately 15 diploid copies of nuclear DNA markers such as short tandem repeats (STRs) [1,2]. Common commercial forensic genotyping methods, such as STR multiplex kits, will generally fail to amplify all of the loci present or even one or both alleles present within a locus at these low levels of DNA, generating partial incorrect profiles that can be misleading [3,4]. In these cases, there are too few copies of the DNA template to provide reliable polymerase chain reaction (PCR) amplicons, causing preferential amplification to occur [5]. Many laboratories try different methods to enhance the sensitivity of detection by increasing the number of PCR cycles (31 or 34 cycles instead of 28 cycles) [1-3,6], increasing injection times of the sample

on a genetic analyzer, increasing the enzyme (TaqGold) concentration per reaction, or reducing the PCR reaction volume. We have designed multiple LCN experiments to evaluate three different samples that are heterozygous at every locus in the AmpFISTR Identifiler™ PCR Amplification Kit (Applied Biosystems, Foster City, CA). Each sample was tested in triplicate at three different LCN concentrations (100 pg, 50 pg, and 10 pg) and at two different PCR cycling protocols (31 and 34 cycles). They were tested in triplicate to determine the consensus profile, where an allele cannot be scored (considered real) unless it is present at least twice in the triplicate samples [2,3,6]. In addition, the heterozygote peak height ratios (PHR) were calculated and compared at different concentrations and PCR cycling [2,4]. Eventually a wide range of concentrations of DNA (2 ng, 1 ng, 800 pg, 500 pg, 300 pg, 200 pg, 100 pg, 50 pg, and 10 pg) were tested at the "normal" cycling protocol of 28 cycles to draw conclusions about evaluating LCN samples. LCN profiles (<100 pg DNA) are affected by stochastic variation resulting in an increase of PHR, an increase in allelic drop out, and an increase in locus drop out that can lead to incorrect genotypes even when triplicates are evaluated.

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Determining the Forensic Viability of DNA from Chewing Gum Undergoing Different Environmental Exposures, *Megan Wenning*, Lisa Lojek, and Glen P. Jackson, Ohio Univ.*

Under some circumstances chewing gum can be a potential source of DNA to identify suspects or link suspects with a crime scene or victim. However, it is not known how long DNA can be expected to last in the gum matrix after expenditure, or what environmental factors might influence the degradation of the DNA. This project aims to elucidate the effects of common environmental variables on the ability to obtain viable DNA from expended chewed gum. We are currently establishing an extraction method for DNA from chewing gum, to enable DNA to be recovered from the complex and stubborn polymer matrix of the gum. DNA quantitation, amplification, and analysis follow SWGDAM guidelines put forth by the forensic community. These include commercial polymerase chain reaction (PCR) and labeling kits and analysis on a commercial capillary electrophoresis (CE) system in the new genomics facility at Ohio University. A uniform pool of standard expended chewing gum from an individual consumer will first be established. Replicate aliquots of this pooled DNA-containing chewing gum will be exposed to different environmental factors before extraction and analysis of the DNA. The environmental factors under consideration include, moisture, light, heat, and time. The quantity of total double standard (ds)DNA and human

DNA will be compared to the DNA levels obtained immediately after expenditure. This study will determine the different environmental factors that influence the extraction and successful analysis of viable DNA from a chewed gum source. This study will impact the field of forensics by validating the practice of analyzing extracted DNA from chewing gum.

Examination and Optimization of the PreCR™ DNA Repair Mix on Damaged DNA for Short Tandem Repeat and Mitochondrial DNA Analysis

Todd Bille[1], Matthew Farr[1], Carter Cromartie[1], Toni Diegoli[2] and Michael Coble[2], [1]ATF, [2]AFDIL*

Biological specimens submitted for forensic DNA analysis are seldom pristine and unaffected by elements of their environment. The DNA contained in samples collected from crime scenes, mass disasters, mass graves and cold cases can be affected by a number of factors that cause variable forms of damage. One method of analyzing heavily damaged DNA is to amplify reduced size STR fragments using "mini-plexes." If the DNA is too degraded, however, the "mini-plexes" will suffer from the same problems as the conventional STR analysis. Being able to repair the damaged DNA in vitro prior to amplification could allow the analyst to perform conventional STR typing on these compromised samples. The PreCR™ Repair Mix (New England BioLabs, Ipswich, MA) contains a combination of recombinant repair enzymes designed to repair various forms of DNA damage prior to PCR amplification. The effectiveness of the PreCR™ Repair Mix on artificially damaged DNA and on non-probative casework samples was examined. Initial studies following the manufacturer's recommended protocol produced limited results with DNA samples for STR analysis, but gave good results for mitochondrial DNA (mtDNA) analysis. The standard protocol was then modified to incorporate the repair reaction components into the standard STR PCR reaction as a pre-incubation step. The modified protocol was further optimized by varying enzyme concentration and incubation times. It was found that these modifications produced a significant increase in the overall average peak heights of artificially damaged DNA samples for STR analysis. Previous research with DNA repair has shown that the formation of chimeric products can create artifacts that may interfere with interpretation. In this study, no chimeric artifacts were observed in over 150 DNA repair reactions performed on damaged DNA. This modified PreCR™ DNA Repair Mix treatment could be a simple addition to the laboratory's existing PCR parameters for obtaining STR or mtDNA profiles from damaged DNA without significantly increasing labor or time.

Applied Biosystems AmpFℓSTR® Identifiler® Direct PCR Amplification Kit

Melissa Kotkin, Applied Biosystems*

This presentation describes an innovative new workflow option for single source samples, the Identifiler® Direct PCR Amplification Kit. The Identifiler® Direct kit is the first commercially available and validated "direct" amplification chemistry for use with DNA database samples and other single source DNA samples. Identifiler® Direct amplifies the same STR loci as the Identifiler® kit, but allows the loci to be amplified *directly* from the biological sample, without the need to perform any DNA extraction or purification. This new kit has the potential to simplify laboratory automation, minimize the opportunity for contamination and other sample integrity issues, reduce labor and consumable costs and accelerate the time to result for critical DNA profiling data. Because the Identifiler® Direct kit enables single source DNA samples to be more quickly and efficiently processed, laboratories can expand their throughput capabilities while also improving sample integrity and data quality.

Abstracts

The New Stats: Calculations for low-level mixtures and for single parent paternity cases

Sarah Chenoweth, Anne Arundel County Police Dept. Crime Laboratory*

Over the past two years, the Anne Arundel County Biology Unit has seen a tremendous increase in submissions of contact samples with low levels of DNA. Interpreting complex mixtures with multiple contributors and allele drop-out has become routine. In order to provide statistics for these mixtures without being influenced by a suspect's known DNA profile, we now apply a stochastic threshold to probability of exclusion calculations. Reducing both bias and the time required to interpret these mixtures has improved analysts' confidence. The Biology Unit also received two cases this year where paternity was in question, but only one parent was available to provide a DNA samples. These include a sexual assault resulting in a birth and a possible homicide where the body of the victim could not be located. By using the single parent kinship calculation available in Popstats, analysts were able to provide some statistical weight to their results.

The Analysis of Defined Data Sets of Mixture STR Profiles Using Several Mixture Deconvolution tools, *Valerie Bostwick*[1], Eugene Brooks[1], Sally Edwards[1], Terry Fenger[1], Rhonda K. Roby[2], [1]Marshall Univ., [2]NEST Project*

Mixture deconvolution tools, also known as fancy calculators, have been designed by several programmers/companies to assist forensic scientists in mixture interpretation of STR data for casework. Mixture results pose an additional challenge in case interpretation and can be quite time-consuming, even for the experienced forensic scientist. As advances are being made in the forensic community with expert systems for single source DNA interpretation, more and more focus is being directed at other software tools that can assist the forensic examiner in interpretation of mixed STR profiles. Controlled mixture studies were conducted to produce two data sets; each data set used a different pair of male and female DNA samples. The design of the mixture samples included varying ratios of the male and female DNA at 30:1, 10:1, 3:1, 1:1, 1:3, 1:10, and 1:30 with various DNA input levels. The different amounts of DNA added to each amplification (i.e., 1.5X, 1.0X, 0.5X, and 0.25X) were based on the manufacturers' published recommendations. These varying ratios and varying input quantities of DNA were amplified with PowerPlex® 16 System (Promega Corporation, Madison, Wisconsin) and AmpFLSTR Identifiler®, Profiler Plus®, COfiler®, and SGM Plus® PCR Amplification Kits (Applied Biosystems, Foster City, California). All samples were run on multi-capillary electrophoresis instruments. The raw data were analyzed using several mixture deconvolution tools and calculator packages. These include but are not limited to: DNA_DataAnalysis Software (United States Army Criminal Investigative Laboratory, Fort Gillem, Georgia); FSS-i3™ Expert Systems Software version 4.1.3 (Promega Corporation) in conjunction with GeneMapper® ID Software version 3.2 (Applied Biosystems); GeneMapper® ID-X Software (Applied Biosystems); and, TrueAllele® Casework System Package (Cybergenetics, Pittsburgh, Pennsylvania). The results of these studies demonstrate that fancy calculators can identify a partial profile of a minor contributor even at low ratios amplified with 0.25 ng total DNA. Through surveying the different mixture deconvolution tools, it is clear that the knowledge base of each software program is different and that they are each querying different parameters. It is the intent of this presentation to share the advances made with each software program and their respective advantages.

Abstracts

An Alternative Method for Estimation of PMI

Stephanie Young and Clifton Bishop, Department of Biology, West Virginia University*

There are several currently accepted methods of determining postmortem interval (PMI), or time since death. These methods include visual analysis of bodily decomposition, body cooling and/or stiffening, biochemical analysis of the rise or fall in certain chemicals within bodily tissues, and the presence of insects that are attracted to decaying remains. With the exception of entomology, the methods listed are considered to be unreliable after a period of approximately four days after death. Here is proposed a molecular method in which PMI can be evaluated for a much longer period of time using a tissue that is relatively protected from external degradative forces, tooth pulp. The method utilizes the predictable degradation patterns of RNA within tooth pulp over time to compare the breakdown of two differently sized fragments (a larger fragment versus a smaller fragment) of the same mRNA molecule using a relative ratio concept similar to carbon dating. In order to simulate a scenario in which a murder was committed and the body hastily disposed of within a shallow grave, the heads of eight common pigs were purchased from a commercial slaughter house and buried within shallow graves located within a wooded area. Two teeth were removed at time intervals spanning 0 to 140 days, weekly for one month and then bi-weekly until no teeth remained. The pulp was excised from each tooth, total RNA was extracted, and reverse transcriptase multiplex Real-Time PCR was used to quantitatively compare remaining amounts of undegraded segments of beta-actin mRNA with a length of 71 bp and 300 bp. Using this mRNA fragment size combination, beta-actin mRNA degradation can be tracked up to 98 days. Entomological data from blowflies would have become scarce by day 28, due to full skeletonization of the remains. Using a combination of morphological observation of the degrading pulp and the molecular data obtained from RNA degradation, the technique presented therefore surpasses the length of time in which previously accepted biochemical assays and entomology would provide the most useful postmortem data. The technique's ability to estimate PMI may be improved with the addition of an increased number of primer and probe combinations to measure different sizes of mRNAs or different forms of RNAs (such as rRNA) along with further data incorporating temperature in the form of accumulated degree days.

CR1 Elements Present In Forensically Important Blowflies

Michelle Thompson, Adrienne E. Guana, and David A. Ray, West Virginia University*

Retrotransposons including Chicken Repeat 1 (CR1) elements have a predictable pattern of mobilization in the genome that makes them useful for phylogenetics and identification of species. This study focuses on the identification and characterization of CR1-like lineages in the genomes of forensically important blowfly species. Sequences recovered were analyzed to identify different clades of elements. It was found that there are at least two ancestral lineages of CR1 that are also found in other dipteran insects (mosquitoes, Drosophila, etc.). Each of these lineages may have given rise to taxon-specific subfamilies that have been recently active in blowfly genomes. These results will be exploited to eventually allow development of a PCR-based species identification method of these forensically important blowfly species, which, in turn, will allow for a faster and more accurate estimation of post mortem index (PMI).

Interpreting Difficult DNA Evidence, *Mark W. Perlin*, Cybergenetics*

DNA evidence often contains mixtures of multiple contributors, or is present in low copy numbers. The resulting STR signals may appear to be relatively uninformative when interpreted using qualitative inclusion-based methods. However, these same data can yield greater identification information when interpreted by computer using quantitative pattern-matching methods. This study applies both qualitative and quantitative interpretation methods to a wellcharacterized DNA mixture and dilution NIST data set, and compares the inferred match information. The results show that qualitative interpretation loses identification power at low culprit DNA quantities (below 100 pg), but that quantitative methods produce useful information down into the 10 pg range. When there are low quantities of culprit DNA (10 pg to 100 pg),
computer-based quantitative interpretation can provide greater sensitivity for property crime cases, touch or damaged DNA, and low level mixtures.

A case of Amelogenin Y-null: simple primer binding site mutation or unusual genetic anomaly?, *Carey Davis[1]*, María Illescas[1], Carmen Tirado Neris[2], Roberto Lopez[2], and Tracey Dawson Cruz[1,3], [1]VCU, Department of Forensic Science, [2]Instituto de Ciencias Forenses de Puerto Rico, [3]VCU, Department of Biology*

Amelogenin codes for a protein found in tooth enamel and has a 6bp deletion in the Y chromosome compared to its homolog in the X chromosome. This deletion makes this gene an ideal sex determining marker for forensic purposes. Many cases have been reported in which sex determination has failed due to a Y allele drop-out at the Amelogenin marker, even in samples from phenotypically normal males. At 1:50pm on January 2008, a thirteen year old boy was murdered by a shot to the head while playing with two friends over at the neighbors' house. A young man entered the apartment and shot the boy in the head, then ran away from the crime scene. The suspect had a previous arrest order for second degree murder and firearm infringement. During the trial, the forensic pathologist stated that the manner of death, and shapes of the wound were consistent with an execution. The judge found the defendant guilty, and he was sentenced to 21 and 55 years in prison. The DNA-Serology section of the Institute of Forensic Science in Puerto Rico was asked to test buccal swabs taken during autopsy to confirm identification of the victim. The autopsy report from the victim indicated that the child was male. Reference samples from the child's father were also collected and submitted for comparison. DNA was extracted using the organic method; samples were amplified using Applied Biosystem's AmpFlSTR IdentifilerTM with subsequent separation and detection conducted on the ABI 3100Avant CE. The profile generated for the victim was XX; since this was inconsistent with the reported gender, allele drop-out for the Y Amelogenin allele was suspected. In an attempt to obtain a more accurate assessment, the sample was amplified using Applied Biosystem's AmpFlSTR YfilerTM which yielded normal haplotypes for DYS456, DYS458, DYSS19, and DYS393 loci but no amplification products were detected for DYS389I, DYS390, DYS389II, DYS385, DYS391, DYS439, DYS635, GATA H4, DYS437, DYS438, DYS448, or DYS392 loci (4 out of 16 tested). Upon further investigation, it was noted that those markers that failed to be detected were all localized to the q-arm of the Y chromosome. The Amelogenin result and Y-STR haplotypes from the father's sample were all normal. To better understand the genetic anomalies observed from the victim sample, Amelogenin and three Y-specific markers (spread throughout the Y chromosome q arm) were selected for further study. Traditional sequence analysis will be used to confirm these apparent Y deletions. Also, in order to determine the root cause of this large-scale Y deletion, fluorescent in situ hybridization (FISH) and microarray analysis will be performed using tissue blocks collected during the autopsy. Data from these studies is currently being analyzed and all results will be presented and discussed.

Where it All Begins: Investigating property crimes and their impact on the DNA Lab
Ashley Simpkins, Anne Arundel County Police Department Crime Lab*

The bulk of our caseload in the Biology Unit/DNA Lab is property crimes. By investigating further into the pasts of the suspects involved in these property crimes, it becomes evident how important solving these crimes can be. This presentation will highlight the arrest records and criminal pasts of CODIS offenders linked to our property crimes.

presenting author

Questioned Documents Sessions

Counterfeit Motor Vehicle Documents, *Scott Walters, United States Secret Service*

Documents have been counterfeited for more than a century. The counterfeiting of currency, credit cards or identification cards poses a significant threat to a country's economy, the personnel finances of individual's and the civil liberty of the population. Often times, criminals will attempt to counterfeit documents that you may not expect them to counterfeit. These documents if overlooked can present just as serious a danger as those documents mentioned above. These include various documents related to motor vehicles such as: temporary tags, motor vehicle titles, vehicle identification numbers, driver's licenses, etc. This presentation will discuss cases that have been examined dealing with various types of counterfeit documents being utilized to make money, commit murder, and/or defraud the public.

Questioned Identification Document (QID) System and Link Analysis Database, Optical Imaging Station, & Genuine Document System Handheld Device,
Jeffrey Payne, United States Secret Service

The QID system establishes a single resource containing authentic and counterfeit identification, travel, and financial documents. The current database contains images and information related to driver's licenses, identification cards, Social Security cards, birth certificates, credit cards, and traveler's checks. The database is also capable of including passports, visas and currency. This database is the first, single repository available to view legitimately issued identity documents and source information concerning their production, security enhancements and other forensic features. This system will be available to local, state, federal and intelligence agencies. Access to this information is critical, not only being able to collect, analyze and catalogue documents that may be related to terrorist investigations, but also to provide a forensic link analysis to investigators in being able to track perpetrators throughout the world.

The Optical Imaging Stations are peripheral devices that capture, digitize, and transmit specific document images, optical variable device images (for example, holograms), barcode data, and magnetic stripe data obtained from travel, identity, or financial documents. Through an interface with the QID system, the captured images and production information can be compared to that of genuine documents as well as other known counterfeit documents by field personnel, or can be transmitted to the Forensic Services Division for appropriate forensic examinations. The field will receive responses within a single business day.

GDS will provide users possessing little or no experience with a simple, secure, and expedient way of verifying the authenticity of a given identity or financial document.
E-Seek M300 handheld devices include machine readable capabilities to include: linear and 2-D barcodes, magnetic stripes, and contact chips. GDS inspects both machine readable data and document features using step-by-step instructions providing document feature verification.

Understanding the US Postal Barcodes for Information Purposes,
Debbie Campbell, U.S. Postal Inspection Service

This is a presentation on the meaning and the information contained in the barcodes applied to "live" mail by the US Postal Office. I will present the process and time of application.

Introducing the New Postal Money Order,
John W. Cawley, III, U. S. Postal Service, Forensic Laboratory Services

In 1864, an act of Congress authorized the Postmaster General to establish a money order system in order to promote public convenience and insure greater security in the transfer of money through the U. S. Mail. Throughout the years the postal money order has been widely used as an instrument for that purpose. However, it has also been targeted as a weapon for crime. Recent substantial increases in counterfeiting caused the U. S. Postal Service to take a new look at their money order and begin a major redesign effort. This presentation will discuss the new design of the domestic and international postal money orders.

Safe-Examination of Condom Wrappers,
Greg Mokrzycki and Lorie Gottesman, Federal Bureau of Investigation

A video of the Trojan condom manufacturing plant will be screened followed by a discussion of two cases involving document examinations of condom wrappers. The lectures will focus on the information that can be gleaned from manufacturing and printing characteristics on condom wrappers. The first case synopsis will cover a Canadian rape/murder where a portion of the wrapper found at the crime scene was matched to another wrapper found at the suspect's residence. The second case details the hunt for a Houston serial killer. The document examiner analyzed condom wrappers found at the crime scenes and sites frequented by prostitutes, inter-comparing similar wrappers, and ultimately matching several to one another. Additionally, the examiner was able to trace a set of these matched wrappers to the stores from where they were sold based on the information gleaned from the production codes printed on the outer surfaces.

Forensic Linguistics: Threat Assessment and Textual Analysis,
SSA Andre B. Simons, Federal Bureau of Investigation

The Behavioral Analysis Unit 1 specializes in threat assessment and textual analysis. A threat assessment of a communication, when paired with unknown author characteristics, can often supplement an investigation and contribute to the strategic allocation of resources. Participants in this session will learn about the identification, assessment, and management of risk through the analysis of criminally-oriented communications using principles derived from forensic linguistics and statement analysis.

Paper Splitting: Its Use in Conservation of Documents and Possible Alteration of Documents, *J. Franklin Mowery, FIIC, Folger Shakespeare Library*

In this presentation the methods used to split fragile paper will be covered in relationship to the conservation and preservation of historical documents. Splitting the paper down its core and inserting and adhering a supporting web (paper) inside and then rejoining the halves allows for a nearly invisible strengthening of a brittle page. Using these techniques it may be possible to alter documents for illicit purposes.

Analysis of Written Material from the United States Holocaust Memorial Museum, *Lynn Brostoff, Preservation Research and Testing Division, Library of Congress; Jane Klinger, US Holocaust Memorial Museum; and, Jennifer Wade, Preservation Research and Testing Division, Library of Congress*

This paper describes the use of handheld X-ray fluorescence (XRF) as a tool the initial examination and analysis of inks on three different documents form the United States Holocaust Memorial Museum (USHMM) collections. The work was conducted by the Library of Congress Preservation Research and Testing Division (PRTD) in collaboration with the Conservation Branch of the USHMM. The USHMM is one of the largest repositories of artifacts and records relating to the Holocaust. Included in the collections are many materials that were produced clandestinely while authors were in concentration camps, ghettos, or in hiding. Of particular interest are cookbooks and personal diaries which reflect events of the Holocaust, every day life during the period, and culture and traditions that victims sought to record. Visual inspection of the artifacts suggests that in some cases the inks appear to undergo changes that may reflect the author's condition, as well as the increasing difficulty of obtaining writing media. Anecdotal evidence indicates that as writing and drawing materials became scarce, commercial products were diluted or mixed to extend their useful life; homemade mixtures were also produced with available materials. The composition of the inks and writing materials is therefore of great interest in terms of both historical and information content. Furthermore, in order to develop sound conservation treatment protocols for the Holocaust documents, it is important to understand the nature of the writing media.

AAMVA's Revised 'Fraudulent Document Recognition' Program, ***Geoff Slagle,*** *American Association of Motor Vehicle Administrators*

AAMVA's revised Fraudulent Document Recognition program introduces both basic and intermediate techniques for the examination of documents that can be employed without the need for expensive tools. The new electronic (online) course is broken into logical modules and contains both printable job aids and knowledge assessment tools. Organizations may deliver the course as a whole, choose to offer only those modules that are of highest priority/interest, or build on the course with more advanced techniques for document examination. Categories of documents include: driver licenses; non-driver identification cards; vehicle titles; social security cards; travel documents; immigration documents; military and government identification; and birth certificates. In addition to a concentration on security feature authentication and document manipulation there is a "people-centric" module that addresses the facets of observation and interviewing.

VSC 6000 Advanced Workstation: Avaluable Tool for Visual Examination of Documents, *Gregory Dalzell and Larry Gella, Department of Homeland Security*

This presentation will be designed to introduce the attendees to the Foster & Freeman VSC6000, which is a specialized document examination instrument equipped with an advanced high-resolution color video imaging system controlled through a personal computer interface. The VSC6000 is a multifaceted instrument, so attendees will be shown various select new features. While all Foster & Freeman video spectral comparators can be used to help detect counterfeit documents as well as document alterations, this presentation should be of particular benefit to forensic document examiners by providing an account of the latest features available from this type of instrumentation that enhance or expand its core capabilities.

What is the Basis for Elimination?, *Ron Morris, Ronald N. Morris & Associates, Inc. and Gerry Richards, Richard's Forensic Services*

This presentation reviews the basic elements necessary to eliminate or identify a writer based on the writer's demonstrative handwriting characteristics. The authors have observed over the years that some FDEs have either lacked sufficient training in what constitutes the basis for elimination or have not fully understood the criteria necessary to make that determination.

Although the determination of identification and elimination are on opposite ends of the opinion scale, the criteria needed to reach these opinions are considerably different. However, both are based on a writer's skill level, the characteristics, qualities, and features of the writing, the quantity and complexity of the examined writing, the full range of variation of the writer, and the occurrence of outside or accidental factors that can influence a writer and subsequently the writing.

To opine an identification there must be a sufficient combination of class and individual writing characteristics in common between two sufficient amounts of writing, with no unexplained differences. To conclude that a known writer did not write a questioned handwriting, the FDE must determine that the known writer could not and did not write the questioned writing under any circumstances, including, but not limited to, intentional or accidental distortion, more than one writing style, writing position, drugs, some other transitory or permanent factor, etc.

In most instances involving signatures and short writings, the evidence in the writing is not sufficient to make such a determination. The key to eliminating a writer is for the FDE to understand that it is the combination of differences, when taken collectively, that determine the truly significant differences that provide the basis for the elimination. The authors have noted that even minor variations in writing characteristics, qualities, and features have been deemed so significant and individualistic by some FDE's that they have maintained that these superficial differences are sufficient to eliminate a writer. In each instance the variation between the questioned and known exemplars have led some FDEs to declare what was in fact a variation a significant difference and positively conclude that a different writer is responsible.

Money to Burn, *Antoine L. Frazier, Federal Bureau of Investigation*

The presentation will give a brief overview of 2008 Bank Crime Statistics from the FBI and discuss the details and results of an interesting charred document case. The defendants committed an armed bank robbery on March 6, 2008 in Fayetteville, North Carolina. One month later, a federal search warrant was executed at the residence of one of the defendants, and firearms, ammunition, holsters, a large amount of U.S. currency, and possible charred U.S. currency was found. The presentation will detail the procedures used to examine, preserve, and record charred documents.

Abstracts

The Importance of Validating and Verifying a Standardized Method: Envelope Examinations and the Anthrax Investigation, *Gerry LaPorte, NIJ*

Letters containing anthrax spores were sent via the U.S. postal service in the fall of 2001 killing 5 and infecting 17 others. The envelopes that were used for the attacks contained three separate pre-printed areas to include a; i) 34¢ Federal Eagle stamp on the front in the top right corner; ii) recycle statement on the back in the lower portion and; iii) a U.S.P.S. copyright marking on the back. The printed image and text was produced using flexography.

The presentation will focus on the use of a generally accepted methodology used to analyze, compare, and evaluate the envelopes from the anthrax investigation. Two separate research endeavors were conducted. The first involved a controlled production run of pre-printed envelopes to assess batch variation based on the morphological characteristics of printing defects. The second was a blind study to evaluate the reliability of associating questioned and known envelopes suspected to have originated from the same source and the potential error rate that may be encountered.

Valuable Signature Analysis: Fall Workshop Summary,
Pete Belcastro and Gabe Watts, Federal Bureau of Investigation

This presentation will be an abbreviated overview of the "Valuable Signature Analysis" Workshop presented in Cooperstown, NY in December 2008. The workshop addressed the authenticity and detection aspects of valuable signatures to include presidential, athlete, movie star, and musician autographs. In addition, investigative and examination techniques, research tools, and industry contacts, that may assist in these types of cases, were discussed. Several industry representatives were present at the workshop and this overview will highlight the experiences and insight they had to share on this topic to include conservation techniques and tools used by the National Baseball Hall of Fame & Museum to preserve their treasures.

Overcoming the Challenge of Selecting and Implementing a Laboratory Information System (LIMS). Top 10 reasons Why LIMS Projects Fail: Tips to Avoid Wasting Time, Money and Resources, *Dr. Peter Natale, Forensic Advantage Systems*

LIMS projects often fail. Depending upon what data you look at the failure rate of these large projects can be as high as 40%. Since no one likes to admit failure, the real statistic may actually be higher. Of course, this is catastrophic. So how can an organization avoid the mistakes that lead to a LIMS project failure? Quite often, the answer is simple common sense; a key variable that is occasionally ignored along with good engineering principals. When these variables are applied appropriately across the selection and implementation of a LIMS project, a higher success rate can be achieved.
If you have been tasked with selecting a new LIMS, this presentation can help. The session will provide the guidance needed to ensure you and your staff are aware of the critical issues that lead to making informed decisions regarding technology, support, product customization, integration with existing technologies, price and long term vendor viability. The presentation also provides an opportunity to learn from some of the industry's high profile success stories as well as failures, including issues encountered, mistakes made and problems to be aware of when automating a laboratory. Derived from independent 3rd party experiences and industry research from the LIMS

marketplace the 10 major issues to remain mindful of are:: Acquiring Top Management Support; Sticking with Unrealistic Schedules; Changing Requirements During the Implementation Phase; Fast Tracking (ie: Cutting Corners) on Product Selection Steps; Pretending your LIMS Implementation is Not a Software Project; Lack of Sound Product Development Methodology by the Vendor; Expediting Vendor Selection and Avoiding "Legitimate" Reference Checks ; Selecting a Product Based on a Vendor's "Brand" As Opposed to Their "True" Capabilities; Not Confirming Requirements and Employing Appropriate Acceptance Methodologies; and, Making Payments to Vendor Before Checking Project Milestones.

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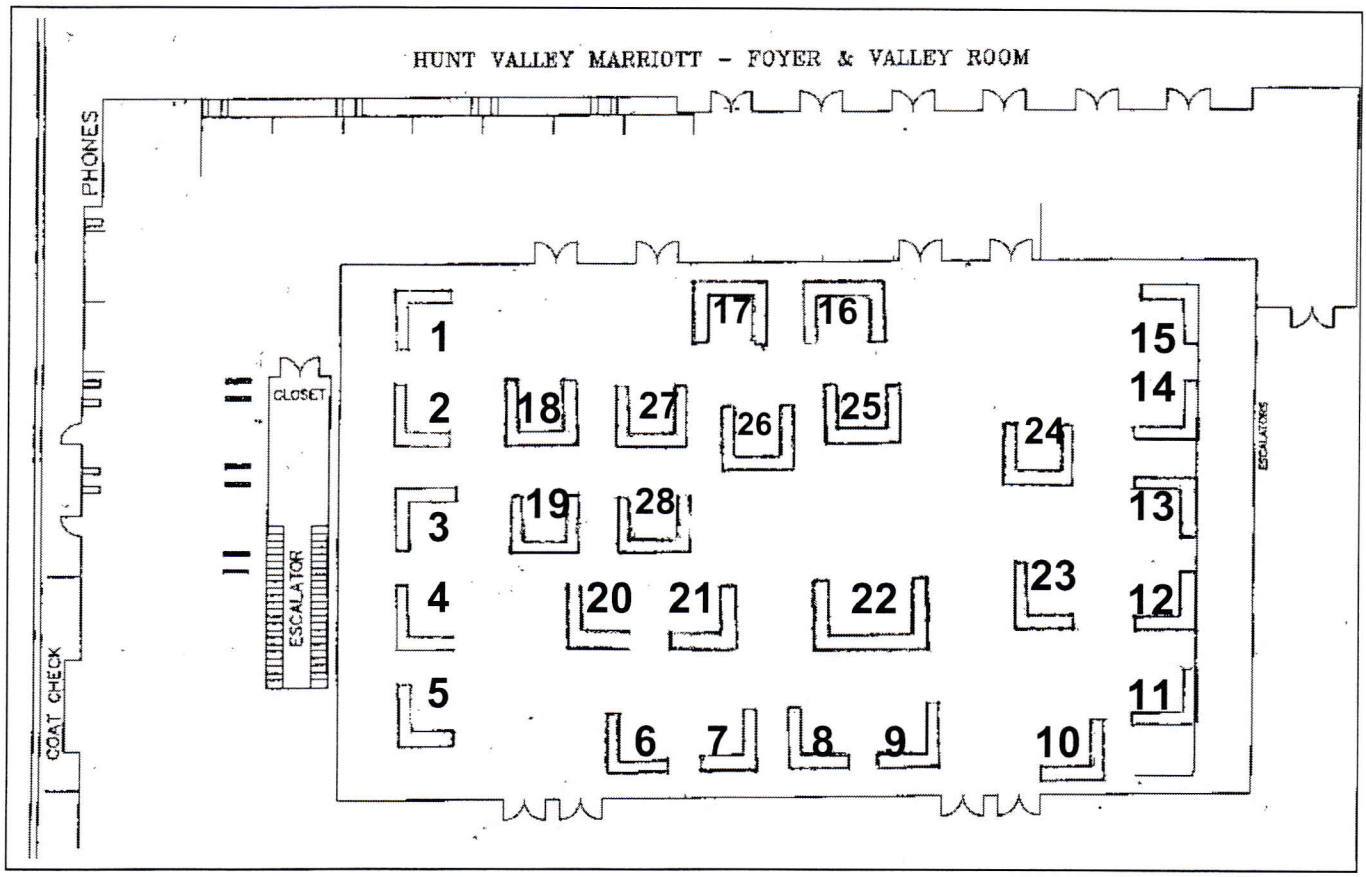
Palo Alto, CA 94304-1030
650-213-8000
www.varianinc.com

Waters Corporation
34 Maple Street
Milford, MA. 01757
800-252-4752
www.waters.com

Whatman, Inc.
200 Park Avenue, Suite 210
Florham Park, NJ. 07932
973-245-8300
www.whatman.com

Vendors



1. Miele-Atlantic Technology
2. BRT Laboratories
3. Leica
4. Aegis
5. ThermoFisher
6. The Computer Solution Company of VA
7. Whatman, Inc.
8. ChemImage
9. Applied Biosystems
10. Government Scientific Source
11. Marshall University
12. Qiagen
13. Waters Corporation
14. Foster & Freeman USA
15. Leeds Forensic Systems
16. Varian
17. Promega Corporation
18. Agilent Technologies
19. Towson University
20. Cybergenetics
21. Brook-Anco Corporation
22. Perkin Elmer LAS
23. Rainin Instrument, LLC
24. RJ Lee
25. ESCO Technologies
26. National Institute of Justice
27. Spectra-Analysis
28. ASCLD/LAB

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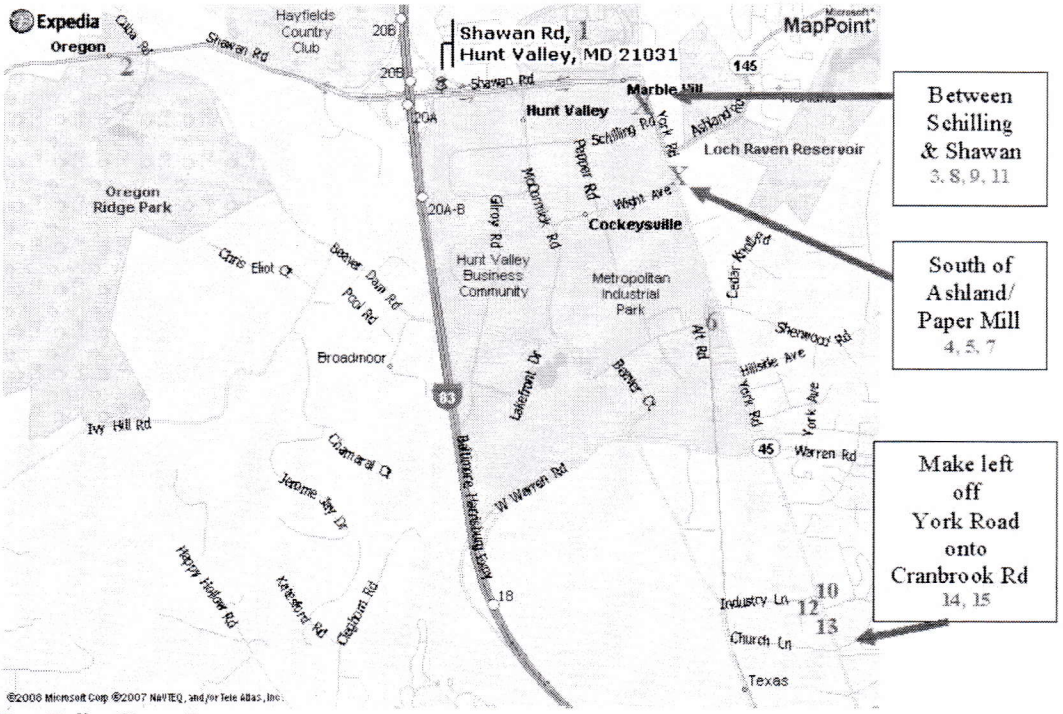
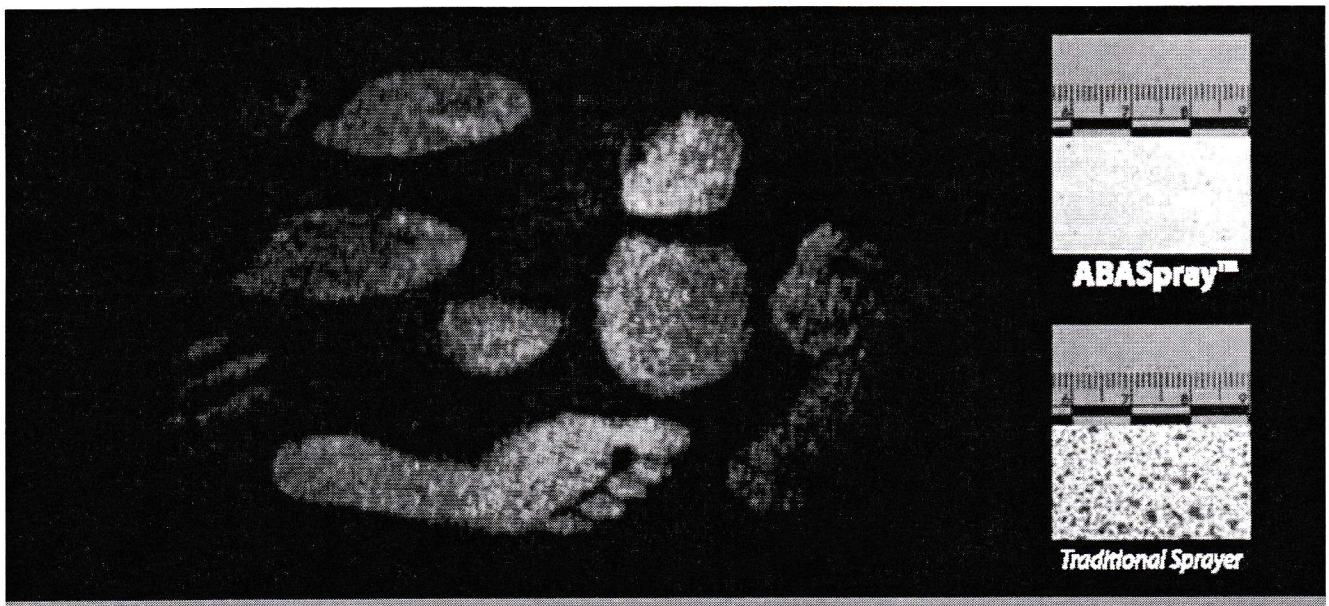
Keena Zitkovich	R.J. Lee Group, Inc.

Restaurants



1. Hunt Valley Town Center
   - Wegman's (this is an upscale grocer with a great café area offering Chinese buffet, soups, salads, sandwiches, sushi, pizza, and other specials…..eat in or carryout)
   - Carrabba's Italian Grill
   - Cheeburger, Cheeburger
   - Panera Bread
   - Noodles & Company
   - Jesse Wong's Kitchen (Chinese & Sushi)
   - California Pizza Kitchen
   - Carmine's Pizzeria
   - Gelato Factory
   - Greystone Grill (dress nicely, pricey)
   - Damon's Grill
   - Sakura (Hibachi Grill & Sushi)
   - Outback Steakhouse
2. Oregon Grill, 1201 Shawan Road (dress & pricey, reservations suggested)
3. Wendy's, 11322 York Road
4. Silver Spring Mining Company, 11100 York Road
5. Andy Nelson's Southern BBQ, 11007 York Road
6. Ashland Café, 10810 York Road (Diner)
7. Baja Fresh, 11121 York Road
8. Burger King, 11300 York Road
9. McDonald's, 11310 York Road
10. Chick-Fil-A, 10142 York Road
11. Subway, 11235 York Road
12. Cold Stone Creamery, 10015 York Road
13. Taco Bell, 9928 York Road
14. India Palace, 35 Cranbrook Road
15. Kabob Parsa, 73 Cranbrook



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