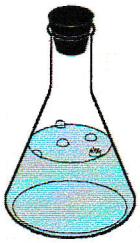
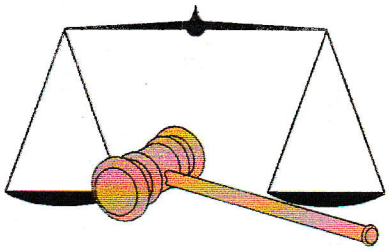


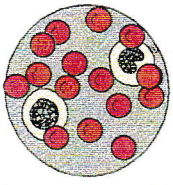


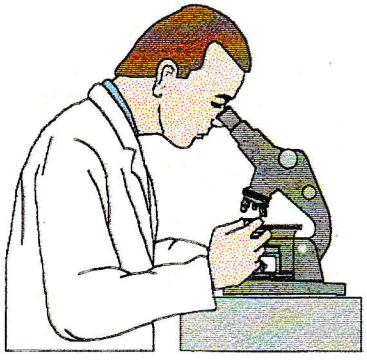
1996 ANNUAL MEETING

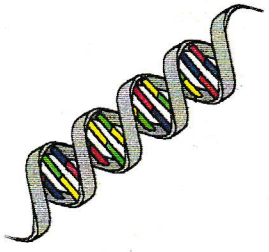
MAY 8, 9, and 10th

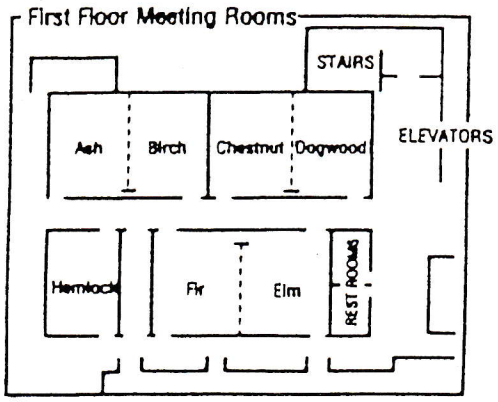
HARRISBURG, PENNSYLVANIA

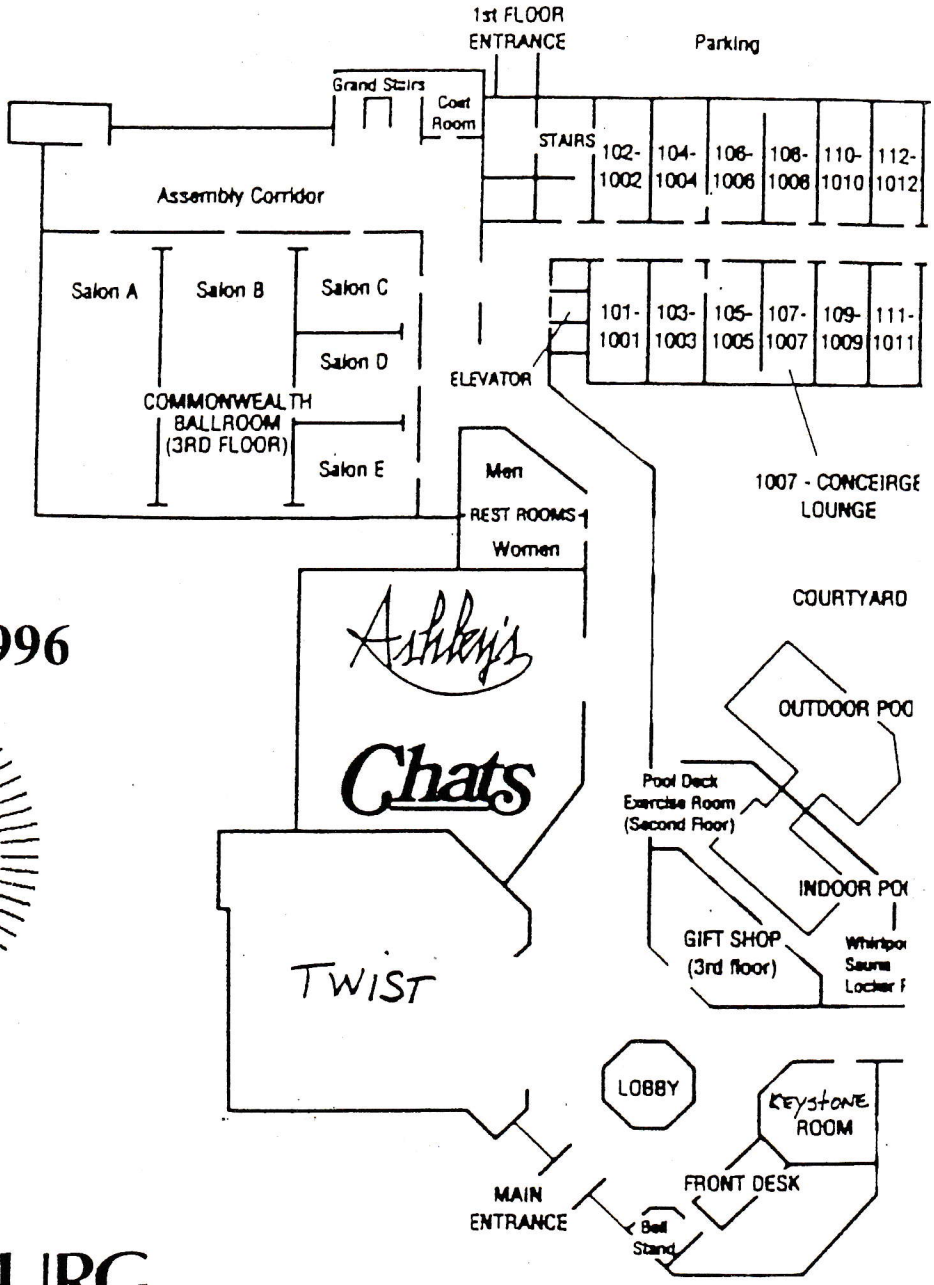
Mid-Atlantic Association of Forensic Scientists











MAAFS - 1996

MAAFS

HARRISBURG Marriott

4650 Lindle Road, Harrisburg, Pennsylvania 17111 (717) 564-5511

MAAFS
MID-ATLANTIC ASSOCIATION of FORENSIC SCIENTISTS

May 8, 1996

WELCOME!!!

Dear Fellow Members and Friends,

It is indeed a pleasure to welcome you to Harrisburg, Pennsylvania for the 1996 Annual Meeting of the Mid-Atlantic Association of Forensic Scientists. It has been 14 years since the Association last met in Harrisburg and we are excited to once again have the opportunity to host what should be an excellent meeting.

There are 200+ attendees registered, over 30 scientific presentations on the agenda, and over 25 exhibitors with state-of-the-art equipment and information for you to evaluate. This, coupled with an excellent facility, promises to provide just the right environment for learning from each other and establishing or re-establishing close professional relationships.

We wish to thank the Criminalistics Section of the American Academy of Forensic Sciences for the funding to print this program for all attendees and exhibitors participating in this meeting. Their continuing commitment to assisting regional societies in the education and training of forensic scientists is greatly appreciated.

Finally, we wish to express a special thank you to all who helped make this meeting possible. There are literally dozens of people whose combined efforts will make this the excellent meeting we expect it to be.

Sincerely,

Harry A. Fox, III
Co-Chairperson
1996 Annual Meeting

Harold A. Freed
Co-Chairperson
1996 Annual Meeting

REGISTRATION

Wednesday
11:00 am to 5:00 pm ..... Assembly Corridor

Thursday
8:00 am to 5:00 pm ..... Assembly Corridor

Friday
8:00 am to 9:00 am ..... Assembly Corridor

VENDOR EXHIBITS

Thursday
8:00 am to 5:00 pm ..... Salon B

Friday
8:00 am to Noon ..... Salon B

AMERICAN BOARD OF CRIMINALISTICS EXAMINATIONS

Wednesday, May 8, 1996

General Knowledge Examination ..... Keystone Room
8:00 am to 1:00 pm — Moderator: Julia Dolan

Friday, May 10, 1996

Forensic Biology Examination ..... Salon C
1:00 to 5:00 pm — Moderator: Julia Dolan

WORKSHOPS

Wednesday, May 8, 1996

Forensic DNA Testimony ..... Salons C & D
12:00 Noon to 5:00 pm — Moderator: Lawrence Presley

Automated Case Management ..... Salon E
12:00 Noon to 4:00 pm — Moderator: Harry Fox

Afternoon Break ..... Salon B
2:15 pm

SCIENTIFIC PROGRAM

Drug Analysis/Toxicology Session ..... Salon E
Thursday, May 9, 1996 — 9:00 am to 11:30 am
2:45 pm to 4:00 pm

Questioned Document Session ..... Salon C
Thursday, May 9, 1996 — 2:45 pm to 4:20 pm

General Session ..... Salon D
Thursday, May 9, 1996 — 9:00 am to 11:30 am
2:45 pm to 4:25 pm
Friday, May 10, 1996 — 9:00 am to 11:30 am (Salons C, D, & E)

Poster Session ..... Assembly Corridor
Thursday, May 9, 1996 — 9:00 am to 5:00 pm
Friday, May 10, 1996 — 9:00 am to Noon

BUSINESS MEETINGS

Wednesday

Executive Committee Meeting ..... Keystone Room
6:30 pm

Thursday

General Business Meeting ..... Salons C,D, & E
1:00 pm to 2:30 pm (ALL MEMBERS MUST ATTEND)

HOSPITALITY SUITE

Wednesday ..... To Be Announced
6:00 pm till ?

Thursday ..... To Be Announced
6:00 pm till ?

MAAFS 1996 ANNUAL MEETING
HARRISBURG, PENNSYLVANIA

SCIENTIFIC PROGRAM

REGISTRATION: - Assembly Corridor	8:00 am to 5:00 pm
EXHIBITORS - Salon B	8:00 am to 5:00 pm
REFRESHMENTS - Salon B	8:00 am to 9:00 am

Thursday, May 9, 1996

Drug Analysis/Toxicology Session **Salon E**
Moderator: Sherry Brown, York College of Pennsylvania

9:00 **Opening Remarks** - Sherry Brown

9:15 **When the Numbers Are Confusing! A Toxicological Dilemma with a Case in Point.**
Robert A. Middleberg, Ph.D.
National Medical Services, Inc., Willow Grove, PA

9:45 **Analysis of Inhalants via GC/MS**
Robert R. Steiner, M.S.
Virginia Division of Forensic Science, Richmond, Virginia

10:15 **BREAK - Please Visit the Vendor Exhibit Area and Have Refreshments in Salon B**

10:30 **Sniffing Death**
Ashraf Mozayani, Pharm.D, Ph.D., DABFT
Office of the Chief Medical Examiner, Washington, DC

10:50 **The Detection of Drugs of Abuse in Urine Following Unintentional Exposure**
Jennifer R. Iem, Jason A. Sklerov, and Nicholas T. Lappas
Department of Forensic Sciences, The George Washington University, Washington, DC 20052

11:10 **Urine Sample Dilution in a Criminal Defendant Population in Washington, DC**
Karoline K. Martin[1], Jerome J. Robinson[2], and Nicholas T. Lappas[1]
[1]Department of Forensic Sciences, The George Washington University, Washington, DC; [2]D.C. Pretrial Services Agency, Washington, DC

11:30 **BREAK - Please Visit the Vendor Exhibit Area in Salon B**

Noon - 1:00 **LUNCH - The Twist Lounge and Hemlock Room (1st Floor)** Elm

1:00 - 2:30 **MAAFS BUSINESS MEETING** **Salons C, D, & E**

2:30 **BREAK - Please Visit the Vendor Exhibit Area and Have Refreshments in Salon B**

Afternoon Moderator: Cecilia Cacciola, Pennsylvania State Police, Laboratory Division

2:45 **Waiter - There's a Condom in My Pie**
Carl M. Selavka, PhD. and Nancy Ruiz-Garcia, B.S.
National Medical Services, Inc. Willow Grove, PA

3:10 **It's Only Natural, Isn't It?**
Debra B. Feldman, B.S., Dr. Carl M. Selavka, Ph.D., F-ABC, Jason W. Freed, B.S.
National Medical Services, Inc. Willow Grove, PA

3:30 **Bufotenine: Case Reports and Analysis**
Anthony A. Burke, M.S.[1] and *Annmarie D. Liptak, B.A.*[2]
Virginia Division of Forensic Science, [1]Richmond, VA and [2]Norfolk, VA

3:45 **Ketamine: Case Reports and Analysis**
Anthony A. Burke, M.S.
Virginia Division of Forensic Science, Richmond, VA

4:00 **Cocaine Logos**
John F. Page
DEA Special Testing Laboratory, McLean, VA

4:15 **BREAK - Please Visit the Vendor Exhibit Area in Salon B**

4:30 **DOOR PRIZE DRAWINGS - YOU MUST BE PRESENT TO WIN!** **Salon D**

HOSPITALITY SUITE AT 6:00 PM - LOCATION TO BE ANNOUNCED

REGISTRATION: - Assembly Corridor	8:00 am to 5:00 pm
EXHIBITORS - Salon B	8:00 am to 5:00 pm
REFRESHMENTS - Salon B	8:00 am to 9:00 am

Thursday, May 9, 1996

Questioned Documents Session **Salon C**
Moderator: John S. Gencavage, Questioned Document Examiner

9:00 am **PLEASE SEE GENERAL SESSION SCHEDULE FOR MORNING PRESENTATIONS**

Noon - 1:00 **LUNCH - The Twist Lounge and Hemlock Room (1st Floor)**

1:00 - 2:30 **MAAFS BUSINESS MEETING** **Salons C, D, & E**

2:30 **BREAK - Please Visit the Vendor Exhibit Area and Have Refreshments in Salon B**

2:45 **Opening Remarks** - John Gencavage

3:00 **Preparation of an Infrared Spectral Library of Photocopy Toners Using Microscopical Reflection-Absorption**
R. A. Merrill and Edward G. Bartick
Forensic Science Research Unit, FBI Laboratory, Quantico, Virginia

3:20 **Image Integrity, and the Admissibility of Digital Imaging in Court**
SSA Douglas A. Goodin BA MPP MFS
FBI Laboratory, Washington, DC 20535

3:40 **Fake!**
Walter F. Rowe
Department of Forensic Sciences, The George Washington University, Washington, DC 20052

4:00 **Forgery of an Entire Document Using Simulation**
Thomas E. W. Goyne, MFS, Forensic Scientist Sr.
Virginia Division of Forensic Science, Richmond, Virginia 23208

4:20 **BREAK - Please Visit the Vendor Exhibit Area in Salon B**

4:30 **DOOR PRIZE DRAWINGS - YOU MUST BE PRESENT TO WIN!** **Salon D**

HOSPITALITY SUITE AT 6:00 PM - LOCATION TO BE ANNOUNCED

Jacks. Denbow.
U of Penn

REGISTRATION: - Assembly Corridor	8:00 am to 5:00 pm
EXHIBITORS - Salon B	8:00 am to 5:00 pm
REFRESHMENTS - Salon B	8:00 am to 9:00 am

Thursday, May 9, 1996

General Session **Salon D**
Moderator: James L. Miller, Pennsylvania State Police, Laboratory Division

9:00 **Opening Remarks** - Harry Fox

9:15 **Trace Detection of Illicit Drugs, Utilizing IMS, in the DEA Laboratory System**
Thomas M. Blackwell, Forensic Chemist
Drug Enforcement Administration, Mid-Atlantic Laboratory, Washington, DC

9:45 **Technical Working Groups in Forensic Science: A Mechanism for Quality Assurance Standardization**
Lawrence A. Presley, Edward Bartick, and Kenneth W. Nimmich
FBI Laboratory, FBI Academy, Quantico, Virginia

10:15 **BREAK - Please Visit the Vendor Exhibit Area and Have Refreshments in Salon B**

10:30 **Primate Specific Results with Quantiblot™ Method for DNA Quantitation**
R. Elizabeth Bush, M.F.S.
Virginia Division of Forensic Science, Roanoke, Virginia 24019

10:45 **A Free Zone Capillary Electrophoresis Method for the Quantitation of Common Illicit Drug Samples**
Jerry A. Walker, B.S., Henry L. Marché, M.S., Norman Newby, B.S., and E. J. Bechtold, B.S.
Drug Enforcement Administration, Mid-Atlantic Laboratory, Washington, D.C. 20532-0001

11:05 **Sexual Assault Nurse Examiners - A New Approach to Evidence Collection**
Lisa C. Schiermeier, M.S.
Virginia Division of Forensic Science, Richmond, Virginia

11:20 **Proficiency Testing in a Forensic Laboratory**
Catherine Theisen Comey, Ph.D.
FBI Laboratory, FBI Academy, Quantico, Virginia

11:35 **BREAK - Please Visit the Vendor Exhibit Area in Salon B**

Noon - 1:00 **LUNCH - The Twist Lounge and Hemlock Room (1st Floor)**

1:00 - 2:30 **MAAFS BUSINESS MEETING** **Salons C, D, & E**

2:30 **BREAK - Please Visit the Vendor Exhibit Area and Have Refreshments in Salon B**

Afternoon Moderator: Lee Ann Grayson, Pennsylvania State Police, Laboratory Division

2:45 **Experts: Certification or "Certi-fiction" Will Anyone Know the Difference?**
Charles R. Midkiff
Department of Justice, Law and Society, The American University, Washington, DC 20016

3:00 **Comparative Evaluation of Efficiency and Effectiveness Between Two Hybridization/Detection Methods for Chemiluminescent DNA(RFLP) Analysis**
Dave A. Pomposini, M.S., Forensic Scientist Supervisor, Stephanie Rauscher-Finn, M.S., and Jerry W. Sellers, Forensic Scientist
Virginia Division of Forensic Science, Norfolk, Virginia

3:20 **Case Study: A Robbery and a Homicide in Arlington County, Virginia**
MPO Edward Robinson, MFS[1], Robert B. Hallett, BS[2], and Eileen A. Davis, MFS[2]
[1]Arlington County Police Department, Fairfax, Virginia; [2]Virginia Division of Forensic Science, Fairfax, Virginia

4:05 **STRs: Precision Study of the Hitachi FMBIO Using CTTv Loci**
Tara L. Savage, B.S.[1], Michelle T. Squyars, B.S.[1], Barbara E. Llewellyn, M.S.[2], Virginia L. Fristoe, M.S.[2], and Jeff D. Ban, B.S[2].
[1]Virginia Commonwealth University and [2]Virginia Division of Forensic Science, Richmond VA

4:25 **BREAK - Please Visit the Vendor Exhibit Area in Salon B**

4:30 **DOOR PRIZE DRAWINGS - YOU MUST BE PRESENT TO WIN!** **Salon D**

HOSPITALITY SUITE AT 6:00 PM - LOCATION TO BE ANNOUNCED

REGISTRATION: - Assembly Corridor	8:00 am to 9:00 am
EXHIBITORS - Salon B	8:00 am to Noon
REFRESHMENTS - Salon B	8:00 am to 9:00 am

Friday, May 10, 1996

General Session **Salons C, D, & E**
Moderator: Paul R. Daube, Pennsylvania State Police, Laboratory Division

9:00 **Microscopic Examination of Hairs Excavated on James Family Farm**
James E. Starrs and Walter F. Rowe
Department of Forensic Sciences, The George Washington University, Washington, DC 20052

9:30 **Virginia's Experience with the Combined DNA Index System (CODIS)**
George C. Li, M.S.
Virginia Division of Forensic Science

9:50 **STRs: Comparison of Silver-Staining and Flourescent DNA Analysis Using the CTT AND CTTv Loci**
Michelle T. Squyars, B.S.[1], Tara L. Savage, B.S.[1], Virginia L. Fristoe, M.S.[2], Barbara E. Llewellyn, M.S.[2], and Jeff D. Ban, B.S.[2].
[1]Virginia Commonwealth University and [2]Virginia Division of Forensic Science, Richmond, VA

10:10 **BREAK - Please Visit the Vendor Exhibit Area and Have Refreshments in Salon B**

10:25 **Preliminary Study of the Use of Scanning Electon Microscopy to Compare 9mm Glock Pistol Rounds**
Richard S. Bendel, Paul Salvetti, and Walter F. Rowe
Department of Forensic Sciences, The George Washington University, Washington, DC 20052

10:45 **The Role of the Forensic Expert Witness**
Hal Deadman
12008 Park Shore Court, Woodbridge, Virginia 22192

11:05 **Forensically Important Flies in Maryland**
Theodore W. Suman, Ph.D.
Science Division, Anne Arundel Community College, Arnold, MD

11:30 **CLOSING REMARKS/DOOR PRIZE DRAWINGS**

REGISTRATION: - Assembly Corridor	8:00 am to 5:00 pm
EXHIBITORS - Salon B	8:00 am to 5:00 pm
REFRESHMENTS - Salon B	8:00 am to 9:00 am

Poster Session - Assembly Corridor

Posters will be available for viewing during the breaks and between the business meeting and the reconvening of the scientific papers. Authors will be present to discuss posters from 10:00 to 11:00 am and 2:30 to 3:30 pm on Thursday, May 9, 1996. Availability to discuss these posters at other times is at the discretion of authors.

Population Studies of the STR System CSF1PO, TPOX, and THO1

Barbara E. Llewellyn, MS, Virginia L. Fristoe, MS, Brian T. Shannon, MS, and Jeff Ban, BS

Virginia Division of Forensic Science, Richmond, Virginia 23219

Experiences with GC/MS Confirmation for Cocaine in Samples Collected by AccuPRESS^{R} Surface Drug Test Kits

Robert H. Lowe, Ph.D., Charles P. LoDico, M.S., and Yale H. Caplan, Ph.D., Corning National Center for Forensic Science, Baltimore, Maryland, 212227

Drug Analysis/Toxicology Session

When the Numbers Are Confusing! A Toxicological Dilemma with a Case in Point.

Robert A. Middleberg, Ph.D. National Medical Services, Inc. Willow Grove, PA

Forensic toxicological examination has two distinct phases: analysis and interpretation. Analyses can be straightforward, although biological matrices present many unique and problematic challenges. A detailed history leading to collection of specimens for toxicological analysis, including known medications, makes toxicological examination logical and directed. While having such information aids the analytical examination greatly, it does not necessarily help in the interpretation of findings. The following case example demonstrates the interpretive challenges to the forensic toxicologist.

The history provided with specimen submission was the sudden death of a 4 year old male who was prescribed clonidine and chloral hydrate (CH) for autism, attention deficit disorder and hyperactivity. The only specimen originally submitted for postmortem analysis was blood. No drugs of abuse or alcohol were detected upon routine screening. Specific analyses for the know medications revealed high concentrations of clonidine and trichloroethanol and trichloroacetic acid, the two latter compounds serving as the common measured metabolic products after CH administration. The CH metabolite concentrations were consistent with overdose and represented a competent cause of death in the child. However, subsequent information provided by the parents showed that the child was prescribed very high doses of CH over a 1-2 year period. Analysis of additional postmortem specimens (gastric contents, vitreous humor and liver) were equivocal toward determining whether the concentrations of CH metabolites represented therapeutic administration versus overdoes. Pharmacokinetic, pharmacodynamic, toxicologic and postmortem considerations made interpretation of the analytical findings difficult in terms of a manner of death, i.e., overdose versus idiosyncratic reaction. This case demonstrates the difficulties presented to the forensic toxicologist in interpreting analytical data for purposes of determining a satisfactory manner in a toxin-related, unexpected death.

Analysis of Inhalants via GC/MS

Robert R. Steiner, M.S., Virginia Division of Forensic Science, Richmond, VA

Death investigations involving inhalation of chemicals are seen fairly frequently in this laboratory. Identification of the chemicals involved typically is done via headspace GC/MS. Sample preparation and handling are critical to obtaining good results with this technique. In addition, certain instrumental conditions require specialized techniques for sample introduction. The techniques used in this laboratory to analyze these cases will be discussed.

Sniffing Death

Ashraf Mozayani, Pharm.D, Ph.D.,DABFT, Office of the Chief Medical Examiner, Washington D.C.

The forensic toxicologists are commonly involved in the sudden deaths following the "sniffing" episode. The variety of the volatiles and the effect of them on the body will be discussed. The cause and manner of death of several medical examiner cases involving sniffing will be presented.

The Detection of Drugs of Abuse in Urine Following Unintentional Exposure

Jennifer R. Iem, Jason A. Sklerov and Nicholas T. Lappas, Department of Forensic Sciences, The George Washington University, Washington, DC 20052

Drug urine testing has become common in the United States for several purposes including the evaluation of participants in industrial accidents, the monitoring of athletes, the supervision of parolees and as a component of pre-employment physicals. Even when screening and confirmatory tests for the detection of drugs in urine are conducted properly, the unintentional exposure to drugs of abuse must be considered as a cause of positive results. Unintentional routes of exposure, which include ingestion and inhalation, may result in the detection of an illicit drug of abuse or its metabolites in urine and lead to punitive action against the apparent violator. The unintentional exposure to several major drugs of abuse including opiates, marihuana and cocaine as well as methods for differentiating intentional use from unintentional exposure will be discussed.

Urine Sample Dilution in a Criminal Defendant Population in Washington, D.C.

Karoline K. Martin[1], Jerome J. Robinson[2] and Nicholas T. Lappas[1], [1]Department of Forensic Sciences, The George Washington University; [2]D.C. Pretrial Services Agency, Washington, DC

Creatinine levels were determined in urine samples in an attempt to identify those samples which had been diluted as a result of "water-loading". Creatinine concentrations in 545 urine samples obtained from 134 subjects were found to range from 6 - 493 mg/dL (mean = 126; σ= 119.7 mg/dL). A creatinine concentration of 20 mg/dL has been recognized by the National Institue on Drug Abuse (NIDA) as an indicator of specimen dilution. Of the 545 samples tested, 174 (31.9%), from 42 individuals, had creatinine concentrations of 20 mg/dL or less. Semi-quantitative drug concentrations were obtained by EMIT and it was determined that of these 174 samples, 13 were positive for the cocaine metabolite benzoylecgonine and 14 were positive for cannabinoids.

The drug/creatinine (D/C) ratios in these samples were used to determine whether the presence of drug in the urine was consistent with "new" use as characterized by an increase in the D/C ratio or "old" use as characterized by a relatively constant D/C ratio.

The large percentage of samples with creatinine concentrations below 20 mg/mL indicates the need to determine routinely the creatinine concentration. The D.C. Pretrial Services Agency is now testing all samples from drug treatment subjects as well as suspected, clear urine samples.

Waiter - There's a Condom in My Pie!

Carl M. Selavka, Ph.D.* and Nancy Ruiz-Garcia, B.S., National Medical Services, Inc., 2300

Stratford Avenue, Willow Grove, PA 19090

Investigation of product integrity and product tampering cases often involves questions which must be answered through laboratory examinations of foods, beverages and pharmaceutical products. Simple appearance of evidence under microscopic and macroscopic viewing provides the information needed to exclude many possible sources of contamination. Similarly, the appearance of products and/or their contaminants can also provide information which supports or excludes contamination scenarios presented by claimants. In still other cases, chromatographic or spectroscopic testing must be employed. In this presentation, a pictorial case review approach will be used to illustrate forensic approaches and interpretations in product tampering and product integrity cases.

Over the past 20 years, our laboratory has assisted in literally thousand of cases involving the examination of contaminated consumer products. This work has been performed on products submitted by physicians, manufacturers, distributors, retail stores, attorneys, other (local, state, federal and commercial) laboratories, poison control centers, government agencies involved in health, safety, law, enforcement and product regulation, and members of the media. Based on these experiences, we have developed a systematic examination approach to the identification or exclusion of possible sources of illness in consumers of potentially contaminated foods, beverages and pharmaceuticals.

The systematic approach to testing begins with consideration of the case history. Investigative focus can be gained when toxicological symptoms or medical findings are used as the basis for design of analytical protocols. For example, prepared foods (obtained through either retail sources or in restaurants) which cause nausea, vomiting and diarrhea are commonly contaminated with microbial pathogens, so microbiological testing would be indicated rather than chemical examinations. On the other hand, when a consumer complains of burning lips, bleeding gums or noxious odors, the analytical protocol would target potential caustic agents and/or volatile contaminants using chemical testing methods.

A brief historical review of the world-wide problem of adulteration or mis-manufacture of consumer products provides context to its magnitude and scope. Largely a concern in developed countries, it is clear that the ways in which consumers purchase products, and the shopping environment, create the potential for **purposeful** adulteration (tampering) to occur and go undetected prior to product purchase and use. In addition, the legal framework of the country involved also may increase or limit the number of adulteration claims. The ability of claimants to receive damages for pain and suffering related to ingestion or exposure to a contaminated product increases the incentive for exaggerated or false claims. In the United States, Federal Law contains penalties for false claims of tampering, but also allows for award of damages related to pain and suffering. In those countries where the law directs compensation only for reasonable medical expenses and follow-up care, the problem of tampering is far smaller. The history of deaths and significant illnesses related to product tampering also indicates that by far the most dangerous tampering agent is cyanide.

Physical examinations often verify that a solid contaminant has been introduced into a product (eg. condom in a pie, tablet in a beverage or glass particles in a capsule). These materials can provide evidence of history - whether the contaminant was introduced in the manufacture of the product, during retail or in the post-consumer phase - through observation, chemical, physical or biochemical testing. For example, a latex product found in a pie demonstrated significant bubbling and other thermal effects. Since the pie was heated in the store prior to sale, the contaminant was likely introduced during preconsumer handling. Physical examination also can

address the introduction timing for a tablet or capsule found in a beverage. Whether markings on the tablet/capsule can be read, or discoloration and dissolution has occurred, reconstruction experiments can define the approximate time required for the contaminant to reach this stage of decomposition.

Physical examination followed by biochemical testing is also useful for the identification of biological stains in and on products and their packaging. For example, the presence of blood on tablets can cause great concern for the consumer, who is not only interested in the presence of the potential bloodstain, but also whether the consumption of the bloodstained product could lead to infection by HIV or Hepatitis. The presence of saliva on the mouth of a retail bottle of water may indicate that an individual drank directly from the bottle, which could explain the growth of mold in an otherwise acceptable product. The entire problem of "backwash" is a common explanation for the presence of foreign objects in bottled beverages. Pressure formed behind the liquid when the consumers drinks from a bottle tends to suck liquid (potentially containing pills, food or other material) from inside the consumer's mouth back into the bottle. It is quite common to identify in a contaminated beverage a prescription drug which is among the consumer's normal dosages.

Some products bear no obvious contamination, but are claimed to be the source of "generalized" illness for a consumer. There is a need in these cases for sensitive screening tests to rapidly identify or exclude as possible sources of the illness many different compounds. We have developed an assay to fill this "General Unknown" need which consists of observation and recording of odor, pH, packaging defects, inclusions and general morphology, microchemical methods for cyanide, strychnine and anions, chromatographic tests for drugs, volatiles, pesticides, rodenticides and insecticides, and atomic emission spectroscopy for 24 elements. If these tests demonstrate presumptive identifications or elevations from control, confirmatory tests are performed to verify or refute the first result(s) before reporting. While there are other, more esoteric, substances which might be present as contaminants - and which would not be detected - the General Unknown protocol is based on the operative theory "When you hear hoofbeats, think of horses".

Based on the use of the General Unknown approach or applications of similar analytical methods, we have identified such wide ranging contaminants as solder, wire, batteries, glass, hairs, paper, gasket materials, rubber, condoms, finger-cots, latex glove tips, adhesive bandages, alcohols, fingernail polish removers, automotive liquids (radiator, windshield and brake fluids, new and used engine oils, gasoline and diesel fuel), aftershave, rat poison, ant poison, bleach, members of virtually every category of therapeutic and controlled drugs, cyanide, mineral acids and bases, organic acids and bases, urine, blood, seminal residua, saliva, and fecal material.

In summary, the use of systematic methods of forensic analysis to sensitively detect compounds and minimize oversight provides important investigative assistance in the toxicological and administrative resolution of consumer complaint and product tampering cases.

It's Only Natural, Isn't It?

Debra B. Feldman, B.S., Dr. Carl M. Selavka, Ph. D., F-ABC, Jason W. Freed, B. S., National Medical Services

The case involved a nutritional supplement which can be obtained through mail order or by purchasing directly from a supplier such as a health food store. The task was to identify and

quantitate those constituents which may have toxicological significance. In addition, there was a request to determine the origin of certain key ingredients which were identified. Analyses were performed whether or not the ingredients may have had a "natural" source, or if they were synthetic active ingredients added to the natural product to enhance it.

To determine this, the contents from each of two capsules, one obtained through mail order, the other purchased over the counter, were weighed, sieved, and microscopically examined in order to separate particles by size, shape, color and durability. In order to identify the active ingredient which was present, these particles were tested by the following methods: Gas Chromatography/Mass Spectrometry (GC/MS), Gas Chromatography with Nitrogen Phosphorus Detection (GC-NPD), and Fourier Transform Infrared Spectrophotometry (FTIR). Caffeine ephedrine and pseudoephedrine were detected using these methods as the three key ingredients. Quantitative examinations were performed for ephedrine, pseudoephedrine and caffeine using internally-standardized, extractive GC-NPD and GC/MS using a preweighed capsule of each type. Using analysis by FTIR, the ephedrine identified in the capsule was found to be consistent with Ephedrine HCI, rather than Ephedrine free base. In addition, microscopic analysis performed for those particles which were identified as caffeine and ephedrine were not morphologically consistent with natural products which contain caffeine or ephedrine. Based upon the results of microscopic examination, FTIR, and quantitative analysis, the ephedrine and caffeine present in both of the capsules could be considered to be of synthetic or partially synthetic origin. Therefore, the analytical findings did not support the claim that these supplements were "completely natural."

Bufotenine

Anthony A. Burke, M.S.[1] and Annmarie D. Liptak, B.A.[2], Virginia Division of Forensic Science, [1]Richmond, VA and [2]Norfolk, VA.

BUFOTENINE (5-OH Dimethyl Tryptamine) an isomer of Psilocin (4-OH Dimethyl Tryptamine), is an hallucinogen, as well as a topical "aphrodesiac". It is naturally occurring in certain plants (e.g. Anadenanthera) and toads (e.g. Bufo vulgaris). It is currently a Schedule I controlled substance under both federal and Virginia Code. Bufotenine has recently appeared in the form of a hard, dark-to-light, reddish brown, irregularly shaped, resinous solid material. Because of its closely related chemical structure to Psilocin, Bufotenine presents an interesting problem for structural identification.
This talk presents an overview of pharmacology, case reports and other descriptive literature on Bufotenine, and a description of analytical procedures.

Ketamine

Anthony A. Burke, M.S., Virginia Division of Forensic Science, Richmond, VA.

KETAMINE (2-(O-Chlorophenyl)-2-(methylamine)cyclohexanone), trade name Ketajet and Ketalar, an analogue of Phencyclidine (PCP), is an anesthetic with hallucinogenic properties which is currently not controlled under the federal code and a Schedule VI controlled substance

under Virginia code. It is normally available in injectable form. It has been recently reported in unusual forms and combinations as an abused "street" drug, and is being monitored by the DEA for possible rescheduling under the federal code.
This talk includes an overview of pharmacology, various case reports, a description of reported and observed mixtures including Ketamine, and a description of the analytical procedures.

Cocaine Logos

John F. Page, DEA Special Testing and Research Laboratory, McLean, VA

Cocaine packaging logos are often seen on kilo packages of Cocaine Hydrochloride. The DEA Source Determination Program analyzes these logos to determine the common manufacturing source of the individual logos. This information can be used to support conspiracy cases in court and show that various individuals were associated in smuggling, distribution and trafficking of Cocaine. The same information also is used to develop strategic and tactical intelligence for DEA's efforts to eliminate Cocaine distribution.
Analysis of Cocaine logos includes a determination of the reproduction method used to make the logos and an identification of the indiviual "toolmarks" (or printing errors, etc.) that enable the analyst to positively identify the common manufacturing source of two or more logos from different cases.

Questioned Documents Session

Preparation of an Infrared Spectral Library of Photocopy Toners Using Microscopical Reflection-Absorption

R. A. Merrill and Edward G. Bartick Forensic Science Research Unit, FBI Laboratory Quantico, Virginia

Widespread use of office equipment including printers, photocopiers and facsimile machines have increased the demand for forensic analysis of documents involving copy toner. Research studies have recently been directed toward analysis of the toner composition. As a polymeric blend, copy toner resin is an excellent sample for analysis by infrared spectroscopy (IR). Several sampling techniques have been studied and have proven themselves suitable for analyzing toner (1). Analysis by microscopical reflection-absorption (R-A) was selected as the most appropriate sampling technique due to its simplicity and availability in most forensic laboratories. Dry toner samples were removed from documents using a heat transfer process and transferred to the reflective side of aluminum foil adhered to microscope slides by double stick tape. Aluminum foil is a readily available, inexpensive reflective substrate for the R-A technique. The sample preparation is simple, fast and essentially non-destructive. Over 500 samples obtained from the FBI Photocopy Library have been analyzed by R-A and a searchable spectral library has been created. Search tests show very positive results. Toners tend to separate into two distinct categories of resins: styrene-based copolymers and epoxy resins. Thus far, 79 groups have been identified within these two categories based on spectral characteristics. Group sizes vary significantly from numerous groups containing only one sample to a group which contains 93

samples. Some variations in peak height ratios within large groups may permit additional discrimination. This suggests variations in concentration of certain components. A flowchart has been developed to assist with group assignments within each category.

(1) Merrill, R. A., Bartick, E. G. and Mazella, W. D., "Studies of Techniques for analysis of Photocopy Toners by IR" Journal of Forensic Sciences, Vol. 41, No. 2, March 1996, pp. 81-88.

Image Integrity, and the Admissibility of Digital Imaging in Court

SSA Douglas A. Goodin BA, MPP, MFS, FBI Laboratory, Washington, DC, 20535

Key Words: Electronic Imaging, Digital Imaging, Image Enhancement

To present an overview of Digital Electronic Imaging and Image Processing and their impact on use as evidence.

Photographic misrepresentation dates almost to the beginning of photography. Subtle manipulations and outright lies can be propagated through manipulating images to rewrite the "Truth." The recent furor over the Time magazine cover that darkened the face of O. J. Simpson is an example of the former, and the bald faced erasures and wholesale alterations of images by the propaganda machines of the former Soviet block are examples of the latter. In the era of chemical photography, a negative, the best original evidence, could always be produced if there were some doubt about a photographic print. The negative was in the camera at the time of the exposure and has probably remained intact since it left the scene of the crime. Methods are available to detect negative alterations. However in the age of digital imaging, no permanent, silver nitrate negative is produced. Images are merely files of bytes on data storage media. And if an image is suspected of alteration, erasure of the original file would destroy any trace of an uncorrupted image. "Image enhancement," also is now commonly referred to in digital imaging. Is "enhancement," alteration? There are methods available now, and coming in the future, for dealing with the authenticity dilemma. Various types of audit mechanisms (some used in general computer security and some specifically aimed at digital imaging) are available. In addition to deliberate alteration, some images may be innocently altered by compression algorithms, and/or the selection of unreliable storage media. Many image compression algorithms alter images by eliminating or averaging high frequency information (details), some with great losses. Images stored on magnetic tape deteriorate over time causing a partial or complete loss of image information. Careful selection of these products can reduce these hazards. Another issue dealing with image manipulation and the ease of altering digital images is their admission as evidence in court. Currently the Federal Rules of Evidence allow printout that represent the contents of a computer's memory to be admitted as evidence. This would seem to apply to digital images. Also photographs may be authenticated by anyone familiar with the conditions that they represent. Some state courts have differed. As digital imaging becomes more sophisticated, so will dedicated image liars. However with available technology and careful common sense most cases of image misrepresentation should be detected.

Fake!

Walter F. Rowe, Department of Forensic Sciences, The George Washington University, Washington, DC 20052.

The availability of home computers and inexpensive graphics software packages have made the manipulation of images for the purpose of deception easier than ever before. Persons and objects may be moved from one image to another; parts of an image can be rearranged. Images of nonexistent persons and objects can also be created. While some kinds of image manipulation can be detected by technical analyses of an image (anomalous variations in contrast or illumination) other kinds may escape ready detection. This presentation will examine several examples of faked imagery and discuss the means by which the fakery in each instance was detected. The following cases will be examined:

(1) The McMinnville Saucer photograph;

(2) Still photographs and motion picture footage allegedly showing German troops on the attack at the opening of the Battle of the Bulge;

(3) The photographs of the Cottingley Fairies;

(4) Motion picture footage allegedly showing British troops attacking on the first day of the Battle of the Somme.

(5) Photographs taken by Alexander Gardner in the aftermath of the Battle of Gettysburg.

Forgery of an Entire Document Using Simulation

Thomas E. W. Goyne, MFS, Forensic Scientist Sr., Virginia Division of Forensic Science

This paper discusses the forgery of a handwritten insurance statement by attempting to simulate the handwriting style of a juvenile and domestic court judge. The suspect, using a handwritten insurance statement previously issued by the judge in a child support case, was able to produce a new insurance statement which made greater financial requirements on the other party. While the document had a striking resemblance to the judge's handwriting style, it contained many features consistent with simulation.

General Session

Trace Detection of Ilicit Drugs, Utilizing IMS, in the DEA Laboratory System

Blackwell, Thomas, M., Forensic Chemist, Drug Enforcement Administration, Mid-Atlantic Laboratory

The use of Ion Mobility Spectrometry (IMS) has allowed DEA laboratory personnel to assist Federal Agents and Task Force operations in the collection and on-site analysis of samples suspected of containing trace amounts of controlled substances. The IONSCAN® (Barringer

Instruments, Ontario, Canada) permits wide range detection, fast analysis time (6 seconds), and high sensitivity in both field and laboratory environments. In addition to its portability, the IONSCAN® allows for the non-invasive sampling of essentially any surface.
IONSCAN® results can be saved to computer disk and a hard copy produced. However, results are later confirmed utilizing conventional laboratory instrumentation and can be used as further evidence to support cases involving asset forfeiture, drug trafficking, and conspiracy. The IONSCAN® has been used to detect traces of controlled substances from clothing, documents, cars, trucks, briefcases, and other items. This presentation will include some brief IMS theory, as well as discussion of actual uses of the IONSCAN® for field support, in addition to some benefits and limitations.

Technical Working Groups in Forensic Science: A Mechanism for Quality Assurance Standardization

Lawrence A. Presley, Edward Bartick and Kenneth W. Nimmich, FBI Laboratory, FBI Academy, Quantico, VA.

Quality assurances are all those planned or systematic actions necessary to provide adequate confidence that a product or service will satisfy a given requirement for quality. This idea of a quality assurance system is not a new one. Moses, circa 1445 B.C., suggested that you "do not use dishonest standards when measuring length, weight or quantity. Use honest scales and honest weights, and honest ephah (dry measure) and an honest hin (liquid measure)" [Leviticus 19:35-36]. Moses recognized the need for `honest' actions that provide confidence of a certain level of quality for a product or service. Technical working groups using quality system concepts have the potential to help satisfy the need for high quality and influence the quality practices of a forensic laboratory.
Technical working groups are encompassing more forensic disciplines, and creating specific liaisons with other forensic and non-forensic scientific and technical organizations. As technical working groups process, share and disseminate more information, their efforts will automatically begin to influence and standardize high quality work products throughout the forensic community. The Technical Working Group on DNA Analysis Methods (TWGDAM) has already substantially affected forensic DNA analysis throughout the United States with the publication of numerous quality assurance consensus guidelines that have become 'the standards' for forensic DNA analyses. The TWGDAM 'standards' have a proven track record of establishing high quality work products throughout the crime laboratory community.
In principle, technical working groups in forensic science may be described as a form of `international and interagency' quality circle. Quality circles originated in Japan in 1962 with the Japanese Union of Scientists and Engineers as a natural consequence of top-down quality management from senior executives to engineers to shop-floor supervisors. Quality circles have been defined as formal, institutionalized mechanisms for productive and problem-solving interaction among employees. Current and emerging forensic science technical working groups may be defined as semi-formal international, interagency groups that come together for consensus building and problem-solving interactions among its members. As technical working groups promulgate consensus standards, the likelihood of standardization of high quality practices becomes more certain, and the potential challenges of opposing experts are better addressed. The purpose of this presentation is to outline and discuss the general organization, functions, structure

and future of technical working groups in forensic science.

Primate Specific Results with QuantiBlot™ Method For DNA Quantitation

R. Elizabeth Bush, M.F.S., Division of Forensic Science, 6600 Northside High School Road, Roanoke, VA 24019

The QuantiBlot™ test kit is used routinely for DNA quantitation prior to PCR analysis. One of the advantages of this method of quantitation is that human species can also be confirmed. Human species is confirmed because the test incorporates the use of a probe that is complementary to a primate-specific alpha satellite DNA sequence at the locus D17Z1. The manufacturer of the QuantiBlot™ kit reports that non-primate blood can react with this test but at a very low level (<.15 ng). Non-primate blood samples, of the same and different species tested by the manufacturer, were tested to verify the species specificity of this test. Chelex extractions of non-primate blood samples were subjected to slot blot analysis using the QuantiBlot™ kit and chemiluminescent detection. The Chelex extract of one (1) species yielded a high level of DNA with this method. Organic extractions of this same sample resulted in no detectable DNA. The results of this study will be presented along with suggestions on achieving primate specific results with the QuantiBlot™ Kit.

A Free Zone Capillary Electrophoresis Method for the Quantitation of Common Illicit Drug Samples

Jerry A. Walker, B.S., Henry L. Marché, M.S., Norman Newby, B.S., and E.J. Bechtold, B.S. Drug Enforcement Administration, Mid-Atlantic Laboratory, Washington D. C. 20532-0001.

Key Words: Capillary Electrophoresis, CE, Quantitation, Cocaine, Heroin, Methamphetamine, Lysergic Acid Diethylamide, Phencyclidine

This paper presents a simple quantitative method using capillary electrophoresis (CE) to analyze commonly seized illicit substances. Fourteen common basic drugs were screened using a 200 mmol sodium phosphate run buffer. Linearity and reproducibility are shown for cocaine, heroin, methamphetamine, lysergic acid diethylamide (LSD) and phencyclidine (PCP). Known adulterants and impurities did not interfere with these drug compounds. Comparisons of CE quantitations to results from other laboratory techniques demonstrate the reliable adaptation of CE to the forensic laboratory.

Traditionally, micelles have been incorporated into the run buffer to separate neutral species which have no electrophoretic mobility. Partitioning into an electrophoresing micelle imparts a net mobility on the solute. However, many common drugs of forensic interest are ionic in nature and can be charged imparting different electrophoretic mobilities to each solute. Basic drugs, in general, are neutral at high pH and positively charged a low pH. Conversely, acidic drugs are negatively charged at high pH. Therefore, the run buffer pH and solute pKa become critical elements creating complications with micellar systems due to ionic interactions with micelle. A free zone system eliminates solute-micelle ionic interactions enabling charge based separations without adding complexity to the run buffer.

The simplicity of this method allows for practical adaptation to everyday use in the laboratory. The run buffer has one component and samples are simply diluted. Additionally, this system can be used to quantitate the vast majority of samples received in the laboratory. As will be shown, the method is elementary and very reliable.

Sexual Assault Nurse Examiners A New Approach to Evidence Collection

Lisa C. Schiermeier, MS; Virginia Division of Forensic Science, Richmond, Virginia

Key Words: forensic nurses, Sexual Assault Nurse Examiners, evidence collection

The scenarios are all to similar: A victim is raped, sometimes beaten, and threatened not to tell anyone. A child confides in a teacher that the mother's boyfriend has been touching him/her in an inappropriate way. An estranged husband breaks into his wife's house and sodomizes her. For sexual assault victims, the experiences have been degrading and humiliating, and will haunt them the rest of their lives. These victims, along with the associated forensic evidence, are often the only witnesses the criminal justice system may look to for apprehension and prosecution of such offenders. However, without a proper medical examination, such evidence and documentation can be lost.
The Sexual Assault Nurse Examiner (SANE) is a nurse who not only has specialized training in the collection and preservation of evidence, but who has also been trained to record victim's statements and to recognize physical injuries which may be consistent with a sexual assault.
The Virginia Division of Forensic Science (VA DFS) trains hundreds of police officers/investigators in the proper documentation and collection of physical evidence from crime scenes. The only difference between them and nurses is that the nurses' crime scene is a human body. Recognizing the impact that evidence collection methods have on the outcome of sexual assault cases, VA DFS joined a local hospital in co-sponsoring a SANE Certification. Although the core curriculum was designed based on that of other SANE classes, some unique topics were also added.
The forensic purposes behind the SANE program were to train emergency room nurses in the effective and appropriate collection of evidence from sexual assault victims using the VA DFS Physical Evidence Recovery Kits, to include packaging and chain-of-custody issues and to equip them with the knowledge to adquately address "non-routine" cases. The SANE program also seeks to familiarize nurses in case preparation and presentation, courtroom procedure and effective testimony, and to teach nurses the legal implications associated with physical findings and evidence collection and to train them in proper documentation, including photography, of these findings.
The forensic benefits of the SANE certification include: more thorough and consistent evidence collection, enhanced communication with the laboratory and investigation officers, and an increased confidence on the nurses' part to collect something they might not have otherwise recognized as potentially valuable evidence. Investigators and prosecutors have seen these and other benefits (such as victim's communication with the nurse about specifics of the alleged assault), thus enabling the nurse to collect the appropriate evidence during the examination; nurses understanding and following chain-of-custody rules; and improved expert testimony by SANE concerning medical hallmarks of rape.

Proficiency Testing in a Forensic Laboratory

Catherine Theisen Comey, Ph.D., Quality Assurance Unit, Forensic Science Research and Training Center, FBI Academy, Quantico, VA

Proficiency testing is one means of assessing a laboratory's performance and an important aspect of laboratory quality assurance. As a part of developing a laboratory quality assurance program, as well as to meet requirements of such bodies as the American Society of Crime Laboratory Directory laboratory Accreditation Board (ASCLD-LAB), the Technical Working Group for DNA Analysis Methods (TWGDAM), and the DNA Advisory Board (DAB), a laboratory needs to develop specific guidelines for its own proficiency testing program. This program could encompass internal as well as external testing. While open proficiency testing would likely comprise a significant portion of a laboratory's proficiency testing efforts, blind testing must also be considered as an additional measure of a laboratory's performance. Blind testing, however, raises a number of serious issues which a laboratory must consider before implementing a blind testing program. Peterson and Markham recently published a detailed examination of proficiency testing in crime laboratories (Journal of Forensic Sciences, Vol. 40 pp. 994-1008 and 1009-1029, 1995) and have raised a number of questions to be considered by the forensic community. These proficiency testing issues will be discussed.

Experts: Certification or "Certi-fiction" Will Anyone Know the Difference?

Charles R. Midkiff Department of Justice, Law and Society, The American University Washington D.C. 20016

The rapid growth of technology, exemplified by DNA, in the courts is a factor in a perceived need for certification of laboratories and individuals. The need is recognized both by those in the forensic community and the legal system. Judges, whose technical knowledge is essentially equivalent to that of attorneys or jurors are tasked with role of "gatekeeper". They are expected to assess the validity of proposed scientific testimony but are ill prepared to fill this role. Many forensic scientists are concerned with poorly trained or fraudulent "scientists" espousing dubious methodology, yet who are regularly accepted as experts by the courts. Legitimate examiners are hopeful that a reasonable certification will winnow both "junk science" and "junk experts". A rigorous program for certification of laboratories is a useful approach but does not address individuals outside participating organizations. Individual certification, therefore, must be a part of any viable program. An obvious benefit of specialty area certification to the legal system is that it should facilitate assessment of proposed expert testimony and ensure that the proponent is as he/she is represented.

A concern, however, is the ultimate value of a claimed certification. By whom was the certification granted? What are the requirements for initial certification? Is verification of claimed achievements required? Are there meaningful, beyond just filling out a form, requirements for maintenance of certification? Questions such as these must be addressed if there is to be confidence by both the courts and forensic community. Neither has any need for "Certi-fictions" produced in batches of thousands and issued upon the clearance of the "Board Certified Forensic Examiner's" check. Unfortunately, at least one such certification mill is already operating and provides "certifictions" in a range of specialty areas. These pose serious potential

problems for implementation of a meaningful certification program which will be accepted by the courts and recognized as worthy of investment of time, effort and money by members of the legitimate forensic community.

Comparative Evaluation of Efficiency and Effectiveness Between Two Hybridization/Detection Methods for Chemiluminescent DNA (RFLP) Analysis

Dave A. Pomposini, M.S., Forensic Scientist Supervisor, Stephanie Rauscher-Finn, M.S., Analytical Chemist Assistant, and Jerry W. Sellers, Forensic Scientist, Virginia Division of Forensic Science, Norfolk, VA

In October 1995, the Virginia Division of Forensic Science (VA DFS) began implementing a chemiluminescent hybridization/detection protocol for DNA (RFLP) analysis of casework. The procedure employs alkaline phosphatase-conjugated oligonucleotide probes, versus radioisotope-labeled probe inserts. In addition to its distinct safety advantage, the procedure is fairly quick and simple to perform compared to the radioactive technique.

Current protocol practiced by VA DFS includes the "Tupperware" chemiluminescence hybe/detection method in conjunction with commercially-prepared reagents and probes. In an effort to both optimize the quality of RFLP results and maintain or improve cost effectiveness, we have examined an alternative technique for the hybe/detection procedure. We sought to adapt the VA DFS chemiluminescent protocol to include the use of our roller-bottle hybridization oven typically used in the radioactive RFLP analysis method.

The increased efficiency of hybridization for which this equipment was specifically designed suggested that: 1) the hybridization could be optimized due to thorough and even membrane coverage as intended by the equipment's design, and 2) a significant savings could be achieved due to reduced probe/reagent volumes necessary to obtain quality results. The conclusions derived from this comparative study of the efficiency and effectiveness of these two hybe techniques will be discussed.

Case Study: A Robbery and a Homicide in Arlington County, Virginia

MPO Edward Robinson, MFS[+] Robert B. Hallett, BS[*] and Eileen A. Davis MFS[*] [+]Arlington County Police Department; [*]Virginia Division of Forensic Science, Fairfax, VA.

In January of 1992, the 68 year old female victim was bound and gagged using materials available in her residence. A number of items were stolen including her VCR, ATM card/PIN #, cash and jewelry. Ladder marks and shoeprints were noted outside her residence and a ladder was found nearby.

At a separate location, the male homicide victim was located. In an unrelated traffic stop, the suspect was detained and incriminating evidence was seized. As the investigation of these two cases unfolded, it became clear that they were interrelated. The evidence included shoeprint impressions, blood, hairs and a secondary fiber transfer from the robbery victim's residence to the homicide victim.

This case study will include crime scene photographs and discussion, results of the analyses of submitted evidence and the outcome of the jury trial.

STRs: Precision Study of the Hitachi FMBIO Using CTTv Loci

Tara L. Savage, B.S.[1], Michelle T. Squyars, B.S.[1], Barbara E. Llewellyn, M.S.[2], Virginia L. Fristoe, M.S.[2], and Jeff D. Ban, B.S.[2], [1]Virginia Commonwealth University, [2]Virginia Division of Forensic Science, Richmond, VA

Short tandem repeat (STR) polymorphisms consist of repeated DNA sequences of 3 to 7 base pairs in length. The analysis of these highly informative polymorphic loci by automated fluorescence is rapidly gaining popularity in the realm of forensic science. One type of fluorescence-based system is the HITACHI FMBIO-100: Fluorescent Method Image Analyzer. The FMBIO detects fluorescent signals on polyacrylamide gels as well as other media. The system is used in conjunction with an Apple Macintosh computer, the appropriate software for data analysis, and fluorescent dyes for sample labeling. The purpose of this study is to evaluate the precision and reproducibility of the FMBIO-100 using amplified CTTv loci. Extracted DNA from five different individuals was repeatedly amplified using the CTTv Fluorescent STR Systems PCR Amplification Kit (Promega). The kit contains fluorescently labelled primers for the genetic loci CSF1PO, TPOX, THO1, and vWA. Following amplification, these samples were typed by separation on denaturing polyacrylamide gels followed by automated fluorescent analysis with the Hitachi FMBIO-100. An inter gel and intra gel comparison study was conducted. The results of this precision study will be presented.

Microscopic Examination of Hairs Excavated on James Family Farm

James E. Starrs and Walter F. Rowe, Department of Forensic Sciences, The George Washington University, Washington DC 20052

Following his death, Jesse Woodson James was buried on the farm of his mother Zerelda James Samuel outside of Kearney, Missouri. Approximately twenty years after his death, James's body was exhumed and reburied in Mt. Olivet Cemetery. In 1978 Milton Perry, Superintendent of Historic Sites, Clay County, Missouri, conducted excavations on the James Family farm. A variety of specimens were recovered, including human and animal bones and teeth, material culture artifacts and clumps of hair. The hairs were examined by Ken Knight of the Kansas Bureau of identification; however, no detailed report of his findings has been published. In 1995 following the exhumation of remains from the James grave in Mt. Olivet Cemetery the hair samples from the 1978 excavations were made available to us for additional tests. A sample of the hairs were examined by conventional transmitted light microscopy. These hairs displayed microscopic features consistent with human head hairs from a person of Caucasian population ancestry. Several of the hairs showed evidence of having been dyed. According to historical accounts, Jesse James was coloring his hair with boot polish prior to his death. The hairs also showed bioderioration artifacts commonly seen in hairs that have been buried, including fungal tunnels, longitudinal fissures and cavities in the medulla. Several of the hairs showed dark discoloration of the roots, a feature frequently seen in hairs removed from putrefying human remains.

Virginia's Experience with the Combined DNA Index System (CODIS)

George C. Li M.S., Virginia Division of Forensic Science

Keywords: DNA, Virginia, CODIS

The Combined DNA Index System (CODIS) was developed by the FBI as a computer system for the indexing of DNA results at the local, state and national levels. CODIS was designed to facilitate comparisons of DNA records, in order to generate investigative leads for law enforcement.
In 1991, the Virginia Division of Forensic Science became one of the first CODIS pilot laboratories. At that time the Division did not yet conduct unsub casework, and the CODIS system was used primarily as a platform for sizing DNA (RFLP) autorads from subject cases in the Central Laboratory in Richmond, and for beta testing purposes.
Currently, the CODIS system in Virginia consists of a networked computer system in the Central Laboratory, where DNA (RFLP) profiles from subject cases, unsub cases, and convicted felons are indexed and searched using the CODIS system. The Tidewater Laboratory in Norfolk utilizes the CODIS system as well, and is linked to the Central Laboratory via a secure modem.
Searches of unsub cases against the convicted felon data bank using the CODIS system have yielded 5 "hits" to date.
In this presentation some of our experiences as a CODIS pilot laboratory will be discussed. Several unsub case "hits" using CODIS will also be presented.

STRs: Comparison of Silver-Staining and Fluorescent DNA Analysis Using the CTT and CTTv Loci

Michelle T. Squyars, B.S.[1], Tara L. Savage, B.S.[1], Virginia L. Fristoe, M.S.[2], Barbara E. Llewellyn, M.S.[2], and Jeff D. Ban, B.S.[2], [1]Virginia Commonwealth University, [2]Virginia Division of Forensic Science, Richmond, VA

Fluorescent imaging systems have become an important tool to short tandem repeat (STR) analysis in forensic casework and data banking. Due to various limiting factors such as cost and other resource considerations many labs will continue to analyze multiplex STR systems using silver-staining detection instead of a fluorescence-base system. The purpose of this study is to evaluate the reliability of fluorescently labeled DNA in comparison to silver-stained DNA profiles of amplified STR loci. Twelve samples were amplified using the CTT GenePrint™ Amplification Kit, and the CTTv GenePrint™ Fluorescent STR Sytems PCR Amplification Kit (Promega). The CTT kit contains several genetic loci, including: CSF1PO, TPOX, and THO1. The CTTv kit contains the same loci, with the addition of vWA. Following amplification, the samples were typed by separation on denaturing polyacrylamide gels followed by silver staining for the CTT amplified samples, and fluorescent imaging using the FMBIO (Hitachi) fluorescent image system for the CTTv amplified samples. Comparison of results will be presented.

Preliminary Study of the Use of Scanning Electron Microscopy to Compare 9mm Glock Pistol Rounds

Richard S. Bendel, Paul Salvetti, and Walter F. Rowe, Department of Forensic Sciences, The George Washington University

Glock pistols present the firearms examiner with a unique challenge. These pistols lack conventional land-and-groove rifling. Ballistic rotation is given to the fired bullets by the barrel's hexagonal cross-section. Firearms examiners are frequently limited to determining that a bullet was fired from a Glock; the striations produced by the barrel are frequently too fine to be compared using a reflected light comparison microscope. The scanning electron microscope (SEM) has several features that commend its use for the examination of Glock pistol rounds: the SEM is capable of higher magnifications than the reflected light comparison microscope; the contrast of the SEM image may be electronically set to emphasize fine detail; and the SEM is capable of producing high quality electron micrographs for courtroom presentation.
Six 9-mm Glock pistols were used in this study. These pistols varied in the number of rounds that had been fired through them. One pistol was virtually brand new; another had been used to fire over 30,000 rounds. All SEM examinations were conducted with a Hitachi S-2400 scanning electron microscope equipped with a secondary electron detector. The fired bullets were simply glued to aluminum sample mounts using electrically conducting silver paste or graphite cement. Rounds fired from the new weapon were easily matched to one another. Bullets fired through this weapon showed a pattern of fine, closely-spaced striations at their bases. Rounds fired from the more heavily used pistols could not be matched. The markings on these bullets consisted of widely-spaced individual fine striations. Some of these striations were parallel to the axes of the bullets and were produced by irregularities in the mouths of the cartridges from which the bullets were fired. Other fine striations were clearly produced by irregularities in the gun barrels. These, however, did not appear to be reproducible.
Other markings on the fired bullets will also be discussed.

The Role Of The Forensic Expert Witness

Hal Deadman, 12008 Park Shore Court, Woodbridge, Virginia 22192

A forensic expert is a person who is allowed in court to give opinion testimony based on the scientific analysis of some type of evidentiary material. Experts usually have qualifications, through education, experience or study, to provide this opinion testimony in a particular field. But the role of the forensic expert is much more involved than indicated by the above statements. This paper will go into the various activities of forensic expert witnesses and discuss what should be expected of the forensic scientist.
The following list incorporates what I believe are the responsibilities of the forensic expert witness and will be discussed in this paper. The paper will deal primarily with experts in the areas of associative evidence or evidence that tends to associate a person with another person or object. Most forensic analysis would fall into this type of evidence.

1. The primary function of the forensic expert is to get the right answer. If an association is made, there should not be any meaningful differences between the objects being compared.
2. Secondly, the forensic expert must provide a basis for his/her conclusions. Testimony must be presented to justify and validate the methods used in the comparison and the conclusions reached as a result of the comparison.

3. The forensic expert must provide testimony about the significance of the matching items. The expert must address the evidential value and as before provide a basis for the assigned evidential value. If the techniques used do not provide good discrimination, this information must be provided to the court. This is probably the most difficult aspect of court testimony.
4. The expert must be able to present and explain to the court and jury in a relative simple and understandable way the methods and procedures used in the analysis. If there are assumptions relied on or limitations of the procedures, these also must be discussed.
5. The expert must also be able to establish that the results obtained in the case were not obtained because of improper handling or contamination (both inside and outside of the laboratory) or due to police misconduct.
6. The expert must also be prepared to support his/her testimony against attack by opposing experts. This will require knowledge of the scientific literature and the background, experience and previous testimony of the opposing expert. This also can be very difficult.

The above considerations are going to be important in almost all cases, especially in the light of the O.J. Simpson trial and the ongoing discussions on the proficiency of forensic laboratories, examiner and laboratory certification and government regulation of crime laboratories.

Forensically Important Flies in Maryland

Theodore W. Suman, Ph.D., Science Division, Anne Arundel Community College, Arnold, MD 21012

Insects can provide valuable death investigation evidence including postmortem interval, location of death, and presence of drugs and other chemicals in decomposing bodies. Many species, particularly flies and beetles, have potential forensic value based on research in the literature where pigs have been used as a surrogate for humans.

In a recent study of over 20 decomposing bodies received at the Office of the Chief Medical Examiner in Baltimore, Maryland, only seven species of flies (Diptera) useful for determining post-mortem intervals were commonly found.

Most of the bodies were found within the last three years and came from central Maryland. They were found in a variety of locations, indoors and outdoors, and were generally found within a month of the time when the persons were last seen alive. Cause of death ranged from overdoses to homicides.

The larvae recovered from the bodies belong to six aspects of blowflies (Diptera: Calliphoridae) and a fleshfly (Diptera: Sarcophagidae). The species of blowflies include Phormia regina (Meigen), Phaenicia sericata (Meigen), Phaenicia coerulelviridis (Macquart), Calliphora vicina (Robineau-Desvoidy), Calliphora livida (Hall) and Calliphora vomitoria (Linnaeus). The fleshfly was Sarcophaga sp. probably bullata (Parker). The most common species recovered were P. regina, P. sericata,and C. vicina with P. regina found on almost all of the bodies.

Biological information including proportion of time spent in the egg to adult stages and key morphological features useful for age determination exists in the literature. Microclimatic conditions that affect development times of these species does vary geographically, necessitating local field studies, particularly for temperature, for greater accuracy in determining postmortem intervals.

Spring and summer life histories on these blowflies in Maryland were published by Introna et al.

(Journal of Forensic Sciences, Vol.36, No.1. Jan.1991.pp.238-243). Recent research by the first author (unpublished) has shown that P. regina, P. sericata and C. vicina are active throughout the year, depending on temperature, and that C. vicina will lay eggs into December in a unheated barn.
The larvae on the bodies were collected primarily by forensic investigators from the Office of the Chief Medical Examiner and by state and local law enforcement agencies throughout Maryland. Training programs on proper collecting and preserving techniques for forensically important insects are in progress.

Poster Session

Population Studies of the STR System CSF1PO, TPOX, and THO1

Barbara E. Llewellyn, MS, Virginia L. Fristoe, MS, Brian T. Shannon, MS*, and Jeff Ban, BS
Virginia Division of Forensic Science, Richmond, Virginia 23219

Key Words: Short tandem repeats (STRs), Population database, RFLP, PCR

Although DNA analysis using RFLP and Southern blotting techniques is a very discriminating technique, the large product size can make it less suitable for use with degraded DNA. The polymerase chain reaction (PCR) analysis offers many advantages over RFLP and Southern blotting techniques, such as lower costs, greater sensitivity, better toleration of degradation, and less time required to perform the analyses. Due to the many advantages of PCR, new methods of analysis are being investigated for use in forensic science. Short tandem repeat (STR) loci are highly informative polymorphic loci that consist of short, repetitive sequences of 3 to 7 base pairs (bp) in length. These repetitive sequences are polymorphic due to variation in the base pair length among individuals, therefore allowing for discrimination between individuals. The repeats can be amplified using the PCR, enabling precise allele designation based on the length of the repeat unit. Since STR typing requires only a small amount of DNA and since the amplification products are less than 400 bp long, the system can be used with DNA that may be degraded. The small size of the STRs facilitates their simultaneous amplification in a multiplex PCR, in which two or more loci are amplified in one reaction from a single DNA sample. The largest advantage to multiplex PCR analysis is that it allows for a more efficient analysis with less time and costs. The Virginia Division of Forensic Science has constructed population data bases for Caucasian, African American, and Hispanic populations using the Gene Print™ STR system (Promega). DNA samples from unrelated individuals were amplified using the triplex CSF1PO, TPOX, and THO1. The PCR products were resolved on a denaturing polyacrylamide gel electrophoresis system with subsequent silver staining. Population data was generated for each STR locus and allele frequencies calculated for each population. At least 9 alleles have been identified for CSF1PO, 8 alleles for TPOX, and 7 alleles for THO1. The total discrimination power of this STR triplex ranges from .856 to .920 depending on the population.

Experiences with GC/MS Confirmation for Cocaine in Samples Collected by AccuPRESS$_R$ Surface Drug Test Kits

Ross H. Lowe, Ph.D., Charles P. LoDico, M.S., and Yale H. Caplan, Ph.D., Coming National Center for Forensic Science, Baltimore, MD

A method for the confirmation of trace amounts of cocaine that have been field sampled by DETEC's "AccuPRESS®" Surface Drug Test Kit was developed. The gas chromatography/mass spectrometry (GC/MS) method confirms the accuracy of the enzyme immunoassay obtained by the field testing kit and enhances the judicial value of the result.

AccuPRESS® Surface Drug Test Kits (DETEC Inc., 172 Nancy Lane, Wyckoff, NJ 07481) are marketed for the identification of drugs swabbed from surfaces or for the testing of bulk powders. Separate kits are available for the detection of trace quantities of cocaine/crack and opiates. A swab is used to gather trace amounts of drug from the surface of interest and to transfer the drug to a buffered solution. A two minute color test is then performed to identify presumptive positive samples. The AccuPRESS test kit is designed and marketed for field use by law enforcement agencies and professional security personnel. Results obtained from the field testing may be used for probable cause. The confirming GC/MS laboratory report may be subsequently introduced to the court as evidence. A GC/MS method for the confirmation of cocaine in the test kit vials is described below.

The solution contained in the AccuPRESS test kit vial is buffered to pH 6.0 with 0.5 M acetate buffer and applied to a copolymeric, bonded solid phase extraction column. The adsorbed sample is washed with water and dilute acid. Cocaine and benzoylecgonine are then eluted with methylene chloride:isopropanol:NH_4OH (80:20:2). The eluate is evaporated to dryness and the trimethyisilyl (TMS) derivative of benzoylecgonine is formed with BSTFA. Benzoylecgonine is derivatized; cocaine is not derivatized under the conditions of the method. Cocaine and the TMS derivative of benzoylecgonine are separated by capillary chromatography on a 15 meter x 0.25 mm ID x 25 μm film thickness, 5% phenymethylsilicone (HP-5) column. The compounds are analyzed simultaneously by GC-MS (SIM) with quantitation by comparison to standards. Deuterated analogs are utilized as the internal standards.

The present study is a compilation of the results from specimens received for GC/MS confirmation testing. Of the sixty-three (63) samples submitted fifty-six (56) were positive for cocaine by GC/MS and seven (7) were negative for cocaine. Of the seven (7) samples testing negative for cocaine, three (3) were positive for benzoylecgonine. Hydrolysis of a portion of the cocaine to benzoylecgonine occurs during the transport of the specimen to the laboratory.

Samples obtained by swabbing the surfaces of paper currency were submitted by the Financial Crime Division, Office of the Attorney General, State of Texas. A total of 35 samples from this division have been analyzed by the GC/MS confirmation method. Thirty-three samples that were tested positive by the AccuPRESS field testing kit were confirmed positive by GC/MS. The concentration of cocaine in the sample vials ranged from 33- 3354 ng/ml. Two samples vials (submitted as negative) tested negative by GC/MS.

A study was undertaken to determine the threshold concentration of cocaine found in United States paper currency in the Baltimore, Maryland area. U.S. paper currency was obtained from both a random, volunteer group and from a financial institution. Field test analyses were negative on all currency tested. One paper currency yielded a faint color reaction. It subsequently was confirmed by GC/MS at 418 ng/ml for cocaine. Eight (8) out of the total of twelve (12) paper currency samples were positive by GC/MS for cocaine with a mean value of 15 ng/ml.