

# **TECHNICAL PROGRAM ABSTRACTS**

## **The Steven Tauzer Murder Case: When Tragedy Hits Home-**

Gregory Laskowski, Kern County District Attorney Forensic Science Division

Assistant District Attorney Steven Tauzer was found murdered in the garage of his residence in September of 2002. Chris Hillis, a former lieutenant of the Kern County District Attorney's Office Bureau of Investigation was soon developed as a suspect. DNA located on key evidence was crucial in developing Hillis as a suspect. Although the case was investigated by the Kern County Sheriff's Department, the crime scene was investigated by members of the Kern County District Attorney's Office Regional crime Lab. Initial evidence processing was also conducted by personnel from the KCDA Regional Crime Laboratory. Because of the onus of 'conflict of interest', the processing of evidence was halted by KCDARCL personnel, and the evidence was then packaged and shipped to the California State Department of Justice Bureau of Forensic Sciences Laboratory. As a result of the Cal DOJ Laboratories Analysis of the DNA evidence Chris Hillis was arrested and charged with the murder of Steven Tauzer.

This presentation will focus on the evidence collected at the scene, its processing, and the resulting interactions of the presenter with the District Attorney, sheriff's homicide investigators, California Department of Justice personnel. The personal conflicts faced by the presenter having to investigate a high profile murder case of his boss and a colleague, who were both more than just acquaintances will be discussed.

## **Characterization of Multilayered Glitter Particles**

Robert Blackledge, El Cajon, CA

Glitter can be important trace evidence. Glitter is not all alike! It shows great variety. The more ways a Questioned glitter particle may be characterized the smaller the subclass of evidence it will fall into and therefore the greater its potential value as associative evidence. Most glitter particles have multiple layers. Glitter is cut into small individual particles from rolls of multilayer film. Although there may be one or more metalized (aluminum) layers, most of the layers will consist of polymers. Not only are the number of layers an important characteristic, also are the composition and thickness of the individual layers. The factory machines that cut the film into individual glitter particles do not make nice clean cuts. Therefore it is not usually possible to simply stand an individual glitter particle on end and under a microscope count and measure the individual layers. Some of the layers may be quite thin. Obtaining an infrared spectrum of layers that are very thin may not be possible with an ordinary FT-IR microscope system. This presentation will show how making thin cross sections and using as the infrared source a beamline coming off the synchrotron at the Advanced Light Source, Lawrence Berkeley National Laboratory allowed us to both measure the thickness and obtain the infrared spectrum in transmission of individual layers in multilayered glitter particles.

## **The Behavior of Expelled Glass Fragments During Projectile Penetration and Perforation of Glass**-Lucien Haag, Forensic Science Services

Bullets striking common forms of flat glass with an orthogonal intercept angle result in a cloud of ejected glass fragments that are in concert with the exiting bullet's flight path. This is *not* the case with strikes at angles other than orthogonal. In these situations, the expelled glass fragments follow a different course from that of the exiting projectile. This is both counter-intuitive and a potential source of serious error in the evaluation and reconstruction of shooting incidents involving shots through glass such as windshields, vehicle side windows and windows in buildings. The flight path of the ejected glass fragments is, however, predictable and is dictated by the orientation of the plane of the glass at the exit site.

In all cases, these high velocity glass particles can produce downrange deposits on a variety of surfaces and can produce pseudo-stippling of the skin in individuals located near the projectile's exit site.

These phenomena will be illustrated in this presentation.

## **Chemical and Instrumental Tests for Suspected Bullet Impact Sites**

Lucien Haag and Mahesh Patel

Several chemical methods are available for testing suspected bullet impact sites for the presence of copper and/or lead via a transfer technique. These tests produce unique color complexes with these two elements.

The transfer technique presented here provides a check of the substrate for possible interferences, pattern information associated with a bullet impact deposit and the direction of travel of the projectile when a positive response is obtained.

Additional information of considerable significance can be derived from the SEM-EDS examination of small, selected areas of Cu- and/or Pb-positive lifts. This non-consumptive analysis not only provides for the confirmation of the target elements but can also yield specific data regarding:

- other elements often alloyed with lead and copper (e.g.- tin, antimony, zinc),
- evidence of special coatings on certain bullets (e.g.- nickel),
- alternate bullet and bullet jacket compositions not normally detected by the transfer technique (e.g.-tungsten, steel, aluminum),
- certain morphological features of the target elements (e.g.- lead deposited in a molten state as a result of an energetic impact).

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- **The Effect of Hematocrit Concentration on Forensic Blood Alcohol Analysis**

- Jessica Savopolis, Department of Justice Fresno Laboratory

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- Defense attorneys have been questioning the validity of forensic blood alcohol analysis based on an individual's hematocrit concentration. The purpose of this

work was to determine how much, if any, hematocrit concentration values affect forensic blood

alcohol measurements using the heated headspace gas chromatography technique with an n-propanol internal standard. Samples were generated from bovine blood to give samples with hematocrit values ranging from 0 to 84 percent. Statistical analysis of the average blood alcohol concentration and the sample hematocrit showed no statistically significant correlation between the blood alcohol level and the sample's hematocrit value. Plasma, whole blood, and red blood cell fractions from human donors were evaluated to confirm the results from the bovine blood experiment were applicable to the evaluation of human samples. These results showed no statistically significant difference between the measured blood alcohol levels for plasma, whole blood, or concentrated red blood cell fractions. The partitioning of ethanol and n-propanol in bovine blood was evaluated by adding the alcohol to the blood sample prior to separation of the plasma and red blood cell fractions. Both ethanol and n-propanol favor the plasma fraction to a similar extent. This supports that hypothesis that the similarity in their partitioning behavior removes any effect of hematocrit on the measured blood alcohol concentration with heated headspace with an internal standard.

### **Statistical Evaluation of Torn Duct Tape End Matching**

Ka Lok Chan, Fred Tulleners, John Thorton You-Lo Hsieh, UC Davis Forensic Science Graduate Program

Duct tapes are often submitted to crime laboratories as evidence associated with abductions, homicides, or construction of explosive devices. As a result, trace evidence chemists are often asked to analyze and compare commercial duct tapes that may establish a possible evidentiary link between different a suspect and a victim, or a suspect and a particular crime or between different crimes. Duct tape end matches, which is the re-assembly of two or more separated fragments, have significant evidentiary value and are considered to be the strongest association in forensic comparative examination. Even though it is a fairly routine examination, there is neither statistical data nor objective criteria to support what constitutes an end match. Hence, this study is designed to examine duct tape end matches in pursuance of developing some objective criteria and arriving at a relevant statistical basis for the comparative examination of duct tape tears.

### **Potential False Positive Breath Tests Due to Biotransformation of Acetone to Isopropanol**

Gregory Priebe, DOJ Santa Rosa Laboratory

Type I diabetics and individuals on low carbohydrate diets may have a build up of the ketone bodies, acetoacetate, beta-hydroxybutyrate, and acetone. Because the biotransformation of alcohols in the liver is a reversible enzymatic process ketones may be reduced to secondary alcohols. Clinical studies have been conducted with insulin dependent hyperglycemic, acidotic patients where isopropanol was detected. Acetone

may be converted to isopropanol in physiological conditions when alcohol dehydrogenase and elevated reduced beta-nicotinamide adenine dinucleotide (b-NADH) are present. Case studies indicate the potential for false positive breath tests in hyperglycemic individuals and defense attorneys have seized this opportunity to introduce these case studies in their defense against DUI breath cases. This presentation will provide a foundation of knowledge to properly address this issue in pretrial conferences and court trials.

### **Forensic Investigation of the Shooting Deaths of Four Oakland Police Officers On March 21<sup>st</sup> 2009**

Mark Bennett, Oakland Police Department

A routine traffic stop by two Oakland Police Officers resulted in the worst incident of Officer fatalities in the history of the Oakland Police Department. Two motorcycle Officers and two Entry Team (SWAT) Officers were fatally wounded by parolee Lovelle Mixon in a single day. After initially shooting two motorcycle Officers, Mixon hid in an apartment across from the scene. Oakland Police made entry into the apartment resulting in a gun battle that resulted in the deaths of two members of the Entry Team and Mixon. Scene investigation of the apartment, examination of clothing and equipment and shooting incident reconstruction using laser trajectory analysis shed light on the sequence of events that took place inside the building.

### **Sex, Lies, and Blood Alcohol Levels**

Stanley Dorrance, Forensic Science Services

This presentation will be a review of actual DUI cases that he has encountered wherein the blood alcohol results fall outside the normally expected levels. He will also be presenting examples of cases with documented preliminary alcohol screening tests, EPAS tests and blood alcohol test results are scientifically incompatible.

### **The Makin' Bacon Case**

Robert Blackledge, El Cajon, CA

This presentation will examine an investigation by the State of California - Dept. of Consumer Affairs, Medical Board of California into the alleged affair between a medical doctor and his female patient. It involves exchanged emails, victim and suspect DNA, far more evidentiary material than was ever found on Monika Lewinsky's blue dress, and condom trace evidence. Where does the "makin' bacon" title figure in? If I told you that you'd have no reason to attend the talk!

Learning Objective: To enjoy fifteen minutes of a tale of a bizarre true forensic case.

Impact Statement: This presentation will have no educational value whatsoever, but it should have impact on any attendee's funny bone.

Key Words: DNA, Condom, Corn starch

## **Issues Facing Forensic Science Graduate Programs**

Fred Tulleners, UC Davis Forensic Science Graduate Program

This presentation will discuss some of the educational and administrative issues facing forensic science graduate programs and how they may impact the graduate student and the crime labs. Some crime lab managers have unrealistic expectations from a graduate program and expect the MS graduate to be fully qualified in a specified area. This concept is unrealistic and it overlooks a key function of a university graduate program. The recent meeting at the American Academy of Forensic Sciences all too well illustrated that the crime labs have abrogated their research effort, since the majority of the presenters were from academia either as professors or as research students.

During this presentation we discuss the following issues that affect a graduate program:

- Primary Focus of a research based university
- Forensic Science Graduate Group concept
- M.S. Forensic Science focus
- M.S. program funding – state vs. self supporting
- Graduate student funding
  - Student Income issues - Teaching Assistant, Research Assistant, and Loans.
- Research funding opportunities/issues for forensic science program
- MS Degree program – research or coursework based
  - Typical MS degree program
  - Time issues
  - Research creep
- University theoretical classes vs. trade craft class
- Duties of the crime lab in regard to training their staff
- Interns duties in lab
- Benefit of a MS Degree
  - Promotion, position, teaching future requirements

## **An Interesting Zip Gun Case**

Mike Appel

A “concrete nail gun”, which it was later determined to not be a nail gun, was submitted to the laboratory. The Agency wanted to know if it could fire a .22 caliber rimfire cartridge. Function testing was performed and the homemade device was found to fire .22 caliber rimfire cartridges. The case involved a person possessing the illegal device when stopped by police officers.

## **The Construction of Mobile Reference Database of Domestic Mammalian Hair**

Elsbeth Murata, CSU Fresno Graduate Program

With over 162.3 million domestic animals currently living with us in the United States, the hairs of dogs, cats, horses, cattle, sheep, and hogs have found their way onto the crime scene (1). Therefore, the ability to distinguish the hair of humans from the hairs of domesticated mammals is paramount to any forensic hair examination. However, the morphological characteristics of these hairs are highly variable, both along the length of a single hair shaft and between different types of hairs found covering the body. We have created an online database of the hairs of domestic animals that captures a wide range of this variability in order to assist trace evidence examiners with the identification of both human and non-human hairs.

The database contains digital images of 3 areas on each of 6 types of domestic mammal (back, belly, and tip of tail) and 3 areas on each human specimen (head, pubic, and axillary hair), so a valid comparison can be made and differences can be illustrated. Three images of each hair were taken: proximal, subshield, and shield to accommodate the inherent variation present on each specimen. The analysis of these digital images includes a number of microscopic characteristics of the hair, including shaft diameter, medullary index, cuticle designations, medullary configuration, cortex configuration, and pigment aggregation among others. Also included are macroscopic characteristics such as shaft length, color, and banding patterns. Using these characteristics collectively, the difference between human hair and domestic mammal hair can be determined.

With 4,982 crimes being committed per 100,000 residents in the United States (2), the ability to identify and differentiate forensic hair evidence may be the difference between successfully prosecuting a case and letting a perpetrator go free. Currently the database includes 50 domesticated mammals with more being continually added. This database will be available via the Internet making it highly accessible and adaptable to the needs of the trace evidence community. With further growth this database will become a truly valuable resource to the forensic science community.

## **Adverse Consequences Stemming from the Conceptualization of the Forensic Science Laboratory as a Mere Testing Facility**

Dr. Peter R. De Forest

A forensic science laboratory system should be more than a testing facility. Succinctly stated, it should be a scientific problem solving resource with a physical evidence focus. Of course, there are predefined analytical problems faced by the laboratory that arise in routine, high-volume cases such as drug testing. The testing facility conceptualization suffices with these. However, when the forensic science laboratory is viewed exclusively as a mere testing facility, the true nature of the forensic science enterprise is obscured. The function of a forensic science laboratory system must be directed to the optimal extraction of information from the physical evidence record produced during the events comprising a crime (or accident) to be investigated.

In most jurisdictions around the world law enforcement agencies assume control of the crime scene, and most commonly nonscientist investigators circumscribe and define the scientific problem(s) to be subsequently addressed by laboratory scientists. Although this is the well-entrenched traditional approach, it needs to be rethought. While it may be natural for law enforcement agencies to take initial control of the crime scene, it does not follow logically that law enforcement personnel should carry out the physical evidence investigation. The physical evidence problems to be addressed should be defined by scientists. This should be done in the context of the scene, not later in the laboratory. Skilled definition of the scientific problem is critical to ensuring that the most appropriate testing is performed and that the most effective and efficient use is made of resources. These critical activities are properly in the domain of scientists. Overlooked possibilities for obtaining useful information from the physical evidence record may thwart case solutions, whereas meaningless testing is wasteful of resources. Beyond the scene, a further complication is that prosecutors can also become involved in decisions that effectively circumscribe laboratory activity, both early in the investigation and during the development of the prosecution case. While input from prosecutors may be valuable, it should not take the form of interference with scientific decisions.

Where the forensic science laboratory service is seen only as a testing facility, myriad adverse consequences flow from this misperception. Some of these are directly related to case resolutions and the quality of justice. Others affect such things as laboratory operation and funding.

In circumstances where both the definition of the scientific problem and the interpretation of laboratory results are left to investigators and attorneys, the laboratory assumes a reactive stance, and the scientists are cast into the role of technicians passively carrying out *tests on items* in response to naïve requests by nonscientists. We should not be surprised to see poor, incomplete, inaccurate, misleading, and erroneous casework as a direct consequence. In these circumstances, the likelihood of successful case solutions and the concomitant physical evidence contribution to the conviction of the guilty would decline while the risk of wrongful conviction could rise. With more scientific input across the entire physical evidence continuum, from crime scene to courtroom, this situation would be reversed.

In addition to gaining more effective and equitable case solutions, a broader understanding, on the part of user agencies and the public, of the true role and capability of a forensic science laboratory system can be expected to offer other important positive benefits. It should result in improved funding and allocation of personnel resources and less uninformed interference by external agencies and critics. Laboratory manager's responses attempting to address some of this interference and criticism can be counterproductive and lead to unintended adverse consequences, such as over-reliance on "safe" but restrictive protocols that result in "cookie cutter-like" approaches to a succession of the highly varied case scenarios that are encountered "real world" practice.

## **Comparison of GRC from Lead Bullet Cores with GRC from Bullet Jacketing**

Nancy D. McCombs, Department of Justice Fresno Laboratory

With the current increase in cost and demand for ammunition, often lower quality products are the only option available for purchase, and may begin to be more frequently encountered in casework. As the jacketing material on much of this ammunition is significantly thinner than what is more traditionally observed, it readily separates from the bullet core. Examination of various types of ammunition, as well as comparison of general rifling characteristics observed on bullet cores with those observed on jacketing material are evaluated.