

The CACNews

News of the California Association of Criminalists • Third Quarter 2016

The Cinco de Mayo Banquet



CAC SEMINAR • SPRING 2016 • LOS ANGELES

brooke
Barloewen



CAC President

I distinctly remember going to my new member reception, meeting the CAC Board of Directors, and deciding that I wanted to work towards being in their positions one day. They were inspiring, welcoming, and realistic when talking about what criminalistics was like.

The Enrichment of Meeting

I have been a proud CAC member for over two decades and feel privileged to serve as your president for the next year. From the beginning, the CAC has been an organization of strong leadership. I have watched some of the finest criminalists make an impact in their fields that lasted much longer than their careers at the bench. I would hate to name only a few because there are so many that have taken the lessons learned in their career and used them to make a positive impact on new criminalists as they continued to give back to their profession.

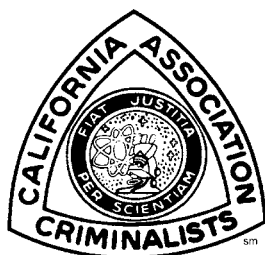
These leaders demonstrate that criminalists at all stages of their careers can continue to improve themselves. By constantly striving to embrace new experiences and welcome new colleagues to the field, they can become better at their own jobs, and what better way is there to do this than by becoming an active member of the CAC and encouraging others to participate as well. The CAC inspires criminalists to become role models by excelling in their own field while still being generous to others with their time and talents. A good criminalist is unselfish, gracious, competitive, humble, well-balanced, and has a great work ethic, while a good leader is approachable, respectful, caring, leads by example, and acknowledges others' successes. Obviously all these traits go hand in hand and describe many CAC members I have known during my career.

I first encountered such role models in the CAC as a student and then as a young criminalist. I met them at CAC meetings where I networked with journeyman-level criminalists not only to seek out a job but to learn about casework techniques, research and development, and how to critically think. In addition to providing forensic science information, CAC meetings provide training on public speaking and testifying, technical writing, approaching and examining crime scenes, ethics, and even correcting and overcoming mistakes. I distinctly remember going to my new member reception, meeting the CAC Board of Directors, and deciding that I wanted to work towards being in their positions one day. They were inspiring, welcoming, and realistic when talking about what criminalistics was like. At this point, I realized that being a forensic scientist was not just going to be my day job, but a life-long career.

An exemplary criminalistics career includes becoming involved in professional activities. I encourage each and every one of you to be active in the association. CAC activities are rewarding and a great way to meet your colleagues. Participation in meetings, workshops, and study groups can help you to increase your scientific knowledge, share what you know, be a leader, and try something new. At CAC events, I have made lifelong friends, found those I can consult on tough problems, helped others overcome obstacles, and learned a lot, all while having a really good time.

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THIRD QUARTER 2016



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The deadlines for submissions are: December 1, March 1, June 1 and September 1.

The CACNews

www.cacnews.org



Banquet Entertainers

Members of the Tradición Dance Company dance for the attendees of the CAC spring 2016 banquet. More photos from the meeting inside this issue.

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CACBITS

Palm Springs Meeting: Call for Papers

The organizers of the CAC fall seminar, to be held in Rancho Mirage (Palm Springs area), October 31-November 4, are requesting papers for presentation at the general and DNA sessions. Papers covering all topics and disciplines are welcome. Please submit abstracts for the general session to Gina.Williams@doj.ca.gov and abstracts for the DNA workshop to Mey.Tann@doj.ca.gov. Abstracts should include the submitter's name, agency, and contact info.

Mark Your Calendars

North South swap means the next CAC seminar will be in the south. 2016 Fall in Palm Springs at the Rancho Las Palmas hosted by the DOJ Riverside laboratory Oct 31-Nov 5. Spring 2017 will be hosted by the San Francisco lab at the Kabuki Hotel May 9-12. The Fall 2017 meeting will be hosted by the Orange County Lab at the Fairmont Newport Beach from Sept 25-30. Spring 2018 has been slated for Contra Costa, 2018 Fall meeting in San Diego and the Spring 2019 meeting for Oakland.

Recent Papers of Interest

(Hat-tip Bob Blackledge)

"Automated Firearm Identification: On Using a Novel Multiple-Slice-Shape (MSS) Approach for Comparison and Matching of Firing Pin Impression Topography," Robert Fischer, Claus Vielhauer, Brandenburg University of Applied Sciences, Department of Informatics & Media.

https://www.researchgate.net/publication/276145425_Automated_Firearm_Identification_On_using_a_novel_Multiple-Slice-Shape_MSS_Approach_for_Comparison_and_Matching_of_Firing_Pin_Impression_Topography

"Onsite Noninvasive and Nondestructive Technical Examination Services for Stamps,"

<http://chsopensource.org/2013/03/18/post-age-stamps-multispectral-imaging/>

"Integrating Cell Phone Imaging with Magnetic Levitation (i-LEV) for Label-Free Blood Analysis at the Point-of-Living"

<http://onlinelibrary.wiley.com/doi/10.1002/sml.201501845/full>

Awards Committee Reminders

The nomination period for both the Anthony Longhetti Distinguished Member Award and the Paul Kirk President's Award (even years only) will be closing June 30th

The nomination period for the Edward F. Rhodes Memorial Award will open July 1st.



Barloewen

It can be tough to make your way to a CAC meeting, but the trip can be well worth it. I would like to compliment the Los Angeles Police Department Forensic Science Division (formally SID) on a great spring 2016 meeting in North Hollywood. There were presentations from almost every discipline in forensic science given by criminalists, managers, law enforcement personnel, attorneys, students, and even someone who had been wrongfully convicted. This assortment provided the perfect blend of a little bit of everything from various perspectives. It also reminded me that, even though I work in one or two disciplines, it is important to be cognizant of what other disciplines can do with a piece of evidence, not to mention what may happen downstream in the judicial process.

The number of forensic science meetings have increased throughout the years. With dwindling travel budgets and many choices in meetings to attend, sometimes CAC meetings are not as well-attended as they should be. I challenge each of you to attend an upcoming CAC meeting, especially

if you have not been to one in the last few years. It may be tough to convince your agency to send you, but a presentation on an interesting case or a paper on how you helped implement a new technique could be your ticket to the meeting. In addition, if you work in the trace section of your laboratory or just want to find out more about processing or preserving trace evidence, you should attend the upcoming joint meeting in Palm Springs with ASTEE (American Society of Trace Evidence Examiners).

As your president, it is my goal to increase CAC membership, increase attendance at CAC-sponsored events, and to encourage CAC members to take the American Board of Criminalistics exam, thus improving themselves and their long-term careers. I also hope, during this next year, to be as good an example as the CAC role models who helped me shape my own career. I look forward to giving back to this organization, which has meant so much to me for the past twenty years.

Brooke

CAC Presentations

Awards presented at the Spring 2016 banquet included Adam Dutra (*below*) receiving the W. Jack Cadman Award, Helena Wong (*facing, top*) receiving the Biasotti Most Outstanding Presentation Award, Dante Webb (not present) received the Ed Rhodes Memorial Award.

CAC Service Awards were presented to Kirsten Fraser, Michelle Halsing, Greg Laskowski and Alice Hilker (*l*) for their contributions on the Board of Directors and to Shannan Kelly and Meiling Robinson (*bottom, l*) for organizing the seminar.

(*r*) Several members of the current CAC Board pose for a group photo. (*bottom, r*) Brooke Barloewen accepts the gavel from outgoing CAC President Chris Coleman.



meiling
ROBINSON



CAC Editorial Secretary

CRISPR has set the molecular biology world on fire, with more and more research being published everyday on applications and advancements. Yet, there is an ethical debate that remains to be addressed.

The CRISPR Controversy

In August of 2012, a team led by molecular biologist Jennifer Doudna and microbiologist Emmanuelle Charpentier, published a paper demonstrating that the Cas9 enzyme can be directed to cut specific sites in isolated DNA (M. Jinek *et al. Science* **337**, 816–821; 2012). You may not even be aware of the aforementioned paper or what CRISPR, “the disruptor,” even is, but its potential impact on our future as a species could be far reaching. I know, I know, this is all about molecular biology and DNA, but bear with me while I weave an intricate three-pronged Sci-Fi tale of intrigue—money, sex, and drugs! Trust me there’s something here for everyone!

What is CRISPR- Cas9 genome editing and why should we care?

CRISPR pronounced like that veggie bin in your fridge, stands for Clustered Regularly Interspaced Short Palindromic Repeats. CRISPR-associated (Cas) genes are essential in adaptive immunity in select bacteria and archaea, enabling the organisms to respond to and **eliminate invading genetic material**. (I know I’m already losing ya!) These CRISPR systems are an acquired immune system in bacteria! So why do we care about how this pathway which allows bacteria to fight viral infection operates? Because a key player in these CRISPR mechanisms is the protein Cas9—the only Cas protein required for **gene silencing**. In these “type II systems”, Cas9 is responsible for the destruction of the **target DNA**.

Voilà! The CRISPR-Cas9 targeted genome editing method was born! Since its development in 2012, UC Berkeley researchers have made a major improvement in CRISPR-Cas9 technology. The improved technique achieves an unprecedented success rate of 60 percent when replacing a short stretch of DNA with another. This method is an efficient and reliable way to make precise, **targeted changes to the genome of living cells**, therefore allowing researchers to adopt it to repair genetic mutations that cause hereditary diseases and repair defective genes. Due to the versatility and efficiency of the CRISPR-Cas9 technology, applications are limitless, thus heralding in a new era in molecular biology research.

Here’s an informational video: <https://youtu.be/avM1Yg5oEu0>

The Money and Drugs- Winner takes all?

“For the love of money is the root of all evil: which while some coveted after, they have erred from the faith, and pierced themselves through with many sorrows” (I Timothy 6:10)

This past March, the US Patent and Trademark Office (USPTO) began their investigation known as a patent interference to determine who deserves the patent on using CRISPR–Cas9 to edit genes. The outcome could determine who profits from licensing revenue from CRISPR—UC Berkeley or the Broad Institute of MIT and Harvard in Cambridge, Massachusetts.

Here’s the timeline breakdown:

- August 2012: Research team led by Jennifer Doudna at the University of California, Berkeley, and Emmanuelle Charpentier, now at Umeå University in Sweden and the Max Planck Institute for Infection Biology in Berlin, publish their paper.
- May 25, 2012: Doudna and Charpentier initiate their patent application.
- Dec. 12, 2012: Another team, led by Feng Zhang at the Broad Institute of MIT and Harvard in Cambridge, Massachusetts, begins a patent application.
- February 2013: Zhang’s research team publishes a paper demonstrating the application of CRISPR–Cas9 in mammalian cells (L. Cong *et al. Science* **339**, 819–823; 2013).

- Mar. 15, 2013: Doudna files patent application, but given a priority date of May 25, 2012.
- Mar. 16, 2013: The United States switches to a first-to-file system
- Oct. 15, 2013: Zhang files his own patent application but claims a December 12, 2012 priority date under the old first-to-invent rules. Additionally, Zhang files an Accelerated Examination Request.
- April 15, 2014: Zhang is issued his first CRISPR patent. Thus—even though Doudna had both an earlier invention date and filing date—Zhang won the initial patent race, and with specific claims covering profitable eukaryotic applications.
- April 2015: The Berkeley team asks the USPTO to begin an interference proceeding to determine which team was the first to invent the technique.
- Jan. 11, 2016: The USPTO grants Berkeley's request for a CRISPR interference.

And so the messy interference continues, but that has not stopped the well of biotech companies which develop CRISPR-based gene therapy from springing up. Millions and millions of dollars have already been invested in companies such as Caribou Biosciences, Editas Medicine, CRISPR Therapeutics, and the newest Intellia Therapeutics. These companies all seek to develop curative medicines and gene therapies using CRISPR-Cas gene editing methods. This controversy only brings up more and more questions like whether or not CRISPR should even be allowed to be patented. In February 2016, Editas (founded by Zhang) raised nearly \$110 million through an initial public offering on the NASDAQ exchange. Currently Editas shares are trading at around \$34, with a market capitalization of \$1.17 billion. With money like this flooding into companies it begs the question, who is meant to benefit from the therapies being developed using CRISPR technology?

The Sex- Eugenics and CRISPR Frankenstein

Despite international condemnation, Chinese scientists were the first to publish research using CRISPR-Cas9-mediated gene editing in human zygotes. This was followed by another publication this year by a separate team of Chinese researchers who were attempting to develop another method of introducing precise genetic modifications in early human embryos. Both teams pursued gene editing in embryos in order to develop and improve the use of CRISPR methods to eradicate devastating genetic diseases before a baby is born. The research yielded many “off target” indel mutations in other locations of the genome. Some find this research promising while others fear engineering inherited genes in humans holds dangerous potential and crosses ethical boundaries.

The ease and low cost of the CRISPR method also allows CRISPR to be far reaching in its applications. The fear that this powerful tool could easily be developed to literally create designer babies is palpable. Perhaps in this not too distant future, companies will offer us a commercialized “*Gattaca*” world where the answer will be “Yes, Dorothy, we can even dye your eyes to match your gown!”

While others are aiming to modify DNA in human cells, others are targeting crops, livestock, and even whole ecosystems. Just in the past few years that CRISPR methods have become widely used, researchers have used the method to engi-

neer mini “teacup pigs” and to make disease-resistant wheat and rice. Progress has also been made toward engineering dehorned cattle, disease-resistant goats and vitamin-enriched oranges. CRISPR gene editing can also be used to induce gene drive. CRISPR can rapidly propagate a genetic modification through subsequent generations because a mutation made by CRISPR on one “drive containing” chromosome can copy itself to its partner “wild type” chromosome, therefore all offspring will inherit the drive containing chromosome. For example, a CRISPR mutation engineered into a mosquito could spread through a large population of that mosquito within a season. Therefore, if one such CRISPR gene drives contain malaria-resistance genes, it could permanently alter an entire population of mosquitos to be malaria resistant in just one season. Conversely, if that mutation reduced the number of offspring a mosquito produced, then the population could be eliminated, along with any virus it is carrying. Scientists are currently developing methods to target *Aedes aegypti*, the type of mosquito blamed for spreading Zika. If deployed, the technology could theoretically drive the species to extinction. Although this application could be widely beneficial, altering an entire population, or eliminating it altogether, could also result in unpredictable effects on the ecosystem. Needless to say molecular biologists and ecologists should be arduously debating the application of gene drive technology.

CRISPR has set the molecular biology world on fire, with more and more research being published everyday on applications and advancements. Yet, there is an ethical debate that remains to be addressed. Now that the stars and perhaps dollar signs have started to fade from their eyes, scientists are just now weighing in on the potential consequences and ethical implications that CRISPR poses. As recently as last winter, the co-inventor of CRISPR-Cas9, Jennifer Doudna, publicly asked the scientific community to pause and discuss the ethics of CRISPR (<https://youtu.be/TdBAHexVYzc>).

CRISPR has the potential to and will effect direct change in our daily lives. As forensic scientists we must question how or if this will change our gold standard for individualization. Will STR typing systems remain standing in this new CRISPR era, or will we need to develop a new typing system or turn to sequencing? Perhaps CRISPR can be used to enhance the way we perform DNA analysis? In general, as citizens and scientists perhaps we should be participating in this conversation. In discussing this topic here in our forum, I hope to engage and stimulate conversation regarding this. Perhaps you have already thought about the implications this holds for forensic DNA typing? Maybe you're concerned about genetically modified food, or CRISPR gene drive? I'd love to hear your thoughts on CRISPR-cas9 technology!

More on CRISPR:

<http://news.berkeley.edu/2016/01/20/advance-improves-cutting-and-pasting-with-crispr-cas9-gene-editing/>

<http://www.nature.com/news/how-the-us-crispr-patient-probe-will-play-out-1.19519>

Mai

American Sherlock: Introducing Criminologist Luke S. May

by Evan E. Filby

This spring and summer mark the centennial of a major early case for Luke S. May, pioneer criminalist. (May always referred to himself as a “criminologist” and the newspapers followed his lead. Hence, the title.)

On a dark night in late March of 1916, two heavily masked men robbed the workers in a bunkhouse a few miles west of Idaho Falls, Idaho. Before they vanished, they murdered the company foreman, Wilbur Breckenridge. Unimpressed by law enforcement efforts, the local farm community hired private detective Luke S. May, President of the “Revelare Secret Service.” May had already made a name for himself by solving another murder that had baffled Idaho law officers.

Space allows only a quick summary of May’s lengthy search for the killers. He began with the barrel of a pistol, broken off when one of the robbers slugged a worker. May figured the crook would soon discard such a useless weapon, and a more thorough search turned up the rest of an old-model .41-caliber Colt revolver. From that, May’s patient legwork led him through three states, tracking the killers by eye-witness accounts and their handwriting on hotel registries.

The two were captured in mid-summer but managed to cut their way out of jail. Then the older of the two crooks, a part-Indian trapper known as “Coyote Bill” Banty, fled to Canada. He was never caught, but his much younger partner was soon recaptured. Seeing the evidence May had collected on him, he confessed and received a ten to twenty-five year prison sentence for second degree murder.

Luke S. May was born in 1892, on a Nebraska farm about one hundred miles west of Lincoln. The family moved to Salt Lake City around 1904. He later said that the Sherlock Holmes stories sparked his decision to take up “scientific crime detection” as his life’s work. May spent two years in a prep academy but never finished high school. Beyond that, however, he studied everything that might help a career in investigation.

May even took the trouble to have a friend translate a German-language version of *Criminal Investigation* by Hans Gross. He learned his lessons well. In the fall of 1910, his careful and attentive crime scene inspection spotted the key piece of evidence that solved his first murder case.

A few months later, May founded his own detective agency. However, around 1914, the Salt Lake City police began an extensive upgrade program. So May moved his headquarters to Pocatello, Idaho. There, May earned a place in a four-volume *History of Idaho*, published in 1920. His biography mentioned the Breckenridge shooting along with two other notable murder cases he had solved.

The *History* noted that he had facilities for handwriting analysis, chemical measurements, development and recording of latent fingerprints, and a hidden phonograph system to capture voices. He also used a wide range of photographic equipment to record crime scenes and evidence. The item said May had invented “a system of wireless telephony.” He had also formulated his own fingerprint powder, being dissatisfied with what was then available.

May solved another Idaho killing that was not mentioned in the *History*. Rancher Thomas Cavanaugh had been murdered in his remote cabin about thirty-five miles north of Weiser, Idaho. But the body had been hidden elsewhere and the perpetrator had done his best to clean up traces left in the

cabin. Deputies started with two suspects and then focused on one who had forged a check on Cavanaugh’s account.

May used several techniques to reconstruct the crime after the body was found. He started with proof that traces left at the scene were indeed human blood. Wounds showed that the victim had been shot in the back of the head and the bullet had exited through an eye. The blood spatter pattern and a partially-melted bullet fragment suggested that he had been kneeling in front of an open oven when he was shot. Back-tracking the missile placed the shooter on a bunk across the room.

Stunned by Luke’s detailed reconstruction, the killer confessed. Today, we take blood spatter and bullet trajectory analysis for granted. But, in 1917, those techniques were practically unheard of in this country.

In late 1919, May moved to Seattle, Washington. He does not explain why. It may have simply been the fact that the combined population of the cities just around Puget Sound was greater than the entire state of Idaho.

Firearms were involved in most of May’s death cases. Thus, by 1920, he had honed his ability to identify specific gun types by their class characteristics. He was also actively pursuing methods to match specific weapons by their individual characteristics.

In 1922, May led the formation of the Northwest Association of Sheriffs and Police. (Many jurisdictions had made him a deputy sheriff. He would hold nearly a hundred such

In a previous toolmarks case, May had some trouble getting the angle and pressure right to reproduce cut marks from a knife. This time, he devised a mechanically-powered arm to generate the proper action.



L. S. May, ca 1935. May-Reid family photo, used with permission.

commissions by 1926.) He would serve as the Association's president for over a decade. Through the Association, May worked to further the use of police radio and teletype communications, and founded what later became the Institute of Scientific Criminology.

The year after the Association formed, May made one of the earliest uses of "fracture matching" to convict a rapist-murderer. He first assisted in the autopsy that detected a broken fir needle in the vagina of the eleven-year-old victim. By good fortune, the sheriff in charge had attended one of Luke's lectures. He collected needle samples from the genitals of his main suspect. May's enlarged image of the matched ends was a major sensation at the trial that sent the perpetrator to the gallows.

May routinely examined blood, hair, fibers, paint and other materials in connection with blunt trauma cases. For one hit-and-run fatality, May deduced the vehicle type from scattered fragments of a broken headlight. Tire marks also figured in a few of his death cases.

In late 1924, May used enlarged striation images, matching individual characteristics of a death bullet, to show that Pearl Conner had been shot by the 7.65mm Luger that belonged to her husband. He supported that with matched marks on shell cases found at the scene of the crime. This was the same period when Colonel Calvin Goddard was making great strides in the same techniques. And Goddard rightly deserves credit for publicizing the method to a wider audience. At the time, May's writing consisted of client reports and letters to colleagues. So he tended to pass his findings along in those writings and in convention talks.

In 1925-1928, May had several death cases that sparked sensational headlines all across the country. That prompted more newspapers to refer to him as "America's Sherlock Holmes." In late 1928, he tackled a case that would put his work in the law books. Identified as "*State vs Clark*," it involved the prosecution of one Franklyn Clark for the rape of fourteen-year-old "Jane Doe." He had laid in wait for her in a blind assembled from cut tree branches. Later, he used the same knife to cut some boughs as Christmas decorations. Crucially, the knife was found in his possession and he affirmed that it was his.

In a previous toolmarks case, May had some trouble getting the angle and pressure right to reproduce cut marks from a knife. This time, he devised a mechanically-powered arm to generate the proper action. May's enlarged photos showed over fifty matched lines between the test cuts and the actual boughs entered in evidence. Naturally, the defense appealed, but the high court affirmed the conviction and set the precedent for the use of toolmark evidence.

Through the Sheriffs and Police association, May had become a good friend of FBI agent James S. Egan, one of J. Edgar Hoover's top aides. Upon Egan's recommendation, Northwestern University officials obtained May's help in creating a modern crime lab in Chicago after the St. Valentine's Day Massacre. In 1931, May served as a member of the committee that organized the Oregon State Police. Later that year, the Commissioner of the Royal Canadian Mounted Police sought advice for the creation of a Crime Detection Laboratory. The history of the lab says, "The one reply that carried most weight was written by Lucas [*sic*] S. May, President of the Northwest Association of Sheriffs and Police."

The year after that, the FBI established its first crime lab. It seems highly likely that May helped with that also, through

his friend James Egan. Such help was never acknowledged, however. J. Edgar Hoover was unlikely to admit that his people were taking advice from a private detective, if he even knew about it.

In 1933, the mayor of Seattle appointed May Chief of Detectives for the city police. During a tenure of fourteen months, he reorganized the division and substantially improved its performance. An independent assessment found dramatic improvements in closing many types of cases: from three times better on robberies to fourteen times better on burglaries.

In 1935, Tacoma police called May right away when kidnappers abducted the nine-year-old son of millionaire lumberman John Weyerhaeuser. The captors had sent a long, detailed ransom demand. May applied what we today call "profiling," based on the content and style of the message. First, the ring-leader was probably an ex-convict, most likely having been in for bank robbery. There was also a married couple involved. And, finally, the gang had some connection with Salt Lake City. All three predictions were found to be true when the kidnappers were rounded up.

That same year, May began a monthly column called "Luke May's Department" for the *True Detective Mysteries* magazine. His down-to-earth, authoritative answers to reader questions showed an amazing breadth of knowledge. In 1936, May's book, *Crime's Nemesis*, was published, describing crime detection techniques for a popular audience.

...Tacoma police called May right away when kidnappers abducted the nine-year-old son of millionaire lumberman John Weyerhaeuser. The captors had sent a long, detailed ransom demand. May applied what we today call "profiling," based on the content and style of the message.

During the late 1930s, a protégé of May's helped found the New Hampshire State Police. A year before that, the protégé had visited police schools and labs all over Europe. In each case, his association with Luke May gave him entrée: May, he said, "was recognized everywhere." Later that year, the Director of a police academy in Belgrade thanked May for his help in setting up a rigorous curriculum in crime science.

However, through his educational and popularization efforts, May essentially "worked himself out of a job," as colleges and universities began offering coursework and degrees in criminalistics. Also, more and more publicly-supported crime labs were established.

As a lieutenant commander in the Naval Reserve, in 1934 May became Assistant to the District Intelligence Officer for the Thirteenth Naval District, in Seattle. He was promoted to full Commander about three weeks before the Japanese attack on Pearl Harbor. May spent World War II training Intelligence investigators and developing counter-intelligence plans.

When May returned to private practice after the war, the game had changed. During his career as a private detective,

cont'd on page 42

"SCIENCE IN ACTION:" —Criminalistics

by Peter DeForest

The complete transcript of the film "Science In Action" [CACNews, 2ndQ 2016] featured criminalists and Dr. Paul L. Kirk. Other than Dr. Kirk the "actors" in the film are not identified in the article. I was certain that many older criminalists would recognize some of their current colleagues from years ago, even though at the time of publication fifty years had elapsed since their student days. My confidence may have been misplaced. Although he is not credited, I have deduced that John Houde is the one who prepared the transcript in the last issue. This is just another of his unheralded contributions to the CACNews. It is clear that the inevitable ravages of time have taken their toll on physiognomy. John must have spent many hours going over the film to be able to extract the dialogue and convert it to text. Although he has known me for many years, he must not have recognized my younger incarnation in the film. The realization that the vast majority of the CAC members would not recognize the "actors" prompted me to offer to write this article.

Science in Action was a pioneering weekly television series that was designed to educate the public about various fields of science. It was broadcast from 1950 to 1966 and was conceived of and produced by the California Academy of Sciences. The weekly series was televised nationwide and is recognized as the precursor of later science television series such as *Nova*.

The *Science in Action* in the Crime Laboratory installment of the series entitled "Criminalistics" was filmed primarily in Room 2590 of the Life Science Building (LSB) at the University of California Berkeley and in the museum at the California Academy of Sciences in Golden Gate Park. Room 2590 LSB was the major teaching laboratory for the Criminalistics Program at Berkeley. The museum venue was used as a simulated crime scene. Filming took place using 16mm cameras during the fall semester of 1965. The finished program was televised nationwide in the spring of 1966.

The 1965 - 1966 academic year was my second year serving as the teaching assistant for Dr. Paul L. Kirk. That fall I was presented with a film script for the *Science in Action Criminalistics* episode with the request that I select students from my class to appear at various points in the film. I also included some prior students who happened to be available, and I arranged a few cameo appearances for myself. This was my first and last experience as a casting director. It was a short career.

Dr. Kirk died in May 1970. At that time Chuck Morton took up a collection among a number of us to purchase a copy of the 16mm film from the California Academy of Sciences to present to Mrs. Kirk as a remembrance of her late husband. In the present age of easily and economically recordable high quality video, it may be difficult to appreciate the value of such a gift. Many years later Chuck Morton arranged to obtain a digitized version of the film on a DVD. Kathy Roberts wanted to show the film at the Spring CAC Seminar she hosted in Pasadena in May 2013. Chuck was unable to attend the meeting, but arranged to give me a DVD to take to the meeting to give to Kathy. Kathy organized a competition among the attendees with the promise of a bottle of wine to the winners. Three competitions were announced. They were as follows:

One, identification of the greatest number of "actors." Two, enumeration of physical evidence practices depicted that would be an anathema now, and three, enumeration of physical evidence practices that were modified to accommodate the filming.

The cover of last quarter's CACNews had a series of frame grabs from the *Criminalistics* film. In the center, as most will recognize, is Dr. Kirk. Clockwise from the top surrounding Dr. Kirk's picture are frames depicting George Sensabaugh, John Murdock and Mary Lou Kelleher, Chuck Morton, Mary Lou Kelleher again, Dr. Kirk with a hand lens, and finally a frame with Jerry Chisum (visiting the campus), Richard Whalley and Brian Parker (an instructor).

The four frames distributed at various points in the transcript are partial repeats of what's on the cover, and should be easily identifiable with the knowledge of those identified on the cover.

The attempt to identify the majority of participants will take the form of a timeline in minutes and seconds. In some cases my memory from just over 50 years ago has failed me. I am still working on these identifications. Any help from another old-timer would be appreciated.

I hope the readers enjoy this exercise. I am sorry that some remain unidentified. One possible excuse that I could offer for my memory failure is that the filming took place in the fall semester, and I would not have gotten to know the first year students that well.

(The entire film may be viewed on the CAC's resources page at www.cacnews.org. —Ed.)

TIME LINE



0:00 The "burglar" with the stocking mask was a member of the film crew.



4:00 The investigation crew consists of a uniformed San Francisco police officer, Chuck Morton, and Dr. Kirk.



5:55 Dr. Kirk and Peter DeForest. (This was a scripted and staged "accidental" meeting on campus near LSB.)



6:15 Criminalistics students entering LSB. (My fiancée and who was my wife at the time the film was televised is walking beside me in the blue sweater.)



6:28 John Murdock, and Mary Lou Kelleher



6:56 Michael Edwards, BS, DDS, MD. Michael had a successful career as a maxillofacial surgeon in San Diego.



6:59 Steve McJunkins



7:12 Thomas Perazella.



7:50 Someone unidentified at this point and Darlene Gall



7:55 Jerry Schluker and George Sensabaugh



8:08 Jerry Chisum, Richard Whalley and Brian Parker



8:46 Patricia Knittel (Zajac)



10:16 George Sensabaugh



12:00 Mary Lou Kelleher, Patricia Knittel (Zajak), Michael Edwards, and Dr. Kirk. (In the lower left foreground is a rear view of my wife to be, Carol.)



13:07 Mary Lou Kelleher and Peter DeForest



17:57 Jerry Schluker



18:08 Carole Emery (Sidebotham)



19:04 Jerry Chisum and Peter DeForest



19:35 Peter De Forest and Darlene Gall



20:23 Jerry Chisum



Ethical Dilemmas

DISCUSSION CORNER WITH CAROLYN GANNETT

Nobody's Perfect

It behooves any forensic practitioner to be aware of personal weaknesses so that he or she may consciously keep them from impinging upon the ability to practice ethically.

The Scenario

John came to realize he had done something potentially unethical in the crime lab. He knows he should notify his supervisor, but he is afraid of the repercussions and embarrassment.

Discussion

People make mistakes. In the crime lab, mistakes can have serious implications for defendants, the public, the justice system, the crime lab, and the profession. They can also be upsetting to the individual who made the mistake, even more so upon facing repercussions ranging from mild to career-ending should the incident become known. After a transgression, an individual involved may be subject to urges of personal preservation in conflict with the ethical response of being forthcoming and working with management to rectify the matter and to help keep it from happening again.

It behooves any individual working in forensic science to recognize this potential conflict and be prepared for its possible future occurrence. With that in mind, none of us is perfect. We all have character weaknesses. Some of them could be allowed to interfere with how we respond upon discovering our mistakes. They could also be allowed to curtail making ethical decisions on a daily basis.

I ask my students to brainstorm about such character traits. Thanks go to them for helping create the list below.

The purpose of this list is to do an exercise that I encourage the reader to try. Privately comb through it and note any traits that apply to you personally. Remember, no one is perfect—you do have some of these traits. And, rest assured that no one else need know your choices, so to get the most out of this exercise be brutally honest. Add to it any that are not on the list below. Then, stay cognizant of those traits you chose. Ensure that you do not let them negatively impact your decision-making process in your daily practice or when you come up against an ethical dilemma.

I see this tact as analogous to how the scientific method deals with bias. We all have biases, but there is no place for them in the practice of science. So, it is the scientist's respon-

sibility to recognize, ahead of time, sources of bias, and build safeguards into experiments and analyses to ensure that those biases do not impinge upon results.

Similarly, we all have character weaknesses, but there is no place for them in ethical practice. It is the individual's responsibility to recognize those weaknesses ahead of time, and take care that they do not impinge upon one's daily practice of forensic science and the resolution of ethical dilemmas.

This tact applies to those traits for which an individual can be responsible—that is, has the ability to regulate or change. Not all traits are of this type. Some can only be regulated by others, and those traits have been listed in bold. The consensus in my classes has been that, because we police each other, colleagues are responsible for pursuing ethical resolutions when non-self-regulated traits are observed to have impacted a colleague's ability to practice ethically.

I encourage practitioners to do this exercise on an annual basis, perhaps in concert with the annual review of one's ethics documents.

So, here it is—a list of some traits and precipitating circumstances that could negatively impact ethical practice. It is not a perfect list—there is some overlap, and the list is continually expanding. If you think of other traits, feel free to let me know so that I might add them in order to help others in their quest for ethical practice.

The List

FEAR: Of punishment (e.g., career loss, job loss, job reassignment); Of embarrassment (see also "Ego – Shame"); Of not being liked (see also "Poor pressure-management skills – From peers"); Of repercussions when being blackmailed

EGO: *Sources of ego-fulfillment*—Commendations from bosses, attorneys, investigators become more important than quality work; Media attention becomes more important than quality work; Prestige (e.g., preferentially assigning one's self the high-profile cases); Case output (e.g., cutting corners on casework in order to have the highest case-output in the section, either to impress bosses or to feel superior to others; see also "Competitiveness"); Shame (e.g., covering up errors; see also "Fear—of embarrassment"); Hero complex (e.g., setting up situations in which you jump in and save the day)

GREED OR PERSONAL GAIN: Material goods (e.g., stealing work supplies, evidence); Promotions or politics supersede quality work; Income (e.g., compensation determines testimony content); Accepting bribes; Sex (e.g., wanting or having sex with another in the workplace affecting the ability to make objective, fair decisions)

IGNORANCE: Of ethics documents' content; Of technical issues; Of the social culture

INTOXICATION: Illegal drugs; Ethanol; Prescription meds (too much, too little)

POOR PRESSURE-MANAGEMENT SKILLS: *Sources of pressure*—From management (e.g., regarding backlogs, turn-around times, funding); From investigators or attorneys (e.g., wanting particular answers or wanting to cut corners); From peers or work culture (e.g., coworkers want you to lower your performance to an average level so that they don't look bad, or participate in something unethical because they all do it; see also "Fear—of not being liked"); Personal (e.g., illness or discord in the family, financial problems)

PERSONAL BELIEFS ALLOWED TO SUPERSEDE ETHICAL PRACTICE:
Morals; Religion; Cultural background

LAZINESS

APATHY (don't care; jaded; burnt out)

MYOPIA

STUBBORNNESS

SYCOPHANCY

NARCISSISM

VIGILANTISM

INSECURITY (lack of confidence)

INFLEXIBILITY (dislike change)

REBELLIOUSNESS (anti-establishment attitude)

ADRENALINE RUSH (e.g., you just want to see if you can get away with something)

ARROGANCE: Believing that the rules don't apply to you; Entitlement; Ivory Tower mentality (e.g., believing you can get away with something because you are in charge)

COMPETITIVENESS (see also "Ego – Case output")

FOMENTING (e.g., "stirring the pot")

VENGEFULNESS

JEALOUSY

SOCIOPATHY: *Occurrence*—"about 3% in males and about 1% in females" (Diagnostic and Statistical Manual, IV-TR, p. 704)

In my layperson's opinion, while sociopathy (characterized in part by antisocial behavior and diminished empathy and remorse) itself may not be a trait that can be self-regulated, it may be that a sociopath could still function ethically should he or she see ethical conduct as a means to fulfilling self-serving ends, such as being successful in a job.

MENTAL ILLNESS

COGNITIVE ABILITY

***ADDICTION:** Gambling; Drugs; Alcohol; Porn; Sex

*It has proved contentious amongst my students whether or not addiction is a trait that can be self-regulated. Some believe that, at least in the earlier stages of addiction, the addict may have the ability to recognize and address the addiction. Others maintain that addiction can destroy the mind's ability to make sound judgments, and hence impinge the ability to rectify the situation without outside assistance. Both may be true, depending on the nature or severity of the addiction.

Share your thoughts and dilemmas at
www.ethicsforum.cacnews.org

DANTE WEBB

A Newbies Perspective

Brain Games, Cognitive Bias and Forensic Science

A Newbies Perspective is a blog post series looking at the world of forensics through the eyes of a young forensic scientist.

The Netflix docu-series *Making a Murderer* has recently caused quite the commotion across the country. A good friend of mine recommended it to me knowing that I would naturally be interested in it due to my work in forensics. Well, she was correct! I'm not usually a binge watcher but I couldn't help it with this. I watched all 10 episodes in a span of two days, barely sleeping in the process (ok ok, I slept A LITTLE). The series details the Steven Avery case, a man from Manitowoc County Wisconsin who was sentenced to 18 years in prison for sexual assault and attempted murder before being exonerated in 2003. Two years after his exoneration he was arrested, tried and sent to prison in connection with another murder. Whether you believe Steven Avery is innocent or guilty, the series is a fascinating look at the criminal justice system, corruption and classism (a convo for another time).

As fascinating as the overall series was, there were two episodes of the series that stood out to me: the episodes dealing with the forensic testimony. Due to the way some of the forensic experts testified, those episodes sparked some discussion on the issue of bias in forensic science such as task relevant/irrelevant information. It was the topic of conversation around my lab for a few days. One expert in particular's testimony was presented in a way that made it seem like she was working directly for the law enforcement agency (although, this can also be attributed to how the documentary itself was presented). It was stated in her case communication log, as a request by the detective working the case, to "put her [the victim] in Steven Avery's garage." That statement in particular caught my attention because I was always instructed that that was a no-no. There were a number of things in my forensic science classes that weren't taught, but play an integral role in this industry. We were taught to be objective, but the actual details and intricacies of cognitive bias and its effects weren't discussed much.

Cognitive bias is defined as a "systematic pattern of deviation from norm or rationality in judgement, whereby inferences about other people and situations may be drawn in an illogical fashion." It doesn't take much to see how problematic this can be in this line of work, where we have no guilty or innocent person to convict or save. In a forensic context, this could crop up when, say, a DNA analyst is doing an interpretation of a complex mixture and he/she has "task irrelevant" information that leads her to an inclusion instead of an exclusion. It is crucial to minimize this in forensic science, especially since many practices involve subjective interpretations and evaluations. Dr. Itiel Dror, one of the leading researchers in cognitive neuroscience and has recently been applying his expertise to the forensic sciences. After discussing this subject with him I see its importance and its potential to shape the future of this field. As forensic scientists, we must be constantly aware of cognitive bias.

A *Newbies Perspective* can be found at <https://www.linkedin.com/in/dantewebb3>

Is it What You Say, or How You Say It?

I was a little taken aback reading Ray Davis' critique of the testimony of Paul Kirk in the *Sheppard* trial [CACNews 2nd Q, 2016]. I question the appropriateness of applying today's "standards" to an event of some 50 years ago.

Nonetheless, it did cause me to consider the nature of my testimony over my career.

While a student under Dr. Kirk in the early '60s I do not recall much discussion of testimony, at least certainly not the mechanics. Not a moot court to be found. However, Dr. Kirk did make the following observation in his book *Crime Investigation* (1960 Edition, p.517)

"It is a difficult task to instruct anyone as to how evidence should be presented in court. This it true because every individual has his own personality and characteristics to condition his ability in this direction, and his own manner and means of presenting his case."

Leaving the University I was employed by the San Bernardino County lab. After a few months of work, a case of mine was in trial. I asked Tony Longhetti if he had any advice about my first testimony. His response was: "Answer only the question asked and tell the truth." I think he was smiling when he said this.

A few years and a number of testimonies later, I moved on to another laboratory. Since I was going to be doing blood alcohol testimony, I was told to observe a particular criminalist, because he was held in high regard for his testimony in this area. I sat in the courtroom and watched him look at the attorney who asked the question then swivel toward the jury and give a response that was clearly measured and calculated. I could not help but think of the audio animatronic Mr. Lincoln who gave a similarly unvarying performance up the road at Disneyland.

I don't think that I would be commenting here if the same issue of CACNews did not contain a note by Bob Blackledge regarding Vince Guinn and his testimony in the Kennedy assassination and Jeffrey MacDonald murder cases. Dr. Guinn was a respected Professor of Chemistry at UCI and research chemist for General Atomic. He performed analyses and testified in many criminal cases using the technique of Neutron Activation Analysis. His interpretations of findings using NAA, principally in cases involving hair comparisons, received severe criticism at the time from many members of CAC.

However, if Ray were to review those transcripts I would not be surprised if they were found relatively free of the "faults" found with the testimony of Dr. Kirk. Dr. Guinn was always praised for his effectiveness as a witness.

I have been retired for a while now, but I still testify on occasion in those cases which never seem to go away. When I do, I still go with Tony's original advice: Answer only the question asked and tell the truth.

Jim White
CAC Life Member
Newport Beach

History Important in Understanding Kirk

The title of a letter to the editor submitted by Evan Filby that appeared in the last issue [CACNews, 2ndQ 2016] caught my eye. The title, *Kirk Was Late to the Game*, which was undoubtedly created in editing by the CACNews. This title was extracted from the first sentence in the following excerpted quotation from the submitted letter.

While Kirk certainly deserves recognition, he was— fact— very late to the game. Just in the West, there were two more pioneers besides Vollmer doing scientific crime detection. The better known one was Edward O. Heinrich, so-called "Wizard of Berkeley." He too began work in the field around 1910. By the time of the 1921 PSM article, he had his own crime lab that was anything but "pseudo" or rudimentary.

The title is misleading and misses the point. Dr. Paul Leland Kirk was clearly a pioneer in criminalistics, but not in the sense of strict priority. In terms of being engaged in case work he was clearly preceded by some others, perhaps by as much as 20 years or more. I don't know who would have claimed otherwise. Edward Oscar Heinrich and Luke S. May mentioned in the letter clearly preceded him, as well as a handful of other European contributors. In fact, the purpose built "crime lab" at Northwestern University was established in 1929, before Dr. Kirk began working in criminalistics. For those who are not aware of it, the laboratory at Northwestern was established by the city of Chicago in response to the St. Valentine's Day massacre. Dr. Kirk's contributions to the field of criminalistics were pioneering and profound, but unrelated to priority in performing casework.

In order to understand Dr. Kirk's contributions, it is important to know his history. It is unfortunate that there is no biography of Dr. Kirk. For some of what I am presenting here I am relying on memory of conversations I had directly with him. After earning a masters degree in chemistry from the University of Pittsburgh, Kirk traveled to Berkeley to earn his PhD. He drove across country and reported having repeated tire failures on the way. This would've been in the early 1920s. One can only imagine the state of tire technology and the quality of the roads at that time. However, Kirk was never able to shake his enmity toward the tire manufacturer. By the 1920s the chemistry department at the University of California was attracting top students from around the world. An incredibly strong department had been built by Dr. Gilbert Newton Lewis. This is what attracted students. Generations of freshman chemistry students worldwide might not know his full name but they would recognize Lewis dot structures or dot diagrams and Lewis acids and bases. Dr. Lewis made many other contributions to chemistry and physics. He may be the scientist most deserving of a Nobel Prize who never received one, although a truly impressive number of professors and students associated with the program he built earned the Nobel. In any case Berkeley was an attractive place to study chemistry, biochemistry and physics.

Dr. Kirk was awarded his PhD in biochemistry by the University of California at Berkeley in 1927. He stayed on at the University becoming a Professor of Biochemistry. During this time he developed expertise in microchemistry along with a world wide reputation in the subject. He devised a number of analytical methods as well as designed and built special apparatus including special pipettes and quartz helix balances. Dr. Kirk was an expert glassblower. Some of his apparatus

designs were commercialized. He was a prolific writer who published five books, over 200 papers in respected scientific journals and contributed articles to the Encyclopedia Britannica.

Dr. Kirk's expertise in microchemistry was such that he was commandeered (perhaps more politely—requisitioned) away from the campus between 1942 and 1945 to work on the Manhattan Project developing the atomic bomb. The time away from the campus was spent between Enrico Fermi's lab at the University of Chicago and a full-scale plutonium production facility in forcibly depopulated Hanford, Washington. Dr. Kirk did the earliest work characterizing small quantities of plutonium from Fermi's reactor in Chicago.

In the decade prior to his work on the Manhattan Project his reputation in microchemistry grew and drew the attention of law enforcement. He told us about his first case. He returned to the lab one day and found a dead dog on the lab bench with the request to determine whether it had been poisoned, and if so, what poison. From his successful solution on this case many more cases followed in rapid succession. As he developed solutions to increasing number of physical evidence problems, he decided to offer elective courses on physical evidence analysis to his biochemistry students. He also began directing student research in criminalistics related topics. There was no formal criminalistics program at that time. A few years after he returned to the campus after the war, he established a BS and an MS program in criminalistics. His students, both pre-war and post-war, founded and staffed some of the earliest criminalistics laboratories in California. Many of these were one-person operations. Some of these individuals were founders of the CAC.

NOTE: Now let me get to the point of this letter. Early in his involvement with physical evidence problems Dr. Kirk recognized that physical evidence problems shouldn't be dealt with on an ad hoc basis.

Dr. Kirk went beyond his burgeoning forensic science casework problem-solving. He defined and conceptualized criminalistics. He saw it as an academic discipline and acted accordingly establishing academic degree programs. In the California Academy of Sciences film (Criminalistics) from 1965 he refers to criminalistics as "a profession and scientific discipline".

As Dr. Kirk was developing his conceptualization of the field he wrestled with nomenclature. Terms such as police science, technical criminology, scientific detection, scientific criminology were considered but found wanting. Many other terms were considered. The Austrian magistrate Hans Gross, had used the term 'Kriminalistik' in his writings. Dr. Kirk wrote a paper in the 1940s where he argued for the use of "criminalistics" as a term describing the field. This began to catch on. When O'Hara and Osterburg, published their book in 1949 they titled it "An Introduction to Criminalistics" but deliberately used some of the older terms alternately because they were more familiar. The then nascent American Academy of Forensic Sciences adopted the term criminalistics for one of the sections. This section has now become the largest section in the Academy.

In addition, Dr. Kirk established the principle of individuality, and wrote in The Ontogeny of Criminalistics that "Criminalistics is the science of individualization." Although this concept of individualization is now being debated and at times misinterpreted, there is no doubt that an important

goal of a forensic analysis is at least the approach to individualization of physical evidence. The other two are classification (or identification) and reconstruction. It is the principle of individualization that sets criminalistics apart from other sciences, and is critical to our role in the criminal justice system.

Dr. Kirk wrote extensively in his books and in his published scientific papers on his methods and philosophy. There are four papers of great value that Dr. Kirk wrote that should be required reading for criminalists, and are cited below. In all of his writings and teachings, Dr. Kirk stressed scientific evidence interpretation. Although Dr. Kirk did not create 'the game' of criminalistics, his contributions to defining its methods and goals as well as turning it into an autonomous scientific discipline makes his advancements invaluable to essentially redefining "the game."

Peter DeForest, D. Crim.
Ardsley

References:

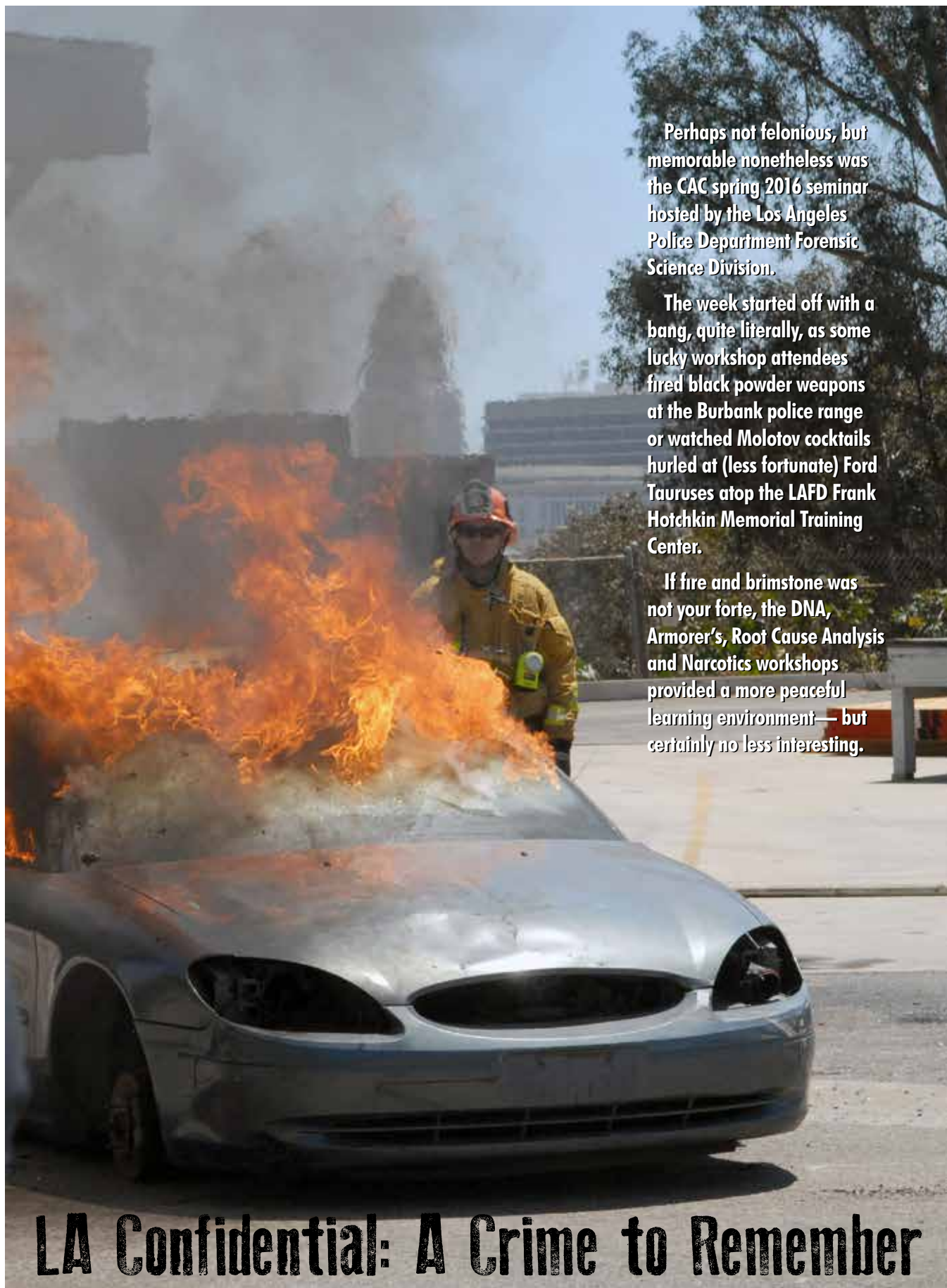
- Beck, J. (1992). *J. For. Sci.*, 37(1), 349-355.
- Block, E. (1958). *The Wizard of Berkeley*. New York: Coward McCann.
- Gross, H. (1891). *Handbuch für Untersuchungsrichter als System der Kriminalistik*. (Handbook for Examining Magistrates as a System of Criminalistics).
- Kirk, P. (1963). Ontogeny of Criminalistics. *J. Crim. Law, Criminology and Police Sci.*, 54(2), 235-238.
- Kirk, P. (1964). The Hybridization of Science. *JOAC*, (47), 869
- Kirk, P. (1963). Criminalistics. *Science*, 140(3565), 367-370.
- Kirk, P. (1969). Criminalistics at the Crossroads. *The Criminologist*, 4(11), 3541
- May, L. (1936). *Crime's Nemesis*. New York: Macmillan.
- O'Hara, C. and Osterburg, J. (1949). *An Introduction to Criminalistics*. New York: Macmillan.



On Back: When your day ends....
Ours begins.



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Perhaps not felonious, but memorable nonetheless was the CAC spring 2016 seminar hosted by the Los Angeles Police Department Forensic Science Division.

The week started off with a bang, quite literally, as some lucky workshop attendees fired black powder weapons at the Burbank police range or watched Molotov cocktails hurled at (less fortunate) Ford Tauruses atop the LAFD Frank Hotchkin Memorial Training Center.

If fire and brimstone was not your forte, the DNA, Armorer's, Root Cause Analysis and Narcotics workshops provided a more peaceful learning environment — but certainly no less interesting.

LA Confidential: A Crime to Remember

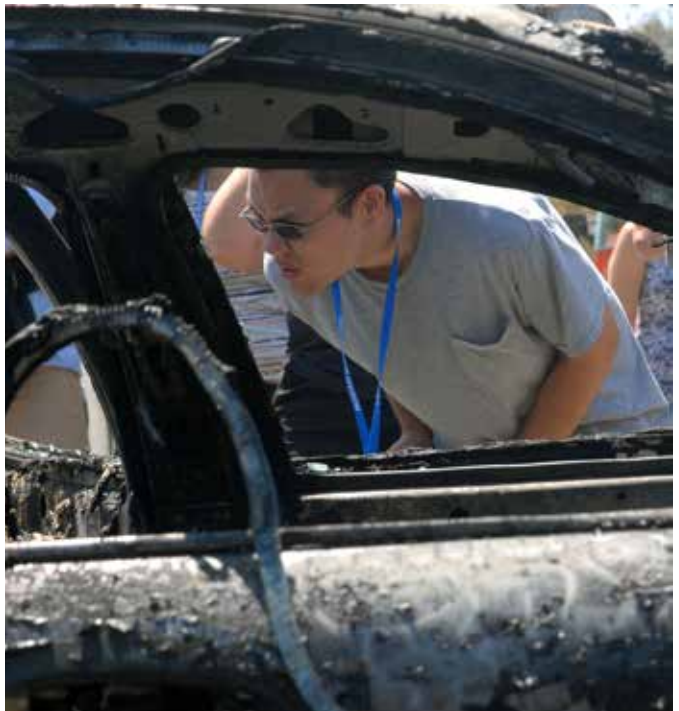
Sabine Eichmann photo.



Sabine Eichmann photo.





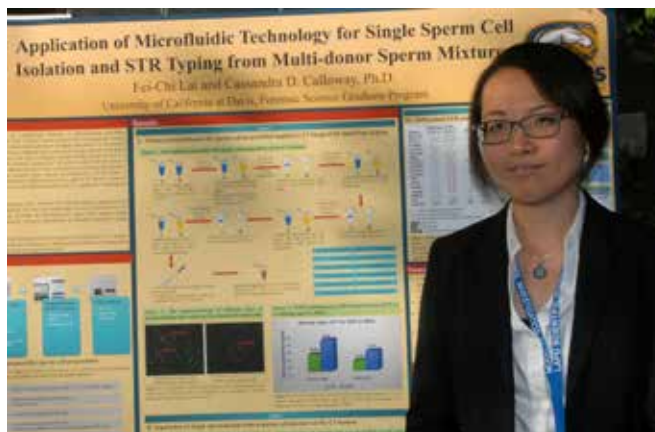
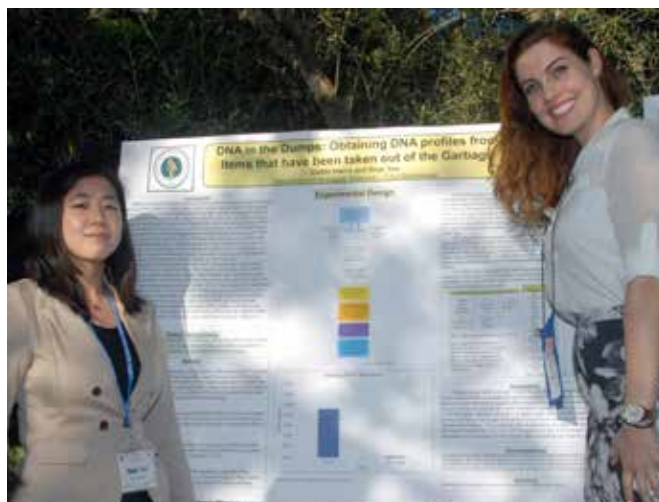
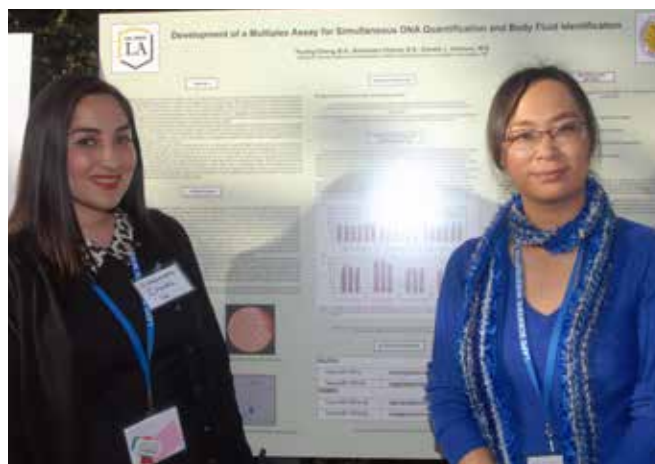
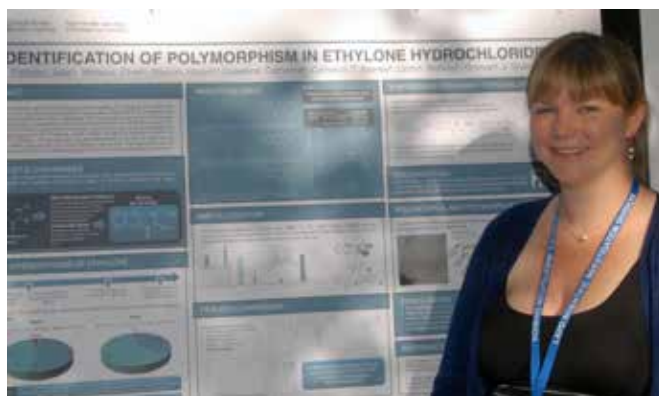
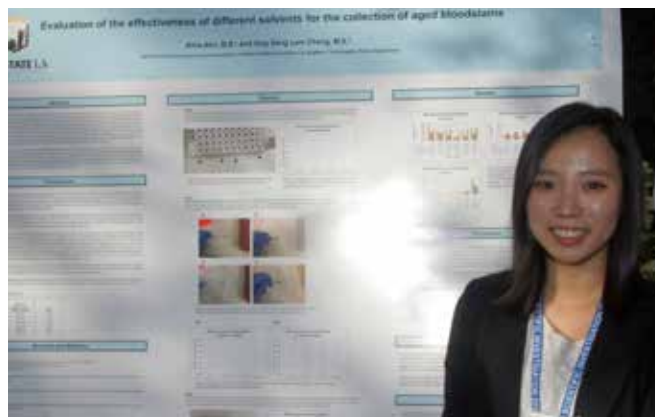
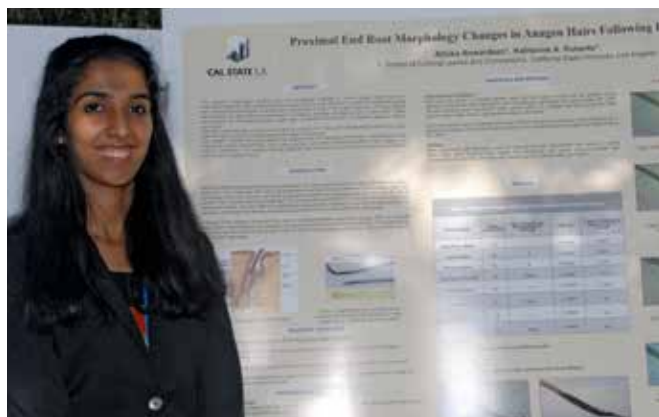
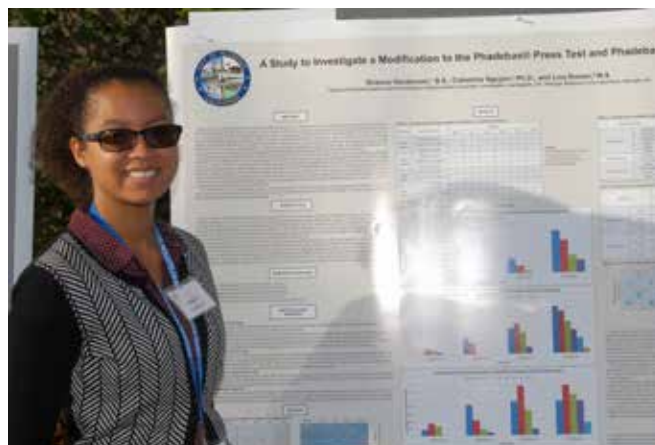


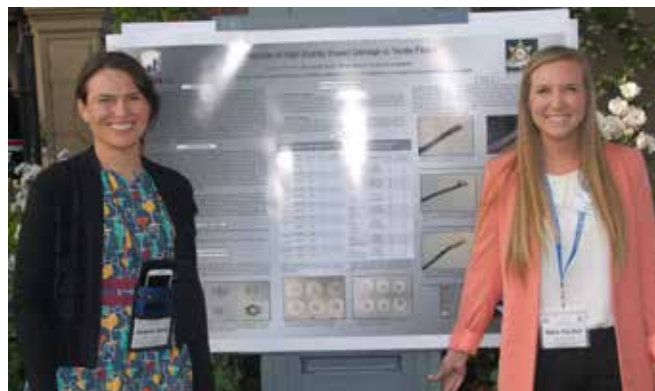
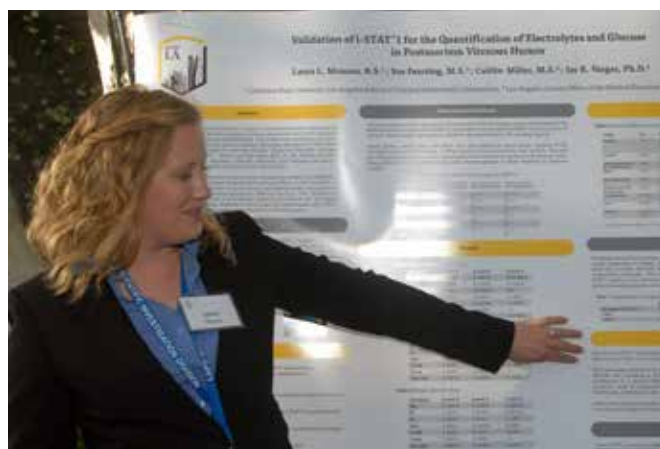
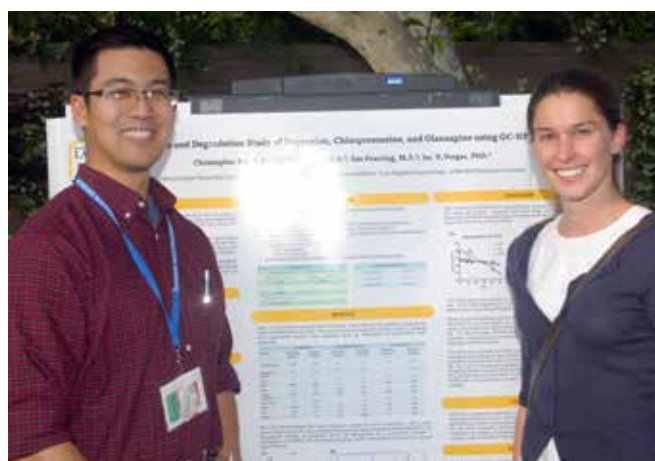
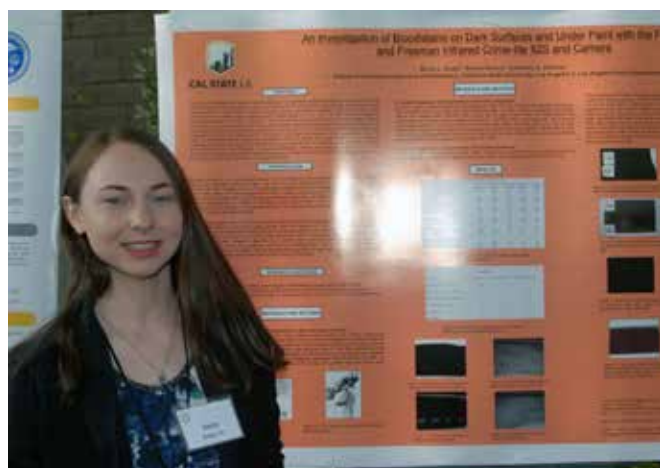
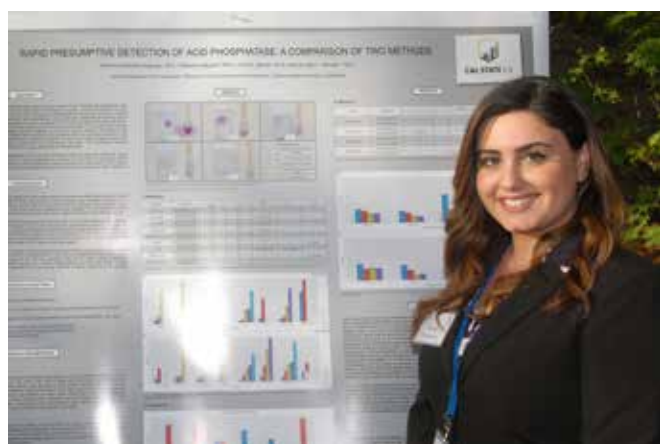
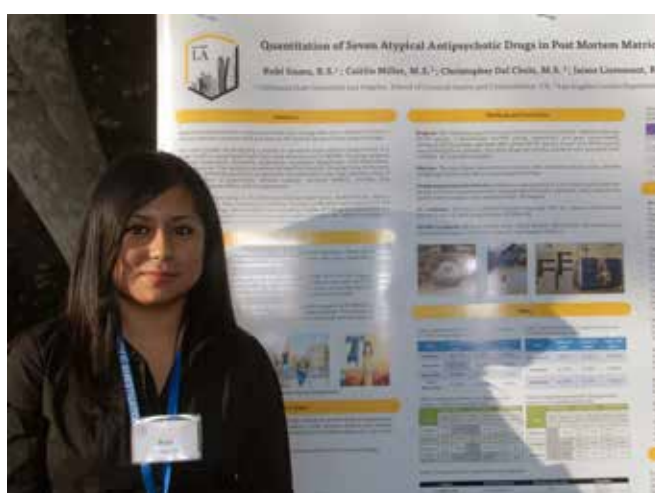




LA Confidential: A Crime to Remember

Poster Sessions











Above, Brian Banks poses after delivering his inspiring presentation, "The Brian Banks Story." Thursday's events were highlighted by a colorful performance by the Tradición Dance Company, followed by some exciting piñata-busting by dizzy, blindfolded CAC members.





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ABSTRACTS OF THE SPRING 2016 CAC SEMINAR

WORKSHOPS

DNA Phenotyping with Parabon® Snapshot™

Dr. Steven Armentrout, Parabon NanoLabs

The Snapshot™ DNA Phenotyping Service is a revolutionary new forensics capability that accurately predicts ancestry and physical appearance from DNA evidence.

Until now, DNA without a match has been worthless to an investigation. With the introduction of Snapshot, unmatched DNA can serve as a genetic witness, and provide a great deal of information about a DNA source. In this 1-hour session, Dr. Steven Armentrout, Founder and CEO of Parabon NanoLabs, will present key aspects of Snapshot and its use.

Participants will learn: • The typical workflow and requirements for using the Snapshot service • The basic science behind DNA phenotyping • Snapshot's strengths and limitations • How it is best used during an investigation (via a hands-on class exercise)

If you are investigator who encounters tough cases with DNA evidence or a DNA forensic analyst wanting to stay on the cutting edge, you won't want to miss this informational opportunity.

Aaron Carter Sexual Assault Series

Detective Sharlene Johnson, LAPD, Robbery Homicide Division

On New Year's Day, 2005, Carman T. and working at a Korea Town area McDonalds. Carmen was pregnant. She went into the restroom and was viciously sexually assaulted at knife-point. A female coworker entered the restroom and the suspect, 23 year old Aaron Carter fled. Male coworkers were alerted and chased down Carter who was detained a few blocks away. Carter was arrested by responding officers and criminal charges were subsequently filed.

Carter's DNA profile was entered into CODIS and by May 2006, it hit to three Los Angeles, California sexual assaults, as well as two Oakland, California sexual assaults. An additional case was identified via Modus Operandi. All of these cases occurred in 2004 while Carter was attending school in Pomona, California. The 2004 investigations yielded no suspect identification, resulting in them being closed Investigation Continued. This case study will review the cases, evidence and the impact DNA analysis had identifying the series and on the judicial outcome.

An Improved Capillary Electrophoresis System for Human Identification

Sara Laber, Promega Corporation

Rapid DNA and NGS hold great promise for the forensics community to extend the reach and depth of DNA typing. While powerful complements to traditional capillary electrophoresis (CE) STR typing, neither approach is likely to replace CE analysis for the majority of forensic samples. As such, improving CE technology will be critical for advancement of forensic DNA typing. The Spectrum CE System will offer increased spectral capacity, which will allow analysis of existing 4-, 5- and 6-color chemistry as well as a new family of 8-color multiplex STR systems. With the additional colors, improved multiplex configurations will provide more complete and consistent results with degraded and inhibited case samples as well as variable "direct amp" samples. The system will also offer increased flexibility and four continuously accessible plate positions. This design improves laboratory efficiency by reducing schedule conflicts, increasing overnight/weekend throughput and reducing the number of instruments needed in the laboratory. The presentation will include an overview of the Spectrum CE System's features as well as a review of initial data generated with existing STR chemistries.

Implementation of Probabilistic Genotyping at the San Diego Police Department

Adam Dutra, Criminalist, San Diego Police Department Crime Laboratory, Forensic Biology Section

In October 2015, the San Diego Police Department began the use of STRmix for probabilistic genotyping of casework data. We were the second public laboratory in California to incorporate probabilistic genotyping and the first laboratory west of Mississippi River to go live with STRmix. This presentation highlights the experiences we have had, the knowledge we have gained, and the lessons we have learned along the way. We will discuss the following topics: validation, implementation/training, changes to analytical record/notes, reporting, proficiency testing concerns, CODIS implications, testimony, and issues we encountered. We will provide some case examples to show how the power of probabilistic genotyping can assist in casework analysis and interpretations.

Implementing Probabilistic Genotyping at DFSC: We Survived, So Can You

Sara Green, Forensic Biologist, Defense Forensic Science Center

An overview of the selection process, validation, and implementation of probabilistic genotyping software at the Defense Forensic Science Center. Competency training of analysts and work flow using ArmedXpert and STRmix will be addressed.

It Wasn't Me

Yukie Partos, Senior Criminalist, Los Angeles County Sheriff's Department, Scientific Services Bureau, Biology Section

This is a presentation of a case that occurred in 2012 and was investigated by the Los Angeles Sheriff's Department. It demonstrates the power of CODIS but potential difficulties

with identification of an individual when using the forensic technologies currently readily available.

Optimizing Collection of Trace Biological Samples From Vehicle Headrests

Kevin Tang, Student, San Jose State University

Adhesive tape and swabs are two methods for collecting biological samples commonly used in the UK and US to investigate crimes involving vehicles. Determining the most optimal collection method may lead to an increase in generating DNA profiles and crime-solving. The object of this study is to evaluate the efficiency of adhesive tape and the double-swab collection methods for investigating vehicle crimes with possible touch DNA samples. To determine this, touch sample recovery from different materials commonly used in vehicle headrests with varying concentrations of biological samples and 3 different storage times (1, 2 and 3 days) will be evaluated. Specifically, 5 and 10 uL of saliva was spiked on mock vehicle headrests made of 3 different vehicle materials for DNA analysis. The different headrest materials collected for the experiment include; cloth, vinyl and leather.

Control samples were placed on the substrates and evaluation of the efficiency of recovery using the two collection methods was performed using qPCR. Additional sample set up and testing will be conducted once a baseline of efficiency is established through replicate and optimization testing. By optimizing this collection technique, we aim to aid in not only investigations involving vehicles but also other crimes with touch DNA evidence present.

The Rattlesnake Killer

Joan Renner, Author

On August 5, 1935, the body of pregnant newlywed, Mary Busch James, was discovered submerged in the backyard fish pond of the La Canada home she shared with her husband, Robert.

A Coroner's jury was convened and they agreed that the manner of Mary's death was drowning with a contributing factor of acute cellulitis of her left leg (possibly the result of an insect bite). What the jurors could not agree on was the cause of Mary's death – was it an accident, suicide, or homicide?

On the day she died Mary left a note addressed to her sister, but there was nothing in it to suggest suicide, and she didn't appear to have any enemies, so the jury returned an open verdict.

The Occidental Insurance Company held a policy on the deceased and conducted their own investigation. They questioned the widower but were not convinced that he was telling them the truth about his wife's death. Occidental refused to pay out on the double indemnity policy and took Robert to court in an effort to get it canceled. Rather than continue to battle in court, the company offered Robert a settlement which was significantly less than the face value of the policy. He took the money. Despite the resolution of the case, the insurance company was so suspicious of Robert that they shared their concerns with the Sheriff's Department and the District Attorney.

Nine months following Mary's death the law was still pondering the information they had received from Occidental when an alarming tale of a murder plot against Mary reached their ears.

Based on the new information Mary's body was exhumed and autopsied a second time. The coroner concluded that the bite marks on her feet and legs had not been made by insects as originally thought. They had been made by the fangs of a rattlesnake.

What had really happened to Mary Bush James?

Integration of Forensic Science Wiretaps in identifying, charging convicting the Hoover Criminals

Detective Daniel Jenks, LAPD, Robbery Homicide Division, Gang Homicide Unit

A case study will delve into a lengthy investigation involving the daring mid-day robbery of an armored truck during a delivery at a Bank of America branch. The robbery resulted in a shooting and the murder of one of the armored truck guards. The case was subsequently linked to a series of robberies and murders orchestrated by a crew of gang members and their associates. The case presentation will discuss how suspects were developed from DNA, ballistics, video surveillance and conventional investigative techniques which resulted in a wiretap investigation.

Ultimately, the case resulted in the suspects ambushing a detective working an active surveillance. The overview will discuss both the federal bank robbery trial, based largely on forensics as well as the subsequent state trial based primarily from the wiretap investigation. An interesting perspective of defeating potential forensic evidence will be demonstrated in the suspects' own words.

On the Development of a Ballistic Headform for Blood Spatter Research

David Raymond, Professor, California State University, Los Angeles, Engineering Department, Donald Johnson, Professor, California State University, Los Angeles, School of Criminal Justice and Criminalistics, Criminalistics Master's Program

Back spatter refers to the ejection of blood particles in the direction opposite of a gunshot wound entrance. Crime scene investigators often analyze back spatter to reconstruct crime scenes and determine the proximity of the shooter to the victim. The mechanism(s) resulting in back spatter are still not well understood due to the complexities of the event and also the difficulty in conducting laboratory testing. Current methods used to study back spatter include shooting a blood-soaked sponge, anesthetized animals, and cadavers. Each model has limitations whether it be anatomical, physiological or ethical. The purpose of this project is to develop a more bio-fidelic human head model to further investigate the mechanisms of blood back spatter from gunshot wounds. Surrogate materials were selected for the skull, scalp, brain, blood and blood vessels through accepted engineering down-selection methods as well as through experimental testing. Material properties from the literature were used where available and experimental testing conducted to collect additional biomechanical response characteristics. A simplified headform design will be presented along with preliminary test results from small caliber ballistic impacts.

Getting From STRmix to CODIS Using the COSTar Program

Brian Burritt, CODIS Manager, San Diego Police Department
Crime Laboratory, Forensic Biology Section

STRmix is a probabilistic genotyping program that attempts to deconvolute mixtures into their contributor components, and for each component and locus it provides a list of possible genotypes and associated weights. This presentation will discuss the general approach to STRmix data interpretation at the San Diego Police Department and the use of the in-house created COSTar Excel spreadsheet for efficiently creating CODIS profiles from STRmix data.

The Genetic Structure of Native Americans in North America based on the Globalfiler® STRs

Kelly McCulloh, Student, UC, Davis, Department of Anthropology

Current forensic STR databases, such as CODIS, lack sufficient population genetic data on Native American populations; these populations are likely to have greater genetic differentiation than populations residing in the US. Given the limited population genetic data for Native American populations, it is necessary to generate information for a genetically and geographically diverse array of tribes to provide better statistical estimates of the strength of associations with DNA evidence in forensic investigations as well as to characterize Native American population structure. This study used the Globalfiler® STR markers to characterize the genetic structure of ten Native American tribal populations from seven geographically distinct regions in North America, including tribes that are presently not represented in forensic STR databases.

Samples from the seven locations which include the Arctic region, Baja California, California/Great Basin, the Southeast, Mexico, the Midwest and the Southwest were analyzed for allele frequencies, observed and expected heterozygosities, and F-statistics using the Globalfiler® PCR Amplification kit's 24 loci. Population specific private alleles observed in this study may assist direct or indirect comparisons to identify the source of forensic evidence or infer tribal or ethnic origin. Geographic isolation and distance, as well as past migration events, have shaped and structured the population genetics of current day Native Americans in North America. The tribal samples exhibited an FST or value above the conservative 0.03 estimate recommended by the National Research Council (NRC) for calculating random match probabilities among Native Americans. This finding, together with lower levels of heterozygosity, implies the locations from which these samples were derived were both geographically isolated and also genetically subdivided. The greater differentiation among tribal populations, $F_{ST} = 0.04$, than had been previously estimated warrants the inclusion of additional regional Native American samples into STR databases, such as CODIS.

Assessing Consistency Among DNA Analysts In Your Laboratory

Supria Rosner, DNA Technical Leader, LAPD, Forensic Science Division, Serology/DNA Unit

In July 2015, ASCLD/LAB published a newsletter clarifying the interpretation of a DNA profile containing a mixture of two or more individuals. The newsletter cited 5.4.5.2 from ISO/IEC 17025:2005 as the most applicable accreditation

requirement. Specifically, the goal was for laboratories to have defined steps that would enable different analysts in the same laboratory reach the same conclusion. This talk will focus on the steps taken by the Serology/DNA Unit of the Los Angeles Police Department to respond to this newsletter and discuss ways to assess consistency among analysts for DNA mixture interpretation.

An Internal Validation of the PowerQuant System at LAPD

Samuel Hong, Criminalist, LAPD, Forensic Science Division, Serology/DNA Unit

The presentation will cover an overview of the internal validation of the Promega Powerquant System within the LAPD Serology/DNA Unit. In addition the presentation will cover the experience since implementation of Powerquant for use with casework. The presentation will conclude with ideas for future uses of Powerquant.

Evaluation of the Mega Kits: GlobalFiler, PowerPlex Fusion and PowerPlex Fusion 6C and Other Stuff

Learden Matthies, Senior Criminalist, Los Angeles County Sheriff's Department, Scientific Services Bureau, Biology Section, Greg Hadinoto, Senior Criminalist, Los Angeles County Sheriff's Department, Scientific Services Bureau, Biology Section

In anticipation of the mandatory requirement to adopt one of the available expanded STR kits, LASD performed an evaluation comparing GlobalFiler, PowerPlex Fusion and PowerPlex Fusion 6C to determine which would perform best. This evaluation includes sensitivity, degradation, mixture, and inhibition studies. Additionally, the three kits as well as GlobalFiler Express were assessed to determine their performance when utilizing them for direct amplification of various, common reference samples substrates.

This presentation also includes some highlights of work done to validate PowerQuant in our laboratory as well as the ongoing validation of PowerPlex Fusion 6C.

POSTER SESSION

A Study to Distinguish High Energy Impact Damage to Textile Fabrics

Galyn Fischer, Dr. Katherine A Roberts, Amanda Davis, Manuel Muñoz

The movement towards the removal of lead and other heavy metal particles from the primer composition of ammunition has the potential to impact the interpretation of chemical test results for lead and other gunshot residue components that are commonly employed by forensic science agencies. Ammunition manufacturers are reducing airborne lead by adopting several reconfiguration designs, including enclosing the base of the projectile; enclosing the entire projectile with brass, copper or gilding metal; fabricating the projectile from a sintered metal that does not contain lead; and/or removing lead styphnate from the primer mixture.

This research addresses whether damage to textile fibers can be associated with a particular form of high energy impact in the absence of positive chemical testing. Textile fabrics comprised of 100% natural fibers, 100% synthetic fibers, 100% semi-synthetic fibers, and a blend of both natural and synthetic fibers were selected as target materials. Each target was dam-

aged as a result of penetration caused either by a bullet or a high energy power tool. All forms of damage were performed in triplicate. This study used lead-free ammunition fired from a Glock, specifically total metal jacket (Speer [lawman] 9 mm Luger 115 GR. TMJ high performance centerfire cartridges) and brass enclosed base (Winchester [Winclean] 9 mm Luger 115 GR. BEB centerfire cartridges) ammunition. A barrel-to-target distance of six feet was maintained in order to discount the possibility of depositing gunshot residue on the target textile fabrics. Initially, each source of fabric material was subjected to the various forms of damage individually. In addition, the materials were combined by layering each fabric to form a stack of three different fabric types, and the damage was repeated.

The damaged area of the fabrics was initially examined with a stereoscopic microscope and photographed using visible and infrared photography. This was followed by chemical testing with both dithiooxamide and sodium rhodizonate. In addition, fibers were recovered from the damaged area for all of the textile fabrics in order to examine the morphology and optical properties with polarized light microscopy. This poster presentation will report and discuss the results of our research findings.

A Study of Stability and Degradation by GC/NPD: Bupropion, Chlorpromazine, Olanzapine

Christopher Tse, Caitlin Miller, Sue Pearrin, Dr. Jay Vargas

Bupropion, Chlorpromazine, and Olanzapine are psychiatric medications that are prone to degradation in post-mortem specimens from the time of collection to the initial and confirmation screen, thereby complicating interpretation. A better understanding of the time course and circumstances that contribute to this degradation was the focus of this work. To determine the stability and degradation of these three drugs, a quantitative liquid-liquid extraction was performed following analysis by GC-NPD. Commonly collected specimens at the Coroner's office (pig's blood, central blood, urine, bile, gastric contents, and liver) were individually pooled, spiked with drug, then extracted over the course of approximately 12 weeks. We investigated the utility of the preservatives (Sodium Fluoride, Potassium Oxalate, and EDTA) to determine if they may contribute to prolonging the stability of these drugs. Initial results confirm a time dependent degradation of these compounds. The effect of matrix type and preservative on degradation will be discussed.

The Observation of Ridge Drift in Aged Latent Fingerprints

Cathy A. Johnson, Josep De Alcaraz-Fossoul, Katherine Roberts

Latent fingerprints are commonly recovered from crime scenes. They may be compared with reference fingerprints to provide circumstantial evidence of the presence of an individual at a location, based on the recovery of contact prints on a particular surface. A limitation of this source attribution approach is the quality and quantity of the friction ridge characteristics. Factors known to affect the quality of the impression pattern include substrate features, type of deposition, environmental conditions, methods of collection, and distortion. These contribute potential sources of error to a comparison analysis. Further, the timeframe from occurrence to recovery may account for degradation effects that preclude a true contemporaneous comparison. A recent research study (De

Alcaraz-Fossoul et al., 2016) describes a new phenomenon, distinct from distortion or degradation effects, entitled fingerprint ridge drift, which is characterized as a modification of (aged) fingerprint patterns at a ridge scale. Little is currently known of the underlying cause or factors contributing to the occurrence of ridge drift. However, fingerprint ridge drift has practical implications in the field of fingerprint identification. Currently, the SWGFAST document does not consider fingerprint ridge drift in order to account for dissimilarities. As a result, an examiner who compares an aged latent print to a fresh reference print without considering ridge drift may erroneously report an inconclusive result where a positive identification may be justified.

The present study was designed to both replicate and expand upon the previous study. Sebaceous and eccrine prints were obtained from a male and female donor, both of similar age. Two substrates were included to serve as the deposition medium (ceramic tile and polystyrene). Three fingerprints were simultaneously deposited (index, middle and ring fingers), stored indoors and exposed to three different natural light conditions (lightness, shade and darkness) over a period of 12 weeks.

The aged latent prints were processed with carbon (black) or titanium dioxide (white) powder for visualization, and documented photographically prior to comparison with the reference inked prints. The prints were tape lifted from the substrates for preservation.

This poster presentation will report and discuss the results of our research findings.

Quantitation of 7 Atypical Antipsychotic Drugs in Post Mortem Matrices Using LC-MS/MS

Rubi Gama, Caitlin Miller, Christopher Dalchele, Dr. Jay Vargas

Atypical antipsychotics are a highly prescribed class of drugs that can be difficult to detect in medical examiner case-work using standard GC-MS methods because of post-mortem changes. This work focused on developing a method to quantitate seven atypical antipsychotics in a single workflow using liquid-liquid basic drug extraction and LC-MS/MS. The drugs analyzed included Aripiprazole, Asenapine, Iloperidone, Lurasidone, Risperidone, 9-OH Risperidone, and Ziprasidone. The validation procedure followed the Scientific Working Group for Forensic Toxicology guidelines to determine the calibration curve, bias, precision, limit of detection, limit of quantitation, dilution integrity, carryover, stability, recovery, drug interference, matrix effects, and ion suppression. We examined these drugs in the following matrices: heart blood, femoral blood, vitreous humor, urine, bile, liver, and stomach contents. We used a calibration curve range of 2 to 250 ng/mL for the 7 drugs. Our results indicated that bias was within 20% from the target value for all drugs except Iloperidone. In between run precision results were within 20% from the target value for Aripiprazole, Risperidone, and Iloperidone. Within run precision results were within 20% from target value for Aripiprazole and Iloperidone. Ziprasidone was found to be unstable in all the matrices, exceeding 20% from the target value. The rest of the drugs were stable in most of the matrices. We were unable to successfully validate all 7 drugs for quantitation in a single run, however, the method is suitable for qualitative drug screening procedures in the laboratory.

Validation of i-STAT®1 for the Quantification of Electrolytes and Glucose in Postmortem Vitreous Humor

Laura Monzon, Sue Pearring, Caitlin Miller, Dr. Jay Vargas

The analytical value of vitreous humor as a sample in postmortem forensic toxicology has been known for some time. Numerous medical examiner laboratories send out this important sample for electrolyte and glucose measurements. This is both time-consuming and costly. The utility of the i-STAT®1 medical device to measure electrolytes and glucose in whole blood samples has been demonstrated for over two decades. This project sought to investigate the effectiveness of the i-STAT®1 medical device for utilization in electrolyte and glucose measurements using vitreous humor as sample matrix. The i-STAT®1 is an electromechanical device that utilizes three sensors: conductometric, potentiometric, and amperometric. Single-use disposable cartridges introduce samples to i-STAT®1. Various cartridge types allow for the analysis of various analytes including: sodium, potassium, chloride, creatinine, urea nitrogen, and glucose. Through this mechanical process, an electrical internal conductor of the analyzer contacts the electrode of a cartridge, sensing the potential(s) generated from analyzer/cartridge interaction. With only 100uL of sample, results are given in under four minutes. Following the Scientific Working Group for Forensic Toxicology (SWG-TOX) standard practice for method validation, quantitative analysis of postmortem vitreous humor revealed the validity and reliability of the i-STAT®1. All analytes of interest received a percent difference less than $\pm 10\%$ for both accuracy and precision studies. Percent differences for sodium at low medium and high concentrations were 0.236%, 0.281%, and 0.0766%. Drug interference studies were performed with many of the analytes receiving a percent difference less than $\pm 20\%$. Interestingly, there was significant interference of drug spiked vitreous humor samples with the presence of ethanol giving inconclusive results for all analytes except creatinine, which had a percent difference of 50%. Overall, the i-STAT®1 was accurate and precise at all analytical ranges for its intended use. As vitreous humor has been used in forensic medicine to help diagnostic interpretation, the i-STAT®1 has the potential to give accurate results in a timely and cost-effective manner.

An Investigation of Bloodstains on Dark Surfaces and Under Paint With The Foster and Freeman Infrared Crime-Lite 82S and Camera

Emily Drake, Kristin Rocco, Katherine Roberts

Bloodstain evidence can be obscured and lost when deposited on dark surfaces where no contrast exists between the bloodstain and the surface. This may also occur when a suspect attempts to conceal bloodstains by painting over them. This research investigates the detection and visualization of bloodstains on dark surfaces and under paint with the use of an infrared alternate light source (IR ALS), specifically the IR Crime-lite 82S manufactured and distributed by Foster and Freeman. The objective is to demonstrate that the system offers a valid, non-destructive tool for criminalists to use in their search for probative bloodstain evidence.

According to the specifications provided by Foster and Freeman, the IR Crime-lite 82S emits IR radiation, and when examining a dark substrate, the background will reflect the IR light whereas bloodstains that are present will absorb IR light. The IR-sensitive camera detects the IR light and the tab-

let software visualizes the contrast between the bloodstains and the background. As a result, the background will "drop out" and appear lighter relative to the darker bloodstain. This difference in contrast increases the visibility of the bloodstain. Neat porcine blood was deposited on various dark-colored non-porous, porous, and painted surfaces in the form of drop, smear, contact, and fine spatter stains. A porcine blood dilution series (1:2, 1:4, 1:8, 1:16, and 1:32) was applied to these same samples in the form of droplets. The Crime-lite and camera was used to scan the treated surfaces in real-time, and capture images when illuminated with both visible and infrared light. Bloodstains deposited on the painted surfaces were concealed by painting a layer of paint over the bloodstain. Additional IR images were subsequently captured to determine the transmission of IR light and detection of the bloodstains under the paint.

To investigate the IR absorption properties of blood, a sample of each porcine blood dilution was centrifuged to separate and quantify the blood components with a hemocytometer prior to application on a black cotton sample and examination with the Crime-lite. A separate hemoglobin dilution was prepared, quantified via UV-Vis Spectrometry, applied to a black cotton sample, and also examined using the Crime-lite. This poster presentation will report and discuss the results of our research findings.

A Study to Investigate a Modified Application of the Phosphatesmo KM Rapid Test Strips

Pertchoui Mariam Grigorian, Dr. Catherine Nguyen, Lisa M. Brewer, Donald Johnson

Presumptive biochemical testing may be used to characterize stains found at crime scenes. It can minimize the unnecessary use of resources and downstream testing. One method for the presumptive identification of semen involves the detection of acid phosphatase, which is found in the plasma portion of seminal fluid. Although acid phosphatase is not specific to semen, elevated concentrations are found in prostatic secretions. Historically, acid phosphatase testing has been conducted through the use of liquid reagents, but the need for more stable testing reagents led to the development of the Phosphatesmo KM rapid test strips. These test strips are individually wrapped pieces of filter paper containing the reagents necessary for the presumptive testing of acid phosphatase. There is no need for additional chemical reagents to drive the reaction forward. According to the manufacturer, the addition of deionized water or physiological saline solution to the suspected stain and then the application of the test strip to the stain will result in a presumptive identification within 5 seconds. To avoid direct contact between the suspected stain and the test strips, a modified method of application was performed in this study.

This modification involved swabbing the stain in question with a sterile moist swab and then applying the swab to the test strips. Alongside this modification, a side by side comparison of the traditional acid phosphatase test and the Phosphatesmo KM test strips was conducted. Serial dilutions of semen from a single donor were spotted on various substrates to compare the sensitivity of the two testing methods. The specificity of the strips was also examined by testing different biological matrices and plant stains, which contain acid phosphatase in various amounts. The initial results of this study suggest that the sensitivity of both methods is similar

in nature. Additional data will be presented by the author on the performance of the Phosphatesmo KM test strips, which will be discussed in reference to the suitability of the strips as a replacement for the tradition acid phosphatase test, both in a forensic laboratory setting and at crime scenes.

A Study to Investigate a Modification to the Phadebas® Press Test and Phadebas® Tube Test

Brianne Henderson, Catherine Nguyen, Lisa Brewer

Saliva stains may be associated with a variety of evidential items and a sufficient amount of epithelial cells may be recovered from the stain for the purpose of DNA analysis. However, saliva stains are difficult to visually locate without the use of a presumptive test. One such test is the Phadebas® Forensic Press Test, which incorporates starch microsphere polymers coated on the test paper. The starch polymer is biochemically degraded by the α -amylase present in saliva, releasing a blue dye in the process. Hence, a positive result for α -amylase produces a blue color reaction on the paper. Based on the manufacturer's recommended procedure, the chemically treated side of the Phadebas® Press Test paper is placed directly in contact with the item suspected to contain a saliva stain. This approach to testing is of concern given that it may potentially alter or impact the probative value of the evidence with respect to subsequent analyses.

In the present study, a modified version of both the Phadebas® Press Test and the Phadebas® Tube Test was evaluated as potential alternatives to the manufacturer's recommended protocol. Initially, for each of the two tests, moist filter paper was placed on the test in order to transfer a portion of the stained area to the paper. For the modified Press Test, the Press Test paper was placed in contact with the filter paper in order to observe a color reaction. In the case of the modified Tube Test, the filter paper was submerged slightly in a Phadebas® solution (aqueous), removed from the solution and rinsed prior to observing a color reaction. For this study, serial dilutions of saliva from each of six (male and female) donors were prepared and analyzed in order to determine the sensitivity of the two modified methods. The specificity of the Phadebas® reagent was also evaluated by comparing the results obtained with human saliva to a source of non-human saliva, other bodily fluids, and plant stains.

The initial results of this study suggest that the modified Phadebas® Tube Test may offer a suitable alternative method for use in a laboratory setting where it is preferable to avoid direct contact between the chemical and item of evidence. This poster presentation will report and discuss the results of our research findings.

Application of Microfluidic Technology for Single Sperm Cell Isolation and STR Typing from Multi-Donor Sperm Mixtures

Fei-Chi Lai, Dr. Cassandra Calloway

Mixed DNA evidence is characterized by a significant difficulty in differentiating contributor genotypes. Biological evidence recovered from a sexual assault crime scene including the victim's body can be a mixture of female-male or male-male cells from multiple contributors. Conventional differential extraction methods can be applied to separate sperm cells from a large amount of epithelial cells. However, the recovery rate of sperm cells may be largely reduced during extraction

and it is ineffective for separating sperm cells from multiple contributors.

New developments in microfluidic technologies allow efficient and high throughput approaches for single-cell analysis and have forensic potential. For one such technology, the recent introduction of a size-selective chip in a smaller size range provides an opportunity to capture and separate single spermatozoa, which can be used for resolving mixtures, encountered in multiple perpetrator sexual assault (MPSA) cases. The aim of this study was to establish a feasible protocol for the sperm cell preparation in C1 Single-Cell Auto Prep System and apply its microfluidic technology to differentiate a sperm cell mixture from multiple donors and obtain consistent STR profiles of each individual.

In order to establish the protocol, several parameters were examined, including centrifugation speed, wash buffer, centrifugation time, removal of round cells, and fluorescent staining. Additionally, Tris(2-carboxyethyl) phosphine, or TCEP, was experimented to increase the DNA yield in whole-genome amplification of multiple displacement amplification (WGA-MDA). The results indicated C1 Single-Cell Auto Prep System could capture spermatozoa/spermatogenic cells successfully yet WGA-MDA provided limited efficiency for downstream STR analysis. The capture rate was up to 64.6% (n=62). 42 partial STR profiles of the captured cells were obtained and the maximal marker call rate was 87.5% (n=14). In addition, on the off-chip tests of MDA, TCEP yielded approximately 1.8 fold greater amounts of DNA from 1 Million/mL sperm cell samples than DTT.

Using the optimized protocol, we succeeded in capturing single sperm cells and resolving a sperm cell mixture from two individuals using STR analysis. Our optimized procedure for cell isolation of spermatozoa using microfluidics has broad applications in genetics and in vitro fertilization (IVF). However, significant modifications are required in order to be applicable to forensic analysis. Several approaches may be applied in a future study in order to both increase the capture rate and improve the efficiency in downstream analysis, such as cell sorting, the implementation of a different amplification method, and the application of other tools in downstream analysis.

Although further studies are needed, based on the success of STR analysis from single sperm cells in our study, the C1 System shows promise for resolving mixtures often encountered in sexual assault cases.

Development of a Multiplex Assay for Simultaneous DNA Quantification and Body Fluid Identification

Alexandra Chavez, Angela Cheng

Biological stains are one the most common types of evidence found at crime scenes. Prior to DNA extraction, quantification, and typing, the questioned biological stains are subject to serological tests in the field and in the laboratory to screen and identify the biological fluids. While these tests are currently a necessary step in the analysis of bodily fluids, the tests generally lack specificity and are labor-intensive to perform. Moreover, the tests consume sample and are incompatible with DNA analysis. In this study, we propose to develop a molecular-based method for body fluid identification using microRNA markers, which is integrated into the DNA quantification step of STR analysis. This multiplex assay for DNA quantification and body fluid identification could potentially

be to improve workflow in the lab and reduce the number of analytical steps required to characterize a forensic sample.

Previous studies have demonstrated the effectiveness of microRNA markers for the identification of body fluids commonly encountered in forensic casework. In these studies, however, each microRNA marker was tested for individually, and the testing was performed irrespective of nuclear DNA analysis. Contrastingly, nuclear DNA and RNA will be co-extracted from each semen and blood sample in this research. The proposed multiplex assay will simultaneously test for the presence of two microRNA markers and the human telomerase reverse transcriptase gene. MicroRNA miR-185 will be used for the identification of venous blood; microRNA miR-891a will be used for the identification of semen; and the human telomerase reverse transcriptase gene will be used to identify and quantify nuclear DNA. The simultaneous testing of the three markers will be achieved by the use of target-specific TaqMan® probes and primers. With this approach, body fluid identification can be accomplished at the quantification step of DNA analysis, thus eliminating the need for separate serological testing. At this presentation, the authors will discuss the results of the preliminary studies on the development of the multiplex assay, and the feasibility of this approach to resolve problems associated with conventional serological testing.

Proximal End Root Morphology Changes in Anagen Hairs Following Exposure to Various Solutions

Athika Anwardeen, Dr. Katherine A Roberts

This research investigates proximal end root morphology changes in human anagen head hair from antemortem subjects. Hairs were exposed to various environmental conditions in an effort to identify the factors that contribute to the formation of antemortem root banding. A total of five anagen hairs from 30 living subjects were exposed to eight different environmental conditions, including submerging hairs in Nanopure™ water, normal saline, 3% hydrogen peroxide, ocean water, phosphate buffer solution, antibacterial solution, ethanol, and xylene. The hairs were exposed to each environment for a period of 14 days and subsequently examined by plane polarized light microscopy for the presence of anagen root banding. This poster presentation will report and discuss the results of our research findings.

Evaluation of the effectiveness of different solvents for the collection of aged bloodstains

Ahira Ahn, Ieng Seng Lam Cheng

Aged bloodstains are often encountered in forensic casework. Aged bloodstains can be problematic to collect and test, because of the stains poor solubility with water. This research investigates the effectiveness of four different solvents for the collection of aged bloodstains: water, 3% ammonia, 5% ammonia and 70% ethanol. A total of three bloodstains for each of the four solvents were deposited on three different substrates: brick, wood, and glass. 40uL drops of blood were used to create bloodstains on brick and wood, and 5 µL drops of blood were used on the glass surface due to its non-porous surface. The bloodstains were exposed to high temperature to accelerate the aging process. The bloodstained substrates were

placed in an oven at 70 °C and sampled biweekly for up to 16 weeks. Sixteen weeks at 70 °C represents 9.29 years of aging.

Bloodstains were swabbed for 30 seconds with a moistened swab. The same method of swabbing was used for all of the samples. The effectiveness of the different solvents on the collection of aged bloodstains was assessed by the strength of a catalytic color test for blood and by the yield of nuclear DNA as determined by the Quantifiler assay following QIAGEN extraction. Ammonia showed more effective on collecting aged bloodstains than water and with ethanol on the brick samples. Ammonia swabs appeared to have more intense color than water and ethanol swabs. Ammonia was able to dissolve stains quickly which allowed swabbing to occur more smoothly than with the other solvents on wood and glass substrates. Also, less flaking was observed on the glass with ammonia than with water and ethanol. However, water showed more effective on collecting the stains than ammonia on wood and glass substrates. Ethanol was poor at collecting stains on brick, but effective on wood and glass substrates. Additional results of this ongoing research will be discussed by the author at the presentation.

DNA in the Dumps

Sinai Yoo, Caitlin Harris

Human DNA has been used in forensic science as an identification marker, using various methods to extract and generate a probative profile that can hold up in a court of law. DNA sources will result in various quantitative amounts dependent on the method of extraction as well as the nature of the biological source.

Although amounts of DNA are rarely the same when collected from various sources, it is rare that objects collected from crime scenes originate from a single source. Oftentimes, the samples are a mix of two or more DNA contributors as individuals carry and shed not only their own DNA but also trace amounts of DNA they come into contact with.

The two categories of DNA shedding or transfer are primary and secondary; primary sources of DNA may include blood, saliva or semen. Whereas secondary transfer can occur through handling of items, however it is unique in that without handling an object, a contributor may pose the risk of contaminating a DNA source by solely being in close proximity to another item that may also contain DNA.

It is the aim of this project to extract DNA samples from sources where secondary transfer may have occurred, analyze how thoroughly mixed the profiles appear to be. A secondary goal of this project is to determine whether or not profiles can be created and analyzed when the source of DNA is collected from a location with several different contributors.

Bullet Impact Damage to Tinted Vehicle Side Windows

Jessica R. Vuguin, Julie Wilkinson, Kathleen Alvarado, Jack Seror

Tempered glass that has undergone damage from a high velocity impact may exhibit distinct physical characteristics. These characteristics can provide important information that may help determine the sequence of events. While investigating firearm-related offenses suspected to involve a motor vehicle, criminalists also report scenarios where they encounter a small amount of intact glass present within the window frames of the vehicle. Casework has shown that the

glass may be missing while the tint remains attached to the window frame.

This study examines an alternative method to evaluate the sequence of events by analyzing the characteristics of the tint remaining in the windows. This was accomplished by examining the physical characteristics or patterns developed as a result of bullet impact damage. Several experiments were conducted using tinted vehicle windows as the target substrate and replicating "shooting" reconstruction scenarios typically encountered at crime scenes. Several independent variables were incorporated in the study, including the weathering of the vehicle side-windows, shooting angle of impact, firearm-to-window shooting distance, directionality, and type of tint applied to the side window.

The impact damage developed for each window was compared with respect to the independent variables. Dyed tints were applied to tempered vehicle windows, some of which were exposed to environmental weathering conditions. The exposed and non-exposed windows were subsequently shot multiple times with a semi-automatic pistol (9mm Luger caliber, Glock, model 19) using full metal jacket ammunition (Federal, American Eagle brand, 115 grain bullets). The physical characteristics of each impact were documented photographically prior to further analysis.

The results of this study demonstrate that distinctive patterns may develop when exposed to certain variables. Some recurring characteristics and patterns developed surrounding the bullet impacts as well as across the window surface. Certain physical characteristics associated with the bullet impact developed at specific shooting angles; for example, a 90° impact angle showed a circular area of damage to the tint whereas a 20° impact angle (directed upward or downward) demonstrated elongated damage.

The results also show that weathering caused the tint to adhere better to the glass, while non-weathering caused the tint to become loose surrounding the impacts. In addition, when the direction the bullet traveled was from the interior to the exterior side of the window, this resulted in a distinct circular pattern and minimal flapping of tint surrounding the impact. This differed from the appearance of the window and tint when the window was shot from the exterior to the interior side. Further research is underway to expand the study, including examination of impacts produced in windows with ceramic and metallic type tints.

Identification of Polymorphism in Ethylone Hydrochloride

Pallister, Julie; Maheux, Chad; Alarcon, Idrilyn; Copeland, Catherine

Ethylone, a synthetic cathinone with psychoactive properties, is a designer drug which has appeared on the recreational drug market in recent years. Since 2012, illicit shipments of ethylone hydrochloride have been intercepted with increasing frequency at the Canadian border. Analysis has revealed that ethylone hydrochloride exists as two distinct polymorphs. The two conformational polymorphs of ethylone hydrochloride have been synthesized and fully characterized by FT-IR, FT-Raman, pXRD, scXRD, GC-MS, ESI-MS/MS and NMR (1H, 13C, and 13C CPDAS). The polymorphs can be distinguished by vibrational spectroscopy, solid-state NMR spectroscopy, and X-ray diffraction techniques. The data presented will assist forensic scientists in the differentiation of the two ethylone hydrochloride polymorphs.

Hair Analysis and its Relevance in Investigation of Violent Personal Crimes

Jessica Bouchet and Nicole Bracci

The macroscopic and microscopic examination of hairs from different sources is a key element in the forensic science community. In this research project, hairs from several sources, ranging from humans to animals, were examined to determine characteristics that allow identification. As the habitat of a crime scene can range from a household (indoor crime scene) to a wooded area, it is important to determine what is relevant and what is extraneous prior to subjecting these items to expensive and labor intensive DNA testing.

A hair examiner should be able to determine what pieces of evidence are of significance to the crime scene by ruling out any commonly occurring objects that may not be of importance. An example of this is the presence of a dog hair. If the crime scene is a residence where the victim has a pet dog, these animal hairs will be of no significant value in this case as they were present prior to the commission of the crime. However, if the victim does not have a dog, and an analyst identifies dog hairs collected at the scene, this evidence becomes important. In addition, if a person of interest in that case does have a dog, then the evidence becomes crucial in the Identification of a suspect and this evidence can play a major role in the case. With today's technological advances, nuclear and mitochondrial DNA testing is possible on human and animal hairs, however it is very costly and time consuming. For this reason, macroscopic and microscopic examinations are important, particularly for the purpose of exclusion.

GENERAL SESSION

Resurrecting a Cold Case: *People v. Stephanie Lazarus*

Shannon Presby, Assistant Head Deputy, Los Angeles County D.A.s Office, Justice System Integrity Division, Paul Nunez, Deputy District Attorney, Los Angeles County D.A.s Office, Justice System Integrity Division

"A bite, a bullet, a gun barrel and a broken heart" - that was the evidence that prosecutors Shannon Presby and Paul Nunez presented to prove that Stephanie Lazarus murdered Sherri Rasmussen. Lazarus' motive for murder was romantic jealousy. Three months before Sherri was killed, she married the man that Lazarus loved.

Sherri Rasmussen was murdered in her home of February 24, 1986. She was beaten in the face and head, bitten on the left inner forearm and shot three times in the chest. One of the gunshot wounds was a "contact shot" showing that the killer placed the barrel of the gun against Sherri's chest and pulled the trigger.

In 1986, Stephanie Lazarus was a Police Officer 1 with the Los Angeles Police Department. Lazarus had attended college at UCLA where she met John Ruetten. Lazarus and Ruetten became friends at UCLA. After graduating from UCLA, Lazarus and Ruetten's relationship became intimate. For Lazarus, Ruetten was "the one" the man she was destined to spend her life with. Ruetten did not feel the same way about Lazarus.

In 1984, Ruetten met Sherri and the two fell in love. They became engaged in the spring of 1985. Lazarus did not take this well. She wrote in her journal that Ruetten's engagement was "very, very bad" and that she could not concentrate at

work because of her emotional upset regarding Ruetten's romance with Sherri.

Lazarus attempted to get Ruetten to change his mind. She confessed her long hidden love for him and asked him not to marry Sherri. When this did not work she confronted Sherri at her place of employment. Despite Lazarus' efforts, Sherri and John were married in November of 1985. Three months later Sherri was murdered.

The initial investigator concluded that Sherri had been murdered by burglars. No arrests were ever made and the case went unsolved for more than 20 years.

But what that detective didn't know; what Lazarus didn't know; what nobody could have known in 1986; was that a tiny blueprint of the murderer was hiding in the bite on Sherri's arm. A microscopic copy of Stephanie Lazarus hid in the DNA swabbed from the bite on Sherri's arm. That microscopic killer sat frozen in the coroner's freezer for more than 18 years.

Utilizing Uncertainty: The Path to Improvement

Joshua S. Spatola, Bureau Quality Assurance Manager (Criminalist Manager), California Department of Justice, Bureau of Forensic Science, Quality Assurance Unit

It has now been over two years since the implementation of measurement uncertainty requirements for those laboratories accredited by ASCLD/LAB to ISO/IEC 17025:2005 standards. For some agencies and/or their staff members, the years leading up to this implementation nearly mirrored the seven stages of grief: Disbelief, Denial, Anger, Bargaining, Guilt, Depression, and ultimately Acceptance.

The California Department of Justice, Bureau of Forensic Services implemented the measurement uncertainty requirements in drug weights, firearms length measurements, forensic alcohol, and drug quantitation in toxicology samples. This spanned 11 different laboratories, up to 65 different analysts, numerous pieces of equipment, and thousands of data points.

This presentation takes a look at the process of estimating measurement uncertainty from the point of view of improvement. Not only in regards to improving the estimated uncertainty values, but more importantly, in order to improve the measurement process itself. Additionally, the presentation gives several real world examples in which information discovered during the uncertainty estimation was used to improve the measurement processes being used.

Legal Developments in Forensic Science

Michael Chamberlain, Deputy Attorney General, California Department of Justice

Judges and legislators continue to grapple with forensic science issues. This presentation will highlight recent legal developments of interest to practitioners. Topics, which could evolve to represent those that are most timely and relevant, may include:

(1) Discovery of criminalist personnel file information in the wake of *People v. Johnson*, (2) The legality of conducting DNA testing in sexual assault cases where the victim has declined to participate in the investigation, (3) More from the California Supreme Court on expert witnesses and the confrontation clause.

Firearm Serial Number Restoration with Electron Backscatter Diffraction

Ryan M. White, National Institute of Standards and Technology

Serial numbers are the primary means of identifying and tracking firearms, and often, serial numbers will be criminally destroyed in an effort to mask the identity of the specific firearm. In some cases, defaced serial numbers can be restored via acid etching or magnetic particle inspection techniques, which distinguish the deformed area of the original serial number from the surrounding metal.

The basis of serial number restoration is the detection of sub-surface crystallographic changes imparted by the marking tool. There are scanning electron microscope (SEM) imaging modes, including forward scattered imaging (FSI) and electron backscatter diffraction (EBSD), which probe a material microstructure and can be extremely sensitive to localized changes in material crystal structures.

In this work, a letter X was die-stamped into a polished piece of 316L stainless steel and then polished away such that the imprint was no longer visible. After the surface was polished, the sample was imaged with multiple techniques (FSI, EBSD) in the SEM. The original imprint was successfully restored with both techniques, though with varying success. FSI provided a faint restoration of the stamped imprint while EBSD pattern quality mapping produces a clear unambiguous reconstruction of the original imprint.

The details (and a brief scientific background) of the new restoration technique will be discussed, including the depth of restoration, the limitations of the technique, and the potential application of the technique in forensic science laboratories.

Obtaining DNA from Fired Cartridge Casings, an Update

Patrick O'Donnell, San Diego Police Department Crime Laboratory, Forensic Biology Section

The San Diego Police Department's DNA Laboratory conducted an extensive study of the ability to obtain DNA profiles from both fired and unfired ammunition. The laboratory, using a modified extraction protocol initially developed in the Netherlands was able to demonstrate that a significant number of DNA profiles could be developed from recovered casings. Historically, many laboratories have excluded the DNA analysis of casings recovered at shooting scenes, in part due to concerns that little DNA existed on the evidence, or because the act of firing and heating destroyed or inhibited DNA recovery. We presented the results of a comprehensive study on the ability to obtain DNA from fired and unfired cartridge casings at the Spring 2014 CAC Seminar.

The laboratory has been routinely testing fired casings in both homicides and gang shootings for nearly two years. This presentation will discuss several cases where DNA profiles recovered from casings and searched in CODIS led directly to the prosecution of those involved in the shooting incident. The presentation will also summarize the data obtained during that two year period to include number of cases analyzed, percent success per casing, percent success per case, DNA amounts recovered, and profiling ability either with initially Identifiler and Minifiler and more recently GlobalFiler.

I Had a Case - Analysis of Handwriting and Printer Defects in a Stalking Case

Jane Rodriguez, Questioned Documents Examiner II, LAPD, Forensic Science Examiner, Questioned Documents Unit

The client files of a therapist were stolen and subsequently the clients received both handwritten and machine printed letters stating that the therapist was breaching confidentiality laws. The anonymous sender was seeking to have the therapists license to practice revoked.

Meanwhile, the therapist received threatening text messages on her personal cell phone. She suspected her soon to be ex-husband of sending the letters and texts.

The letters, along with a printer seized from the suspect's residence, were submitted to the LAPD Questioned Documents Unit for analysis. The results of a handwriting analysis showed that it was highly probable that the suspect wrote one of the handwritten letters. There was a correlation between defects present on some of the machine printed letters and defects present on sample print pages from the questioned printer. This correlation served to identify the suspect printer as having produced some version of the machine printed documents.

Richard Ramirez (The Nightstalker) - Before DNA

Gisele LaVigne, Senior Criminalist, Los Angeles County Sheriff's Department, Scientific Services Bureau

The year was 1985 and a series of sexual assaults and murders terrified the residents of Los Angeles and Orange counties by an individual called the Nightstalker. The victims included children, adults and the elderly. He spared the lives of some, while others were killed. The satanic symbol, the pentagram, was also observed at some of the crime scenes. Once law enforcement agencies started sharing information about these crimes, it was determined that he had been as far north as San Francisco. The evidence collected and analyzed in hopes of identifying the Nightstalker included biological fluids, shoe prints and firearms evidence. He was ultimately convicted of 13 murders and sentenced to death.

Michael Jackson Death Investigation

Detective Orlando Martinez, LAPD, Robbery Homicide Division, Robbery Special Section

This presentation will detail the unique circumstances surrounding the death of Michael Jackson, the issues addressed for a successful prosecution and how problems were overcome. This case was unique in the type of toxicology testing performed, the use of outside experts and testing and the cooperation between the California Medical Board, the California Department of Justice and the LAPD.

Implementing 3D technology into Traditional Forensic Firearm Examinations

Heather Seubert, Chief, Firearms/Toolmarks Unit, FBI Laboratory

The Firearms/Toolmarks discipline can be traced back to the early days of the 1920's where early pioneers such as J.H Mathews, Calvin Goddard and James Hatcher were exploring "forensic ballistics". In these early days of researching, many of their methods showed close parallels to the new technol-

ogies that are emerging, relying upon measurements and illumination techniques. And the same question continues to motivate the practitioner to determine whether or not a bullet or cartridge case could be "identified" to a particular firearm. Even before the arrival of the comparison microscope, a match could be determined through the use of a filar micrometer, which was a special device placed at the top of a compound microscope, containing a scale, with a cross hair that moved along the scale. Another method used was the method of interchange, which depended upon an illumination technique and involved a long camera set-up with a short lens.

Now, almost ninety-years later, these very principles of measuring and illumination that highlighted areas on bullets and cartridge cases are being advanced to a level beyond the 2D world. These advancing technologies require the right approach for implementation and almost a strategy map for integration. The Firearms/Toolmarks Unit (FTU) of the FBI Laboratory has been evaluating and validating 3D technologies to enhance an identification conclusion with the desire to establish a qualitative and quantitative threshold which will introduce an objective component to this subjective discipline. Over the past four years, the FTU has acquired many of the advancing technologies available to the forensic science community in an effort to develop methodologies, build collaboration and further the discipline of firearms and toolmarks. The technologies that the FTU has begun evaluating includes the Sensofar Confocal Microscope, the TopMatch Gelsight technology, the Alicona Focus Variation and the EvoFinder. Over the course of this validation journey, the FTU has experienced various challenges.

This presentation will highlight some of those challenges such as gaining acceptance from practicing examiners, fiscal forecasting for support from management, surviving technology hurdles. This presentation will also discuss how to prepare personnel to perform the evaluation and testing of these systems, setting up organized sample databases, preparing samples for testing, maintaining company support, estimating the fiscal projections for the continual maintenance and upgrades, building collaboration, and looking downstream to how the results generated will be articulated in a report of examination. And, finally, how we can prepare for the legal challenges that will accompany the admission of these technologies in a court of law.

Presenting Blue, the LAFD Arson K-9

Gus Gaeta, Investigator, Los Angeles Fire Department, Arson Counter Terrorism Section

Arson K-9 handler, Investigator Gus Gaeta, will demonstrate how the accelerant detection K-9, Blue, works at a fire scene. Following a brief explanation of how the arson K-9s are properly trained and calibrated for detection of accelerants, Blue will demonstrate a search for and identification of accelerants, previously set up within the containers and/or props.

Ramona Gardens Fire Bombing

Robert McLoud, Investigator, Los Angeles Fire Department, Arson Counter Terrorism Division

This presentation will share how the case of the Ramona Gardens Fire Bombing was solved. The uniqueness of this case includes the agencies that were involved, media cover-

age, the location, a reward offered, items of evidence collected and analyzed, all leading to the suspects' capture.

The Brian Banks Story

Brian Banks, National Football League, Officiating Department, Football Operations

From a promising young athlete to a convicted felon imprisoned for crimes uncommitted, Brian Banks' story is one of exasperating hardship, inspiring resiliency and redemption.

A high school football star with his sights set on the NFL, Banks was on his way to accept a full-ride scholarship offer from USC until his dreams were thwarted when he was falsely accused and subsequently convicted of kidnapping and raping a classmate. As a result, Banks served more than five years in prison and another five monitored as a registered sex offender. In 2011, his accuser was recorded admitting to fabricating the charges and with the help of the California Innocence Project, Banks successfully cleared his name, regained his reputation and earned tryouts with several NFL football teams.

Due to his time off the field, his career as a player was short lived, but his career in football was just beginning—Banks was hired by NFL Commissioner Roger Goodell and works in the league's operations department.

Now a prominent activist against wrongful convictions, he has assisted in the exoneration of two wrongfully convicted men and travels to schools, organizations and events across the country to share his story, offer lessons he's learned and advocate for justice for all.

Featured on leading media outlets, including CNN, 60 Minutes and CBS Nation Morning News, Banks' story also caught the attention of Hollywood, and A-list producer, Amy Baer and award-winning director, Lee Daniels are at the helm of a feature film about Banks' life.

Motivated by his powerful motto, Success Is My Revenge, Banks offers deeply personal perspective on redemption, overcoming unimaginable challenges, maintaining a positive outlook and reclaiming one's path in life.

Confession Evidence and It's Relationship to the Forensic Examination

Dan Simon, Richard L. and Maria B. Crutcher Professor of Law & Psychology, USC Gould School of Law and Dept. of Psychology

In some criminal investigations, forensic examiners have been privy to the fact that the suspect had already confessed to the crime. This talk will discuss various aspects relating to such exposure. First, we examine the risk that the exposure to confession evidence might influence the forensic examination. Second, we examine how methods of interrogation bring suspects to confess. In particular, we will discuss the diagnostic potential of the interrogation methods to distinguish between true and false confessions.

Performance Verification of the Crime-lite 82S IR and Camera

Emily Drake BS, Student, California State University, Los Angeles, School of Criminal Justice and Criminalistics, Criminalistics Master's Program

The Crime-lite 82S IR (Foster and Freeman) alternate light source emits infrared light. When combined with an infrared sensitive camera and tablet, the light source may be used to detect and visualize bloodstains on dark surfaces or surfaces that render bloodstains near invisible to the unaided eye. Infrared illumination enhances the contrast between bloodstains and the surface of deposition in circumstances where the background reflects IR light. Under these conditions, background "drop out" causes the surface to appear lighter whereas the bloodstain, which absorbs IR light, appears darker.

For the performance verification study, neat porcine blood was deposited on various porous and non-porous substrates in the form of four different stain types: a drop, smear, contact, or fine spatter. These experiments were also replicated using a diluted blood series (1:2, 1:4, 1:8, 1:16, and 1:32) that was applied to the substrates in the form of a drop stain. This verification involved a comparison of the observations when viewing with the unaided eye under standard visible light versus real-time visualization under IR illumination. The images formed when blood was exposed to IR illumination were captured when the stains were initially deposited and after the stains had dried. The images formed when blood was exposed to visible light were captured using a digital camera once the bloodstains had dried.

The results show that the Crime-lite 82S IR and accessories can aid in the detection and visualization latent blood when there is poor contrast between the bloodstain and the background surface on which it is deposited. In particular, porous substrates performed best when visualizing bloodstains under IR illumination. Although the results of the verification showed that some surfaces fail to "drop out" when exposed to IR illumination, the authors recommend the use of the Crime-lite 82S IR as a search tool to examine surfaces that tend to be difficult to visualize blood.

North Hollywood Shootout

Doreen M. Hudson, Commanding Officer, LAPD, Forensic Science Division

In 1997, the Los Angeles Police Department Crime Lab was under-prepared for the magnitude of a marathon crime scene spread out over a one-square mile perimeter involving multiple casualties, massive media coverage and fear of booby trap devices. Sound familiar? Nevertheless, with strong leadership, empowerment, continual communication and strategic support, the seven teams executed a near flawless crime scene investigation. The external stressors of personal safety, media attention, demand for answers and fatigue were overcome by decisive organization, leadership within teams, well defined roles and crime scene basics. This was the LAPD Crime Lab's ground zero for developing a stronger and better plan for managing mass casualty, large scale and complex crime scenes in the years that followed.

Fundamental Principles of Forensic Science: Letting Go of Individualization

Keith Inman & Norah Rudin, CSUEB, Forensic DNA Consulting

As the new millennium dawned, we proposed our forensic science paradigm, published both in our book, Principles and Practice of Criminalistics, The Profession of Forensic Science, and also in our paper, The Origin of Evidence. Our

scars. Offered, are some techniques to prepare oneself for entry into the career and to hopefully lessen the impact. Anecdotes from experienced criminalists are used to define the potential problems and to illustrate helpful strategies for coping with the stresses of the job.

This presentation is adapted from, *Are You Mentally Prepared for a Career in Forensic Science?*, which was given by the author to incoming forensic science students at Penn State Univ., and inspired by the various essays in the *CAC-News*, 4th Q, 2015.

The Lily Burk Murder Case

Detective Albert Marengo, LAPD, Central Homicide Bureau

On July 24, 2009, at approximately 0600 hours, Lily Burk was found murdered in her automobile in a parking lot of a closed business at 5th Street and Alameda in downtown Los Angeles. No witnesses to the murder were located by the police. The ensuing investigation involved a multi-agency joint effort. The LAPD and LASO Crime Labs played a major role in solving the case in less than 24 hours.

Why Be Ethical?

Jeff Thompson, Criminalistics Laboratory Director, LAPD, Forensic Science Division

Why should a criminalist (or anyone else) behave ethically? While this may seem obvious, this presentation will attempt to present a fresh look at legal and scientific ethics, especially where the two fields overlap – forensic science. No one starts off planning to be unethical (with some unfortunate exceptions), but there are situations that can challenge anyone's sense of what is right and wrong and how to properly act. In addition to real world examples to illustrate potential traps, a more global view will be included. By presenting the latter view, attendees will be provided a perspective to assist them in better assessing the limitations of methods and people, and more effectively recognize when the potential for an ethical lapse is present.

Welby Way Incident

Sergeant II Michael W. Odle, LAPD, Training Division, Firearms and Tactics

The presentation will provide insight into the rescue operation from Sergeant Odle's personal perspective as an entry team member.

Microscopical Evaluation of Catagen and Telogen Human Hairs for nDNA analysis

Faye Springer and Deven Johnson, Sacramento County Laboratory of Forensic Services

Hairs in the catagen and telogen growth phase were evaluated for the likelihood of obtaining nDNA results based on their traditional microscopical appearance and the presence of nuclei following nuclear staining. Transmitted light microscopy, stereo microscopy, polarized light microscopy, and nuclear staining followed by evaluation using transmitted light microscopy were used in the effort. These micro-

scopical results were correlated to the number of detected loci using an EZ1 robot nDNA extraction protocol, nDNA quantitation using Quantifiler Duo kit, and amplification with the AmpF/STR Identifier Plus Kit. An objective criteria was established in determining which catagen and telogen hair roots would be used for nDNA analysis.

Proximal End Root Morphology Characteristics in Antemortem Anagen Head Hairs

Dr. Katherine A. Roberts, Professor, California State University, Los Angeles, School of Criminal Justice and Criminalistics, Criminalistics Master's Program

The proximal end morphology of antemortem anagen head hair was compared with the characteristics documented to occur in postmortem hairs. Antemortem anagen and telogen head hairs (N=967) were recovered following exposure to seven environments. Root morphology characteristics consistent with those reported in postmortem hairs were observed in 66 (14%) hairs exposed to a water, normal saline, outdoor soil, or indoor shower environment. Thirty-three anagen hairs (7%) exhibited a root band at the proximal end. The mean distance from the root tip to the onset of the root band ranged from 0.23 to 0.7mm, depending on the environment. The mean distance from the root tip to the onset of the root band was 0.46mm, with a mean band length of 0.44mm.

Based on the existing reported literature, trained hair examiners must rely on experience and on approximate values to classify root banding in postmortem subjects. However, the results of the study presented here illustrate the need to better characterize postmortem banding through quantitative measurements, including the range for root tip to band distance and the overall band length. Additionally, studies should investigate the underlying cause(s) contributing to the morphological changes observed in decomposing antemortem anagen head hair exposed to different environments.

Additional projects are being investigated and developed by the authors. The findings in this paper should not be taken to suggest that little could be learned from the recognition of possible postmortem root banding in evidence hairs in casework, even given the current state of knowledge. We have shown that banding patterns that might be confused with those resulting from decomposition taking place within the follicle can result from extra follicular decomposition in other environments. However, it is important to note that this only occurs under a very limited number of experimental conditions. Anytime that possible postmortem banding is recognized in evidence hairs, it is imperative that the case context be taken into account in any interpretation offered.

Detection of Bullet v Non-Bullet Damage to Textile Fabrics

Gregory Hogrebe, Student, California State University, Los Angeles, School of Criminal Justice and Criminalistics, Criminalistics Master's Program

This study investigates a methodology to distinguish the damage to textile fabrics that is attributed to the penetration of a bullet or shotgun slug as opposed to the effects of wear, cutting, tearing, and stabbing-related damage. Textile fabrics comprised of 100% natural fibers, 100% synthetic fibers, and a blend of both natural and synthetic fibers were selected as the target material. Initially, each source of fabric material

was subjected to the various forms of damage individually. In addition, the materials were combined by layering each fabric to form a stack, and the damage was repeated. Three different types of ammunition were selected to generate the firearms-related damage: a copper-jacketed bullet (American Eagle 9mm Luger and 45 Auto caliber), a hollow point bullet (Remington 9mm Luger) and a shotgun slug (Winchester Super-X 12 Gauge). Each bullet was fired in triplicate with a muzzle-to-target distance for each of the textile fabrics of 6 feet for the handgun rounds and 30 feet for the shotgun rounds. The firearms-related fabrics were initially examined and photographed using infrared photography, followed by chemical testing with both DTO and sodium rhodizonate. In addition, fibers were recovered from the damaged area for all of the textile fabrics and the morphology was examined with polarized light microscopy. This poster presentation will report and discuss the results of our research findings.

Timing Is Everything: Statute of Limitations Case Study

Lisa Schliebe, Criminalist, LAPD, Forensic Science Division, Serology/DNA Unit; Nancy Nelson, Detective (Ret.), LAPD, Robbery Homicide Division, Sex Crimes Unit; Jane Creighton, Deputy DA, Los Angeles County D.A.s Office, Sex Crimes Division

In November of 1994, one day apart, two young girls were brutally attacked and sexually assaulted on their way to school. Each girl had a sexual assault kit taken and they were able to give a description of their attacker. Two suspects were initially identified. DNA testing proved inconclusive and the case went cold. In 2012, a new request was submitted to re-examine clothing for possible sperm for one of the victims. At first, it seemed the evidence had been destroyed, but following a lucky turn of events, there was evidence to examine and an unknown male profile was obtained. A CODIS hit led investigators to the correct suspect, exonerating the two original suspects. The DDA's office now had the difficult task of finding a charge, within the statute of limitations, that would lead to prison time and sex offender registry of the suspect.

This presentation will show how science and the law were able to work together. By thinking outside of the box, the detective, the crime lab, and the DDA's office were able to bring justice not only to the victims in this case, but to the original suspects that were wrongly accused.

Luke May, cont'd from page 9

May handled over 260 death cases, with nearly three hundred victims. But only eight such cases came after the war. Even before the war, anywhere from a third to half of May's cases involved questioned documents. Afterwards, most of his cases were in that area. Yet May's reputation was such that attorneys sometimes hired him just to intimidate (successfully) their opponents. He was diagnosed with leukemia in September 1964 and died from it on July 11, 1965. Right until near the end, his wife was still turning down requests for his services.

This brief overview cannot do justice to the breadth of May's expertise. Besides all manner of death cases and questioned documents, he handled just about every kind of investigation one can imagine. Some were relatively mundane, like background checks, divorces, burglaries and smuggling. But he also had cases that involved explosions (accidental or bombings), structural collapses, aircraft and ship wrecks, cattle rustling(!) and more.

If a case required some new technique, he studied hard and either improved what was available or developed his own. Thus, May pioneered advances in almost every sub-area of forensic science: wound ballistics, criminalist photography and on and on. Around 1933, he described his techniques in two published manuals, one on field techniques, the other on the overall investigative process. Two men he trained, J. Clark Sellers and John L. Harris, went on to successful careers in California, and were Charter Members of the American Society of Questioned Document Examiners.

Primary References:

- Hawley, J. (1930) *History of Idaho: The Gem of the Mountains*, Chicago: The S. J. Clarke Publishing Company.
- May, L. (1970). *Luke S. May Papers*, Seattle: University of Washington Special Collections.
- May, L. (1936). *Crime's Nemesis*. New York: Macmillan.
- Newell, E. (1937, May 11). State Police: Organization, Functions and Cost of Such a Force in New Hampshire. *Union-Leader*. Manchester, New Hampshire.
- Saunders, G. (1987). Fiftieth Anniversary of the Crime Detection Laboratories, 1937-1987. *RCMP Gazette*, 49(11).
- State v. Clark, 156 Wash. 543, 287, Pac. 18 (1930).
- Theoharis, A. (ed.), (1999) *The FBI: A Comprehensive Reference Guide*, Phoenix, Arizona: The Oryx Press.

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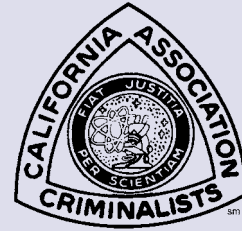


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