

The President's Desk

Something for Every Member

I just want to start my year as President by stating what an honor it is to follow some of the great names in criminalistics. I look at the signatures on the coconut and see people who have influenced me in the field, people with whom I have gone to school or worked, the authors of many papers and developers of analytical methods, and people I have spent time with at conferences, meetings, and training classes. I hope to carry on the tradition with the energy and commitment needed to follow in their footsteps. I want to thank Pennie Laferty and Ray Davis for leaving the presidency in good shape and the organization running smoothly. I must also thank Dean Gialamas for his contributions and leadership as our treasurer these last two years. I believe his knowledge of financial matters and guidance in changes we made will impact us in a very positive way in the years to come. Lastly, those that attended the Oakland meeting have to thank the Oakland Police Department staff for their hard work in putting on a successful meeting. Tom Abercrombie, the most active non-CAC member, and Brian Karp were in the forefront but I know the rest of Mary Gibbons' staff contributed to the success of this meeting.

This year I intend to challenge you with my messages. My intent is to encourage conversation and action. Where are we and where are we headed in our profession. The four topics I will address will be participation in the CAC, quality assurance/accreditation issues, analysis of samples for which there is no interpretation or the interpretation can be misconstrued (gunshot primer residue on clothing or cars, for instance), and leadership in the field. In the future I hope to stimulate discussion and responses in favor or against my opinions, in the *CACNews*.

Participation in the CAC

I find it very disturbing that we have not been able to find more than one person willing to take on the tasks of president-elect the past two years. I want to encourage *ALL* members of this association to begin the process of learning about the CAC. The best way is to begin small, become a committee member on a larger committee, then take an elected board job or move your committee membership to one of the more difficult committees.

I will outline a good method for learning about the association before you take on the task of president-elect. This is a path that one can take to becoming comfortable enough to become president (you must have served on the board to be eligible for president-elect). Start on a committee like Training and Resources or the Awards Committee. These are larger committees that will get busy only periodically with the work spread out among the committee members. A good way to learn a board member's job is to volunteer to help a board member who is in your lab or a neighboring lab. For example the treasurer's job has an assistant position that helps with the dues collection and tracking. The nominating committee is an excellent way to get started allowing you to learn the names of members. The Southern or Northern Regional Directors jobs are not time intensive if you are organized. These are two excellent ways to be introduced to the Board of Directors.

The next committees can get very busy during certain times of the year but they also provide incredible insight into this organization. They are the Endowment, the Financial Review, and the Ethics Committees. Other committees that probably require a little experience or at least specialized experience include the ABC, By-laws, Historical, and Merchandise Committees. Some of these committees are multi-year commitments and vary in the times they get busy.

Please turn to page 26

I find it very disturbing that we have not been able to find more than one person willing to take on the tasks of president-elect the past two years.



Jim Stam CAC President

Third Quarter 2005



On the cover...

The pride of federal, state and local law enforcement, these patches symbolize the services performed by our nation's crime laboratories. Send us your own lab's patch for display in a future issue of the News!



C O N T E N T S

- 2 President's Desk Jim Stam
- 4 CACBits / Announcements
- 6 Shooting Reconstruction Course
- 7 Editorial Secretary Ron Nichols
- 8 Feedback Letters to the Editor
- 9 Oakland Two Thousand Five Shots from the Seminar
- 18 Seminar Abstracts Oakland Spring 2005
- 28 Proceedings of Lunch Norah Rudin & Keith Inman
- 34 Identification of a Non-Operable Firearm to Bullets and Cartridge Cases from a Homicide Fourteen Years Prior Ron Nichols

PUBLICATION STAFF

Art Director John Houde/Calico Press,LLC (206) 855-1903 john@calicopress.com Editorial Secretary **Ron Nichols** (925) 280-3623 ronald.nichols@atf.gov

Technical Jennifer Shen (619) 531-2655 jshen@pd.sandiego.gov

Webmaster **Mark Traughber** 909-361-5000 mark.traughber@doj.ca.gov Advertising Vincent Deitchman (510) 238-3386 vdeitchman@oaklandnet.com

The CACNews, ISSN 1525-3090, is published quarterly (January, April, July, and October) by the California Association of Criminalists (CAC), Editorial Secretary, c/o Bureau Alcohol, Tobacco and Firearms, 355 N. Wiget Lane, Walnut Creek, CA 94598-2413, (925) 280-3623, ronald.nichols@atf.gov. The CAC is a private foundation dedicated to the furtherance of forensic science in both the public and private sectors. **Nonmember subscriptions** are available for \$16 domestic, \$20USD foreign—contact the editorial secretary for more information. Please direct editorial correspondence and requests for reprints to the editorial secretary.

©2005 The California Association of Criminalists, All Rights Reserved.

Notice to Contributors: We publish material of interest to our readers and are pleased to receive manuscripts from potential authors. Meetings and course announcements, employment opportunities, etc. are also solicited. Advertisements are also accepted, although a fee is charged for their inclusion in *The CACNews*. Please contact the advertising editor for further information. Because of the computerized typesetting employed in *The CACNews*, submissions should be made in the form of MS-DOS compatible files on 3.5 inch floppy disks or by e-mail (ronald.nichols@atf.gov). Text files from word processors should be saved as ASCII files without formatting codes, e.g. bold, italic, etc. An accompanying hardcopy of the file should be submitted along with the disk. Graphics, sketches, photographs, etc. may also be placed into articles. Please contact the editorial secretary for details. The deadlines for submissions are: December 1, March 1, June 1 and September 1.

CACBits • Section News

Crime Scene Study Group Request for Participation

CAC South Crime Scene Chair, Mark Traughber asks:

I'd like to help put together the Crime Scene study group again. If you're interested, read on. If not, you can hit delete.

What I have in mind is to meet on our own, not with the luncheon meeting, and meet in a central location (like Orange County) around lunch time.

- ---No high priced, dry chicken lunches. You buy your own dry chicken for less. ---No long commute time... traffic minimal during commute to/from meeting
- which would be approx 10AM/2PM. —You won't be leaving your home earlier than usual or getting home late,
- most likely. Good for day care people. —You won't have to decide which study group to attend if 'Crime Scene' is at the same time as another, desirable group.

Some stipulations are that, since I'm not Mr. CSI (in fact the reason I'm doing this is because I can use some help) this will not be the Mark Traughber show. I'm thinking of something like the successful 'Bring Your Own Slides' concept from CLIC (Clandestine Laboratory Investigating Chemists). Just a painless presentation of anything interesting or useful from your crime scenes, by you. Major screw-ups are also welcome but keep it as a learning tool and use your discretion with non adjudicated cases. I'm sure some CAC member will be quick to inform me about something I'm not including here, but whatever it is we can work it out. Many people also can use help with blood spatter, trajectory, which pocket protector works at scenes, and even the concept of a control.

Homicide calls can be easy or they can require knowledge in every area of criminalistics as well as ability to use common sense. The current trend to specialization isn't helping matters, and they don't teach common sense in college.

Please email me (mark.traughber@doj.ca.gov) if you're interested. Although these meetings will require the presence of active homicide people, I hope we also see those who are interested or will one day be involved. This is a concept missed by (some) management called 'training'.

The last point here is that if I don't receive enough emails, this idea (and study group, for now) will be as dead as...

IABPA Bloodspatter Training Conference

The International Association of Bloodspatter Pattern Analysts is having their 2005 training conference at the Santa Barbara Radisson Hotel, October 5-7, 2005. More information may be found at www.iabpa.org.

Yahoo Forensic Science Group Active

Visit the Yahoo group dedicated to the discussion of forensic science issues: http://groups.yahoo.com/group/forensic-science

To subscribe send a blank e-mail to:

forensic-science-subscribe@yahoogroups.com

To unsubscribe send a blank e-mail to:

forensic-science-unsubscribe@yahoogroups.com

CAC Southern Director's Report

A luncheon study group meeting was sponsored by DOJ Riverside on March 23, 2005. The meeting was held at Indian Hills Gulf Club and about 50 people attended. There was a net loss of about \$50.00. The study groups that met were Trace, Alcohol, CSI, and DNA. The guest speakers were Dr.'s Andy Shen and Mike Breeding from the Gemological Institute of America. Their talk was titled "Behind the Fancy Colors of Gems, Rubies, and Sapphires-Treated or Natural?"

We have had some study group chair changes. Wayne Moorehead resigned as Chair of the Trace Study Group and is running for Southern Director. Mel Kong from San Diego has volunteered to chair the group. Carolyn Gannett resigned as Chair of the Crime Scene Investigation Study Group. Mark Traughber has volunteered to chair this group.

The QA Study Group is now being chaired by Erin Trujillo. The QA group conducted quality system audits at Orange County in March and San Bernardino in April. They have a quality system audit scheduled for Ventura in May.

CAC will be giving out some recognition for those folks who are or who have served as study group chairs for a significant period of time. We thank those folks for their commitment and contributions that help CAC be a successful organization.

I am resigning my position as Southern Director and am running for the Office of President Elect. Thank you to all those folks who helped me and put up with my cajoling to be the next luncheon hosting lab.

> —John Simms Regional Director, South



Your CAC Board of Directors hard at work sorting through reams of information, so you don't have to!

Jobs • Meetings • Courses



With fire in his eyes, CAC member Dr. John DeHaan explains a demonstration on National Geographic Channel's "Is it Real? Spontaneous Human Combustion," which aired April 24, 2005.

CRIMINALIST III

(Senior Trace Evidence Examiner)

Salary: \$3,691 per month.

The Honolulu Police Department located in Honolulu, Hawaii, is seeking qualified, experienced candidates for a laboratory examiner position in the Trace Evidence Unit of the Scientific Investigation Section. This unit is responsible for examination of the following major evidence categories: gunshot residue, hair & fibers, fire debris (arson), paint, glass, explosives, and elemental analysis. This position requires previous experience and must be able to perform as a senior worker, technical expert and advisor in the analysis of difficult and complex physical, chemical, instrumental and microscopic analyses involving a broad spectrum of forensic evidence. The examiner must be able to interpret and evaluate examination results, prepare formal laboratory reports and testify as an expert witness in legal proceedings. The purpose of this announcement is to develop a pool of interested, qualified candidates to fill the vacant position.

For complete requirements call the City and County of Honolulu Department of Human Resources at (808) 523-4301 or visit: http://www.honolulu.gov/hr.

Laboratory inquiries may be directed to the Honolulu Police Department Scientific Investigation Section at (808) 529-3281.

CAC Northern Director's Report

The Alameda County Crime Lab hosted a dinner meeting on March 3, 2005 at the Office of Emergency Services in Dublin. The dinner was catered by Tony Roma's. Ann Keeler and Michelle Dilbeck were the meeting coordinators.

The guest speaker for the dinner meeting was Dr. G Reiber. Dr. Reiber gave a great presentation on the Heizer Homicide Case, a bizarre serial homicide case in Contra Costa County. Ninety-seven individuals attended the dinner meeting and there was a profit of \$18.30.

Prior to the dinner meeting the following study groups met: DNA, Firearms, Drugs.

The DNA Study Group had thirty-five individuals in attendance. The following topics were discussed at the study group meeting: Real time PCR at the CA DOJ, the Santa Clara County Crime Lab's DNA profile index program, Prop 69 implementation and databank issues, and SWGDAM meeting updates.

The Firearms Study Group had thirty-four individuals in attendance. In the morning the group held a bullet path reconstruction workshop. In the afternoon, the following topics were discussed: Gunshot proximity testing, firearms and toolmark identifications, bunter marks, the Woodin laboratory tour, the Sturm Ruger factory tour, the Ruger barrel paradox and the Shot Show. There was also a demonstration of a new comparison microscope.

The Drug Study Group had ten individuals in attendance. Dr. Timothy Smith gave a presentation on the abuse and chemistry of steroids, and discussed how they are obtained.

The next dinner meeting will be hosted by Peter Barnett and Forensic Science Associates. There is a speaker lined up for this meeting, however a date has not yet been set.

—Linda Abuan Regional Director, North



CAC Members Bob Blackledge and Lucien Haag along with James Roberts worked on a poster recently along with presenter Susanna Rudy, a forensic nurse. The subject of the poster (see photo) was how characteristic markings in a victim's chest might be caused by emergency resuscitation using an "intraosseous injector" rather than from some less benign source.

Shooting Reconstruction Training Course Offered

October 17-21, 2005 GUNSITE TRAINING ACADEMY Paulden, AZ

Michael G. Haag / Lucien C. Haag - Instructors

This is the third 5-day intensive training course by these instructors. It is intended for forensic scientists and crime scene investigators who investigate shooting incidents or process shooting scenes.

This course will again be held at the famous *Gunsite Training Academy* near Prescott, Arizona and will provide the participants with both a theoretical basis as well as practical experience in evaluating and reconstructing a wide variety of shooting incidents.

The proper use of various tools, equipment and reagents necessary for the reconstruction of shooting incidents will also be covered during this 40-hour course.

Firsthand experience into the nature of many terminally







ballistic issues such as bullet penetration, perforation, destabilization, deflection, velocity loss, deformation and projectile ricochet will be demonstrated with a variety of common 'target' materials such as tissue simulants, rubber, glass, sheet metal, wood, drywall, soil, cinder blocks and concrete. The use of lasers and photography of laser trajectories are included in this course.

Trace evidence considerations at projectile impact sites and on recovered projectiles will also be demonstrated as well as the proper interpretation of the impact sites and the trace evidence materials generated during these impactive events.

Various methods and experimental designs for empirical testing of actual case situations will be demonstrated during this course.

This training program includes an illustrated syllabus for each participant, classroom lectures with accompanying PowerPoint presentations in one of *Gunsite's* modern classrooms and daily live-fire demonstrations on a special range set up for this purpose. The shooting portion of this course will be followed by firsthand examination of the target materials and recovered projectiles. Methods for documenting results and court presentation are also included in this comprehensive program.

The course will conclude with a written examination along with a Certificate of Completion from the instructors.

Class size will be limited to 25 attendees with enrollment approved by the instructors. Further information regarding this training program, registration forms, cost and the special lodging arrangements associated with this special course can be obtained from Mike or Kim Haag though their website at www.forensicfirearms.com and Email address of mhaag@forensicfirearms.com

Do *not* contact the Gunsite Academy for registration or lodging questions. Use the contact sites listed above.

Notes: The incident angles were -10 degrees for the hard stone and ca. -9 degrees for the 5/8" sheetrock. As you can see I was just at, and then slightly below, the critical angle for the one series of shots into sheetrock. The slightly steeper strikes penetrated the sheetrock but the last, slightly shallower one ricocheted at a very high departure angle. These photos were taken with a Nikon D100, open shutter and a sound-activated fill-flash on a mount to my rightrear. The ammunition was Hornady Vector 115-gr. 9mm FMJ-RN These mini-tracers use a fine zirconium wire in the core to produce a bright, white trace for about 1.5 seconds of flight.

Decisions, Decisions

Time to ponder the great scientific questions of the modern era...

First a little background. In *Back to the Future*, Michael J. Fox played a high school senior who traveled back in time and saw his own future begin to be erased in a photograph because he messed with the time-space continuum. The question I pose is if someone does travel back in time and permanently disrupts their own time-space continuum, will they actually ever exist to go back in time to disrupt it in the first place? And, as a follow-up, if the continuum is therefore not disrupted because they never existed in the first place did they not exist because they disrupted their own continuum? And, if this is the case, didn't they have to exist to disrupt it so they wouldn't exist?

Next stop – the big bang theory.

Thinking to a logical conclusion...

If Anakin had actually decided to take out the Chancellor when he had a chance (or if someone actually died when a lightsaber cut off both their legs and they burst into flames), then there would have been no evil Republic. No evil Republic, then no *Star Wars IV*. No *Star Wars IV*, then no *Star Wars I*, *II*, or *III* because it was *IV* that prompted the need for *I*, *II*, and *III*. Anybody else, aside from me, that is getting a headache?

Becoming the ever less necessary Giants update...

Speaking of headaches...

Out of nowhere...

When everyday decisions become a lifestyle. Morning coffee is black. No cream, no sugar, no decisions about whole milk, low-fat, non-fat, decaffeinated, caffeine, cold, hot, foam, no foam.

Advancement throughout the years...

Instruments and software are becoming so high-tech that it does not take much to actually introduce a sample and get some very good analytical results. Highly detailed operating procedures are increasingly being touted as examples of excellent quality assurance. LIMS systems becoming so user friendly that reports of results are standardized so that the laboratory is consistent in the way everyone reports results. Eh...that's okay. No need to clutter the day with making decisions.

On a more serious, but related note...

At one time I had a huge collection of war games. These were the games that actually had a board and not a controller. The armies were represented by cardboard counters or, sometimes, plastic miniatures and not realistic, fully-clad and armed video graphic representations of a single soldier leading a squad of men to take the next hill. I recall having some time on my hands one afternoon and gazing into the closet trying to decide which one to play. By the time I actually made the decision, it was too late to play!

Decisions are tough. In fact, some advertising companies tout particular items or products as taking the decision-making out of the process. Many people would think this is good because they simply do not like making decisions. I would tend to look askance at such a proposal because my first thought would be that the item or product is such that if someone were to make a decision, they would not get it. In fact, had the companies not removed the decision making process, no one would ever purchase it!

Decisions can be time-consuming. Research is important to make informed decisions. Counsel is recommended for wise decisions. Some decisions require other things to be put into place first such as securing a home loan. Some decisions require planning for an unknown future and assessing many potential variables that could come into play.

Routine decisions turn into lifestyle choices. In case you were wondering my morning coffee is black and has caffeine. Depending on what I am doing and how I am feeling during the remainder of the day, it could be something else. Not so in the morning. Not my mornings.

How about the decisions that one never faces. One reason for such would be avoidance. I would not recommend this technique. Rarely helpful, it usually leads to some pretty negative consequences. On the other hand, avoidance of a decision is actually a decision in itself—a decision to actually avoid the decision.

Another reason that one may never face a decision is because someone does not pose an opportunity to make a decision. Well, to get those oft-heard excuses out of the way, your CAC needs you! Young and old there are committees on which to serve and office positions to hold. There is a magazine to contribute to and an association in need of individuals to step to the front and do even the little things. There, make a decision. No excuse, the opportunity has been made.

How about those decisions that we put off until tomorrow? My best friend of the past 15 years passed away from an unexpected heart attack on New Year's morning. He was to turn 44 this past May. Another friend who was about to turn 44 in September passed away a few weeks ago, another unexpected heart attack. Sometimes, tomorrow does not come. I wonder what decisions each of my best friends put off, only to have never made.



Ron Nichols CAC Editorial Secretary

How about the decision that is related to the opportunity of a lifetime? You know these decisions. They truly are those opportunities that pop up once in a lifetime. They are so rare, so unique and have such a potential for life-change that we are almost paralyzed from making a choice. Others debate the possibilities to death feeling that they have a whole lifetime to make the choice.

Well, I would like you to consider something a friend shared. "The opportunity of a lifetime has to be seized within the lifetime of the opportunity"¹. No opportunity lasts forever. That dream house will eventually be bought. That job opportunity has a filing deadline. Someone willing to take the risk will eventually seize that business venture that was offered. Unlike our casework, opportunities of a lifetime do not build up in a backlog until we can get to them.

In a life filled with potential opportunities I am certain you are wondering what sets these opportunities apart from the rest. Well, I am glad you were wondering that because it leads into what I was going to discuss next. I do so enjoy when I am right in tune with what the reader is thinking.

Probably the biggest characteristic of an opportunity of a lifetime is that it should scare you! The potential obstacles will look insurmountable. When you think of all the possibilities that this opportunity could mean, you should feel overwhelmed. Opportunities that come along once in a lifetime should be so great and fantastic that they are what dreams are made of. In fact, I would suggest that if you look at the oppor-

Avoidance of a decision is actually a decision in itself—a decision to avoid the decision.

tunity and, while it looks great, you have no immediate idea on how you would accomplish it alone, it is likely an opportunity of a lifetime.

Another characteristic of an opportunity of a lifetime is sacrifice. Anything that is worth something should cost something. Otherwise, it is not appreciated. When growing up, children usually see owning a car as an opportunity of a lifetime. When they finally own one, at some significant cost to themselves, it is treated as that opportunity of a lifetime. Sometimes I wonder if we do a disservice to our own children, mine included, when they are given so much simply because we want them to have opportunities we did not. Appreciation comes with sacrifice, or, put another way, sacrifice will help us to appreciate a bit better.

Please turn to page 27

F E E D B A C K

Distinguished Member Award Acceptance Speech

It's such an honor to be chosen to receive the 2004 Anthony Longhetti Distinguished Member award for many reasons.

First, because this award is named in honor of a man I respected and admired. I'm so proud to have known Tony, and only wish I could have known him better.

Second, when I look at the names of the folks who received this award, I'm humbled. These are people I looked up to my whole professional life. To borrow one of Raymond Davis' favorite quotes, "If I have seen farther, it's because I stand on the shoulders of giants." But I haven't seen farther, I've just been given an opportunity to shine, courtesy of the CAC.

And the third reason I will always cherish this award is because criminalistics is in my blood. Long before it was fashionable to do so, my dad took me to work. At the tender age of about 8, he took me to the crime lab at San Mateo Sheriff's Office in Redwood City, where he was a photographer. The year was about 1965. Oh man, what fun that was. It infected me completely. That year and in subsequent years I got to make a nuisance of myself to the likes of CAC founder Don Harding, Cecil Hider (who would later become my boss at DOJ Santa Barbara), Paul Dougherty and Steve McJunkins. I was bit by the bug very early on and the passion for forensic science never abated.

Finally, some thank-yous are in order: First to Pennie and the members of the CAC board of directors for choosing me for this award. To Kevin Andera and the members of the Awards committee for the nice write-up in the newsletter. And to the member who nominated me—whoever you are—thank you! Also to my wife, Donna who, in the early days of the CACNews, put up with my taking over the living room rug to spread out the page proofs. And thank you to my dad, who took his son to work, that day and many days.

Most of all, I want leave you with this: Criminalistics has a "heart" and that heart is the CAC. A big thank you to *you*, my friends and colleagues for supporting me over the course of my career.

-John Houde

A Chance to Say Thank You

I did not get the opportunity to say thanks and goodbye at the last CAC banquet in Oakland. So I will take that opportunity now. It was an honor to serve at the executive level on the Board of Directors and a privilege to work with so many bright and talented people. I want to say thanks to all the members who served on committees often working in anonymity and without praise. Thank you. Your efforts do not go unappreciated or unnoticed.

The strength of our organization depends on its members to step forward and use their talents in a variety of ways. I encourage those who have not yet participated to step forward and not wait to be asked. We need you.

A special thanks to the staff at the Oakland Police Department Crime Laboratory for conducting a fun and successful seminar. I will be in Sweden by the time you read this running in the Stockholm Marathon and getting my novel published there. Hej så länge.

-Raymond Davis

OAKLAND SPRING TWO THOUSAND FIVE

Perfect weather and a full schedule of events came together to make the Oakland CAC Spring Seminar a success! Attendees participated in workshops covering crime scene processing, interviewing techniques, microcrystal testing, relational leadership, and DNA robotics. The rest of the week was filled with topical papers covering just about every area of forensic science. (See the abstracts elsewhere in this issue for details.) At the banquet, a quiet dinner was interrupted by a series of murders, investigated noisily by an ersatz detective who enlisted the aid of everyone present. By dessert, the mystery was solved and everyone went home satisfied.



















Following Tuesday's workshops came the general session. Attendees were welcomed by Oakland Police Chief Wayne Tucker and Crime Lab Manager Mary Gibbons.





























ABSTRACTS

FROM THE SPRING 2005 CAC SEMINAR OAKLAND

A Novel Method of Screening for Human Male DNA in Forensic Samples

Jaiprakash G. Shewale, Elaine Schneida¹, Jerilyn A. Walker², Mark A. Batzer² and Sudhir K. Sinha^{*1}

¹ReliaGene Technologies, Inc., 5525 Mounes St., Suite 101, New Orleans, LA 70123, USA. ²Department of Biological Sciences, Biological Computation and Visualization Center, Louisiana State University, 202 Life Sciences Building, Baton Rouge, LA 70803, USA.

Screening of sexual assault evidence samples for the presence of sperm or semen is generally the first step in forensic DNA analysis. For this study, a total of 887 sexual assault cases were screened by using p30, AP and microscopy methods. The failure rate for obtaining a male profile from p30 positive, microscopic positive and p30 and microscopic positive cases was 58, 45 and 17%, respectively. Thus, currently used methods of screening provide false positive results. In addition, these screening tools are not targeted to detect the presence of male DNA. As a result many evidence samples containing tissue or body fluids other than semen cannot be screened using these methods. Thus, there is a need for a sensitive, reliable and high throughput screening method for the detection of male DNA in forensic samples.

We have developed a novel screening system, Y-Screen, for the detection of male DNA in forensic samples. The method is based on PCR amplification of Alu insertions fixed within the Y chromosome. The Alu family of interspersed repeats is the most successful of the mobile genetic elements within primate genomes, having amplified to a copy number of greater than 1,000,000 per haploid genome. Alu repeats are unique nuclear markers that are ideally suited for human identity testing. Individual Alu repeats are approximately 300 bp in length and are thought to be derived from the 7SL RNA gene. This approach eliminates false positive results obtained from degraded DNA, a draw back of currently available DNA quantitation methods based on real-time PCR. Using the Y-Screen assay, it is possible to detect as little as 5 pg of male DNA. Avian DNA is incorporated as an internal control to monitor the presence of PCR inhibitors in the extract. The protocol is designed to consume less than 10% of the evidence sample. Screening assay can be performed using a 96 well format to facilitate high-throughput screening. The utility of the Y-Screen assay in forensic DNA analysis will be discussed.

Mitochondrial DNA Analysis of Aged Siblings and Longitudinal Samples

Jessica Wijbenga, BSc.^{*1,2} and Cassandra D. Calloway, MSc.^{1,3}

¹ Roche Molecular Systems, Alameda, California ² Utrecht University, Utrecht, the Netherlands, ³ University of California, Berkeley, California.

When nuclear DNA analysis fails or is not appropriate, mitochondrial DNA (mtDNA) can be analyzed to obtain forensic information for crime scene cases. High copy number and high degree of sequence variation allow for the analysis of even degraded DNA samples. Also since mtDNA is maternally inherited, it allows for an expanded number of reference samples in missing persons cases. However, heteroplasmy (presence of both wild-type and mutant mtDNA's within a cell) can occur during life and result in differences between maternally related individuals. Heteroplasmy has been reported to increase with age and to occur at certain positions more frequently. Heteroplasmy may be inherited maternally or result from a somatic mutation.

To further characterize heteroplasmy, we typed the hypervariable regions I (HVI) and II (HVII) in lymphoblasts (n=45 samples) collected from aged sib-pairs (SP) and fibroblasts (n=89 samples) from the National Institute of Aging Cell Repository Longitudinal Study (LS). The SP study consisted of 15 families with an individual and at least one sibling. For the LS study, biopsies were collected from individuals two or more times throughout life.

Samples were typed using the Linear Array Mitochondrial DNA HVI/II Region-Sequence Typing Kit from Roche Applied Science. This linear array allowed us to rapidly screen 134 DNA samples from 78 individuals. In addition, we screened the samples for heteroplasmy at position 414 in HVII using a SSO-probe. Previous studies showed that this mutation occurs more frequent in older individuals. Since many forensic laboratories use a reverse HVII primer that contains the mutation site (T414G), we investigated this site to determine whether the mutation could influence the PCR yield and thus the typing/sequencing results.

Heteroplasmy was observed in two of the LS individuals for region HVI (at position 16093) and in four of the LS individuals for region HVII (position 146, 152, 189 and 195). Three individuals showed an occurrence of the heteroplasmy at an older age, but this heteroplasmy could not be detected at a younger age. These data suggest that the heteroplasmy is a result of a mutational event rather than inherited. Interestingly, one individual was heteroplasmic at position 146 at age 36 but not at age 51. Heteroplasmy was observed at position 16304 in one individual of the SP study, but was not observed in the sibling's sample. This finding suggests that the mutated mtDNA is not inherited from the mother.

Heteroplasmy was detected at position 414 in eight LS individuals. The presence of mutant mtDNA reached up to 75% of mtDNA. Another individual had a complete transversion from a T to G at the age of 79 but this mutation was not de-

tected at ages 73 and 85. Of note, there was no detectable heteroplasmy of the 414 position in lymphoblasts. In total, there were 19 occurrences of heteroplasmy in 89 fibroblast samples versus one occurrence in 45 lymphoblast samples. This data suggests that the occurrence of heteroplasmy is more prominent in skin cells. Heteroplasmy at position 414 or even the T414G mutation does not affect binding of the HVII reverse primer.

The analysis of mtDNA can be very useful in forensic cases. Important is that criminalists realize that heteroplasmy can have an impact on mtDNA typing or sequencing, especially in cases when older individuals or skin cells are involved.

Wrongfully Convicted—the Clue "SAVING RAY KRONE"

Christopher J. Plourd, J.D.

The goal of this presentation is to demonstrate that innocent people can be convicted of serious crimes because of crime laboratory errors and omissions. This is a serious problem. The educational objective of this presentation is to identify common errors in forensic scientific investigations and suggest strategies for improving objectivity in crime laboratory analysis. The attendee will be able to understand the need for caution in reaching a conclusion.

The problem of innocent people being convicted and unjustly imprisoned for crimes they did not commit is a growing national concern which has been receiving public acknowledgment by politicians and is catching the attention of the general public. Advances in DNA identity testing have exonerated a number of innocent people. Some exoneration cases involve crime laboratory errors relating to trace and biological evidence.

Ray Krone was the 100th person convicted of and sentenced to death for a capital murder to walk free from prison since the reinstatement of the death penalty in the United States. Ray Krone had maintained his innocence throughout his incarceration. Ray Krone was sentenced to death in 1992 for the brutal murder of Kim Ancona, a Phoenix bar manager. Krone spent three years on Arizona's death row before his death sentence and conviction was overturned. Krone was then retried and convicted a second time and sentenced to life in prison in 1996. Ray Krone, who had been branded as the "snaggletooth killer," was proved innocent of the murder of Kim Ancona by Post Conviction STR DNA testing in 2002. After being cleared by DNA, Ray Krone walked out of an Arizona State Prison a free man after 10 years.

The murdered bar manager, Kim Ancona, had been cleaning the CBS Lounge in Phoenix, Arizona on the evening of December 28, 1991. Her naked body was found in the men's restroom the following morning. She had been stabbed eleven times. An examination of the body revealed that she had been bitten on the left breast. There were unidentified shoe impressions, fingerprints, and hairs. Other evidence indicated she had been sexually assaulted. There was blood at the crime scene and on the victims clothing. The blood was typed as ABO Type O, the same as Ancona, Krone, and some 43% of the population. Forensic DNA technology available at the time of the 1992 prosecution (DQ alpha) did not identify the blood or saliva of the perpetrator. Crime Laboratory errors occurred in 1992 that caused a misinterpretation of the blood and saliva evidence. This same evidence, with use of STR PCR DNA testing, would expose these errors in 2002.

Ray Krone was a United States postal letter carrier who had no criminal record and had been honorably discharged from the U.S. Air Force. He knew the victim, as he had socialized with her and had been a customer of the CBS Lounge. There was little evidence that tied Krone to the killing except for evidence of a bitemark on the victim's breast, which an American Board of Forensic Odontology (ABFO), Board Certified Forensic Odontologist said positively, (better than a fingerprint) matched the dentition of Ray Krone. Despite evidence of his innocence presented at both of Krone's trials, the State's circumstantial evidence bolstered by the forensic bitemark evidence convicted Krone. This bitemark evidence was controversial and disputed by other ABFO Board Certified forensic experts.

After Krone's appeals were exhausted following his second conviction Krone sought post-conviction DNA testing. Krone's lawyers asked that the victim's tank top, through which the bitemark may have been inflicted, be examined for saliva DNA analysis. Not only was saliva found, but the results of testing showed that neither Krone nor the victim Ancona could have been the genetic source of the saliva. Comparison of the genetic profile of the saliva donor against the FBI Combined DNA Index System (CODIS) database associated the DNA evidence with a 36- year old inmate of the Florence, Arizona State prison. The inmate was Kenneth Phillips, who had been convicted of child molestation after the date of the Ancona murder.

The Krone case is clear proof, again, of the power of DNA. Not only did the DNA test show that Ray Krone was excluded as the perpetrator, it also identified a different individual who was already incarcerated in the penitentiary for an unrelated sex crime. The odds were 1.3 quadrillion to one that Kenneth Phillips was the contributor of the saliva DNA found on Kim Anconas' tank top. After the saliva DNA matched Phillips, his hair was found to be consistent with evidence hairs found on the victim's body. Phillips confessed to being present at the time of the murder of Ancona in a tape recorded interview. Phillips' blood was genetically identified on the inside and outside of the victim's jeans and underwear. Phillips' fingerprints were found in the men's room of the CBS lounge where Kim Ancona's body was found.

The Krone case is another in a growing number of cases where crime laboratory testing has been shown to be erroneous. Lessons can be learned from the Krone case. An independent scientific technical working group of forensic scientists should be formed to objectively study exoneration cases.

Disclosure: A Legal Obligation, a Professional Requirement, and a Scientific Responsibility

Peter D. Barnett, Forensic Science Associates, 3053 Research Dr., Richmond CA 94806

The product of a scientific inquiry is an opinion. The expression of a scientific opinion, most often made in a written communication of some type, must include the scientific facts (data) upon which the opinion is based, it must be capable of review by other knowledgeable scientists, and must explicitly answer a question that is of interest in the inquiry being made. Neither the facts nor the opinion, standing alone, are of much value. It is only in their combination, and their ability to provide an answer to a relevant question, that the work of the scientist provides information on which decisions can be based. The communications of forensic scientists frequently fall short of accepted legal requirements, professional responsibilities, and accepted scientific practice. To the extent that accepted laboratory practices fail to satisfy the legal, professional or scientific requirements for disclosure, we must examine our practices and change them to conform our practices to what is legally required, professionally mandated, and scientifically acceptable.

Requirements for disclosure do not simply mean that a forensic scientist has to provide, when requested, bench notes, proficiency test results, laboratory procedure manuals, and the like. The disclosure requirements mandate that the scientist disclose what was known to him before any work started, what information was obtained, from any source, as the investigation progressed, what questions were being addressed by the work that was being done, the thought process that resulted in the particular work that was undertaken, , and the conclusions and opinions of the scientist. How those opinions will be presented in court, what visual aides may be used, and what exhibits might be presented to the jury must also be part of the disclosure obligation.

Legal requirements for disclosure are set forth in the Federal Rule of Civil Procedure Rule 26, California Penal Code Section 1054 (which codifies Proposition 115 which was enacted by California voters), and various judicial rulings. Professional responsibilities are set forth in the CAC Code of Ethics, the ABC Rules of Professional Conduct, ASTM Standard Practice for Reporting Opinions of Technical Experts (E620-97), and a current ASCLD/LAB proposed accreditation requirement ("Proposal 22"). Scientific practices are set forth in books (e.g., Robert A. Day, How to Write and Publish a Scientific Paper), authors' instructions for various journals, and established practice. The legal, professional and scientific disclosure obligations will be discussed in the context of situations in which one or more of these obligations was not met by the work that was done, the report that was published, or the testimony that was given. Repercussions of the failure to satisfy disclosure obligations will be described.

Something from Nothing [S&N]: The DNA Analysis of Handgun Swabs at Cellmark In *U.S. vs. Williams*

Edward T. Blake^{*} and Alan Keel, Forensic Science Associates, 3053 Research Drive, Richmond CA 94806.

During the investigation of a shooting in Washington, D.C., a Sig Sauer handgun was recovered. Five swabs were collected from different areas on the handgun by Metropolitan Police crime scene technicians. These swabs were taken from the handgun [1] left hand grip, [2] right hand grip, [3] backstrap, [4] trigger, and [5] finger grip. These handgun swabs and other evidence [baseball cap and vehicle airbag] were submitted to Cellmark for DNA analysis by the U.S. Attorney's Office. This report describes the Cellmark analysis of the five handgun swabs.

The analysis of the handgun swabs at Cellmark proceeded according to the following steps: First all five swabs were bisected and extracted for DNA without microscopic examination for cell debris. A human DNA slot blot assay failed to detect human DNA. Next, DNA was extracted from the five remaining combined half swabs and assayed for human DNA. Like the first combined swab DNA extract, no human DNA was detected in the second combined swab DNA extract. Next, all of the first handgun swab extract [20µl] and all of the second handgun swab extract [30µl] were combined and concentrated to 10 µl using Microcon filters. All of the concentrated handgun swab DNA extract [10µl] was subjected to a PCR based analysis of the nine Profiler Plus STR genes and amelogenin. The result of this analysis revealed an amelogen X allele at ca. 6800 rfu and a Y allele at ca. 4500 rfu. Five alleles were detected at the D8S1179 locus [10, 12, 13, 14, and 15] that ranged from 651 rfu [12] to 104 rfu [13]. One other possible allele was detected at the D21S11 locus [31.2] at 57 rfu. No alleles were detected at the remaining seven STR loci. Unsatisfied with this result, the Cellmark technician then rinsed the tube originally containing the concentrated handgun swab extract with 10 µl of TE buffer and subjected this tube rinse to a second PCR based analysis of the Profiler Plus genes. The tube rinse analysis also produced a mixture with an amelogenin X allele at 2359 rfu and Y allele at 1077 rfu. Two or more alleles were produced at all nine STR loci where the major alleles are shared by defendant, Williams. Many of these alleles were in the rfu range of the Y allele. Thus, the rinsed out tube preparation appeared to be significantly less degraded than the original concentrated and consumed handgun swab DNA preparation and contained significantly more genetic information.

The Cellmark report authored by Rachel Cline and Lewis Maddox contained only the result from the rinsed out tube analysis and failed to reveal the result from the concentrated combined handgun swab extract that was consumed. The Cellmark report also failed to reveal that the published result from the handgun swabs was based on the analysis of a rinsed out tube previously containing the handgun swab concentrated DNA extract. The result obtained by Cellmark appears to violate well understood scientific principles such as conservation of mass, reproducibility of the same or similar sample, and irreversible direction of degradation.

This report presents the record and testimony from this analysis and queries whether or not Cellmark scientists have discovered new and previously unknown properties of nature.

Discrimination of Beige Carpet Fibers

Catherine Beitia, Sacramento County District Attorney, Laboratory of Forensic Services, 4800 Broadway, Suite 200, Sacramento, CA 95820-1530.

The analytical scheme a forensic scientist uses to identify and discriminate among fibers in evidence cases was used to calculate the discriminating power of forensic analytical fiber protocols used currently in forensic laboratories. This project attempts to do this by looking at the individual beige to colorless carpet fibers found in common residential carpets within the Sacramento, California area. Two hundred eighteen carpet yarns were collected from a carpet retailer. Analytical tests performed on the carpet fibers included visual stereomicroscopy, polarized light microscopy, transmitted and reflected fluorescent microscopy, Fourier Transform Infrared Microspectrophotometry (FTIR), and UV/ Visible Microspectrophotometry. In addition, fibers were cross-sectioned, and modification ratios measured (an indication of circularity). The presence or absence of delusterant was also noted. Results of the study will be discussed.

Development of an In-House DNA Laboratory Information Management System (DNA-LIMS) to Increase Workflow Efficiency

Patrick Paton, BS and Matthew Gabriel^{*}, MFS, San Francisco Police Department Criminalistics Laboratory, 850 Bryant Street Building 606, San Francisco, CA 94103.

Due to recent state and federal grant awards, the San Francisco Police Department Criminalistics Laboratory DNA Unit has had the opportunity to analyze >500 backlogged suspectless cases (e.g. homicides, sexual assaults, robberies and burglaries) in addition to active cases for the generation of DNA profiles for submission to the Combined DNA Index System (CODIS). The DNA Unit has addressed the need to expand casework testing capabilities and streamline the analysis process by implementing higher throughput laboratory instrumentation for DNA extraction, quantitation and genotyping. With this increase in the amount of casework data generated, the DNA Unit has also developed an in-house Microsoft Access based DNA Laboratory Information Management System (DNA-LIMS) to accommodate the data associated with these cases.

Over the past two years, the SFPD DNA-LIMS has been developed to meet the custom demands of the Forensic Biology Unit and serve as a fully integrated data management system for case and evidence tracking. Further functionality of the DNA-LIMS was designed to offer an effective analysis tool for data management relating to each step in the DNA analysis process (e.g. DNA extraction, quantitation with QuantiBlotTM or QuantifilerTM, PCR amplification, ABI Prism 310 STR run, export of GenoTyper(r) data, DNA STR profile management for CODIS uploads and creation of genotype tables for laboratory notes). Since this system was developed with the primary objective of allowing the analyst to minimize time spent performing data management and administrative tasks for batches of case evidence samples (e.g. duplicate data entry and handwritten case notes), DNA-LIMS offers a streamlined approach to benchwork.

Other useful administrative features of the DNA-LIMS include: on-line technical and administrative review, generation of Reports of Laboratory Examination, monitoring of casework statistics for each analyst or entire unit for a given time frame, managing casework photo documentation, recording communications, court dates and requests for discovery materials, tracking and maintaining quality control of reagents, reagent kits, pipette calibrations, supplies inventory, external proficiency tests, and so on.

The Microsoft Access based DNA-LIMS offers integration with current DNA analysis instrumentation such as the ABI Prism(r) 7000 Sequence Detection System for DNA quantitation and GenoTyper(r) software for creating and exporting genotype tables. Future implementation of a high throughput liquid handling platform such as the Bio-Mek(r) 2000 for DNA extraction, sample concentration normalization and PCR setup as well as the ABI Prism 3100 Genetic Analyzer / GeneMapper ID(r) for data analysis will offer additional data migration and management capabilities for even more efficient DNA testing. The flexibility of a system such as the DNA-LIMS also offers adaptability to other forensic science disciplines that require similar case management, evidence and sample tracking and laboratory data analysis needs.

The Role of the Criminalist Working for the Defense in Criminal Cases

Chuck Morton, Forensic Analytical, 3777 Depot Road, Suite 409, Hayward, CA 94545.

This is a personal review of 43 years of criminalistics experience working primarily for defendants in criminal cases. Since the large majority of criminalists work in public laboratories where the objective is to assist law enforcement and prosecutors in solving and prosecuting crimes it should be instructive to the members of this organization to get a sense of the similarities and differences in the roles we play in the American system of criminal justice. The CAC has historically been a professional home for a significant number of criminalists who do work for defendants. This has resulted in a greater appreciation, in California, of the defense criminalist's role than in much of the country. It has also contributed to the practice of a higher level of forensic science than encountered in much of the country. Although we all like to think of ourselves as, and presumably attempt to be, neutral scientists in carrying out our respective assignments, the context in which we work imparts specific responsibilities and limitations in our interaction with the criminal justice system and each other. A discussion of the practical implications of responsibilities and limitations influencing the work of the criminalist hired by the defense and examples of casework encountered over the years should provide the membership with an even greater appreciation of the role of the defense criminalist.

The Search for a Serial Killer-The Role of DNA Databases

Mary M. Hong, Orange County Sheriff-Coroner

In 1995, the Orange County Crime Lab began to re-examine evidence in unsolved homicide cases with the intention of obtaining DNA profiles to enter into the DNA database (CODIS). This project was begun at this time due the availability of casework and offender databases in the State of California, and the routine use of DNA typing technologies, including RFLP and PCR-based methods.

Among these cases, three separate cases, which included a total of four homicide victims, were determined by DNA analysis to have been committed by a serial killer. Each of these involved a rape/murder of a female victim; in one of the cases the husband was also murdered. The initial analysis linking these cases was PCR-based DNA typing using CTT, DQalpha and D1S80. RFLP analysis was also performed on two of the cases to enable the DNA profile to be searched in the CA database and nationally through the then operating fax network. An investigative task force was formed which found a fourth case, from Ventura County. This case involved a female rape homicide victim and her male companion. DNA analysis demonstrated that this double homicide was committed by the same individual who had committed the previous crimes. After Profiler Plus and COfiler typing became available in 1999, the thirteen locus profile was developed and submitted to CODIS. In 2001, the Orange County Crime Lab was contacted by the Contra Costa Crime Lab with a request to compare a DNA profile obtained from three of their cases that were part of a series of rapes occurring in the late 1970's. The Contra Costa County profile was found to match that of the Orange County cases, thus linking a homicide series with six victims to a rape series with more than 50 victims. These cases are still unsolved. It is hoped that with the increased number of samples introduced to the offender databases with the passage of Proposition 69, this serial killer will be found.

Puma Panel: STR Marker Development for Forensic and Ecological Applications

Julia A. Collins*1,3, Jay A. Well¹ & Holly B. Ernest^{1,2,3,4}

¹Wildlife and Ecology Unit, Veterinary Genetics Laboratory, University of California, One Shields Avenue, Davis, CA, USA 95616; ²Wildlife Health Center, University of California, One Shields Avenue, Davis, CA, USA 95616, and ³Forensic Science Graduate Group, University of California, 1333 Research Park Drive, Davis, CA, USA 95616; ⁴Department of Population Health and Reproduction, School of Veterinary Medicine, University of California, One Shields Avenue, Davis, CA, USA 95616.

Polymorphic microsatellite DNA markers (commonly called Short Tandem Repeats, STRs, in forensic literature) have become important tools of wildlife forensics and molecular ecology by providing accurate means of identifying individuals and characterizing the genetic structure and variation of wildlife populations. Microsatellite markers are particularly useful for studying threatened wildlife species such as puma (Puma concolor, also called mountain lion and cougar), which are highly secretive and dangerous to handle. An accurate method of identification is essential in cases of livestock predation, public safety incidents, poaching, and illegal capture. Accurate census and genotype data are needed to properly manage and conserve this protected species. The aim of this study was to test and optimize tetranucleotide STRs originally developed for the domestic cat (Felis catus) by the Laboratory of Genetic Diversity, National Cancer Institute, Frederick, MD, in contribution toward a polymerase chain reaction (PCR) multiplex of puma markers capable of providing discriminatory forensic match probabilities. Sex and species informative markers were investigated to augment the multiplex. The multiplex assembled in this study does not provide sufficient match probabilities, however additional puma-specific markers are in development.

Justice at Last: Who Really Killed Stephanie Crowe

Connie Milton, Criminalist, San Diego Sheriff's Crime Lab

On the morning of January 21, 1998 twelve year old Stephanie Anne Crowe was found murdered in her bedroom. Her entire family was home at the time of the murder. Witnessed in the area the night before was a schizophrenic transient. Initially charged with her murder were Stephanie's older brother, 14 year old Michael, and two of his teenaged friends. When Stephanie's blood was later found on the transient's clothing, charges against the boys were dropped. But how did the blood get there? Was the transient a killer, or just the unlucky subject of police contamination? Examination of the physical evidence led to the eventual resolution of this case and justice for the murder of Stephanie Crowe.

Means Of Recovering Spermatozoa from the Oral Cavity

Sherille L. Cruz,^{1,2} M.S.; Katherine A. Roberts,^{1,2} Ph.D.; Donald J. Johnson,^{1,2} M.S.; Barry A. J. Fisher^{1,3}

¹California Forensic Science Institute, ²School of Criminal Justice and Criminalistics, California State University, Los Angeles, 5151 State University Drive, Los Angeles, CA 90032, ³Los Angeles Sheriff's Department, Scientific Services Bureau

The investigation of cases involving allegations of sexual assault can prove to be problematic. One compounding issue is the fact that there are usually no witnesses to the crime. This can mean that accounts of the alleged incident often conflict. While physical evidence, such as semen, saliva, and physical trauma establishes an association between the victim and the suspect, this is contingent on the successful recovery of evidence. The particular focus of this study was to evaluate several factors that influence the successful recovery of spermatozoa from the oral cavity. A total of 86 oral cavity samples were collected from 9 individuals. The samples were sub-characterized according to the collection method used: 43 were collected using floss and 43 were collected by swab. Successful recovery of spermatozoa was assessed as a function of three variables: The collection method; the time elapsed, post-copulation; and, the effect of oral activity post-copulation.

All of the samples were subjected to a differential extraction procedure prior to microscopic evaluation of the extracted pellet using hematoxylin and eosin staining. The microscope slides were examined at X200 and X400 magnification and the concentration of spermatozoa per microscopic field of view was scored. Spermatozoa were successfully recovered in 47% of the 86 samples included in this study. Further, the results demonstrate differences in recovery of spermatozoa as a function of the collection method: 54% of the swabs were successful in recovering spermatozoa compared to 40% of the floss samples. As a general trend, the average concentration recovered (combining the floss and swab data) decreases as the post-copulation time interval increases: the greatest decline in average concentration recovered occurs within 1.5 to 6 hours. However, spermatozoa were successfully recovered from 4 samples even at the 24-hour post-copulation time interval. Finally, the data from this study suggest that spermatozoa recovery from the oral cavity decreases as oral activity increases.

The floss collection method has been shown to recover spermatozoa in cases where the swabs were negative. Further, in cases where both the floss and the swabs are successful in recovering spermatozoa, the extract can be combined for analysis purposes. Therefore, the inclusion of floss in California's standardized sexual assault kit is recommended to facilitate, not replace, swabs in the collection of spermatozoa from the oral cavity.

A New Rapid and Easy-to-Use Differential Extraction Method

Yasser Daoudi^{*}, Kimberly Huston, Allan Tereba, Laura Flanagan, Paraj Mandrekar, and Ryan Olson, Promega Corporation, 2800 Woods Hollow Rd., Madison, WI 53711

One of the main reasons for the large backlog of sexual

A Comparison of the Effectiveness of Swabs and Floss as a

assault samples is the difficultly in working with the evidentiary material. Typical vaginal swabs contain a mixture of victim epithelial cells in large excess over sperm cells. Unprocessed, these samples can only be analyzed using male specific markers that provide important evidence but are of limited use in searching national databases due to the inheritance and nonrecombinatorial nature of the Y chromosome.

In 1985, *Gill et al.* developed a method to enrich for sperm cells in the presence of an excess of epithelial cells. After a controlled proteolysis in the absence of a reducing agent, the sample is centrifuged in a spin basket to remove from the solid matrix intact sperm and solution containing the DNA from lysed epithelial cells. Because the resulting sperm pellet contains loose cell debris a considerable amount of contaminating solution is left and must be diluted out with serial washings and centrifugations. This process is time consuming and results in loss of sperm and variability between examiners.

We have developed a new differential extraction method that takes advantage of the nearly two decades of experience using the standard differential extraction. After a standard Proteinase K digestion of the sample, the solid support and DNA-containing solution are centrifuged through a special material that effectively separates the sperm from soluble DNA and cell debris. The samples are washed once without centrifugation to remove any remaining soluble DNA in the sperm fraction. DNA IQ(tm) Lysis Buffer containing DTT is then added to the epithelial and sperm fractions. This buffer effectively lyses the sperm without need for further Proteinase K digestion. The total time for separating the sperm from epithelial cells following addition of the sample to the Proteinase K Digestion Solution is approximately 1 hour 20 minutes which includes the 1-hour Proteinase K digestion. The purification of the DNA requires 40 minutes so the total separation and purification can be accomplished in 2 hours.

Because the same standard Proteinase K digestion and initial centrifugation is used to help remove the sperm from the solid support and to lyse the epithelial cells, the efficiency of these steps will be identical to what is currently available. However, only one centrifugation is required for efficient separation so the sperm recovery is better. In addition, the handson time as well as the overall time needed to do the separation has been greatly reduced from the current method. Data will be presented on the sensitivity and successful processing of old samples.

Summary of the April 2005 Forensic Science Society Conference

Adam Dutra, San Diego Police Department, adutra@pd.sandiego.gov

I was honored to receive the CAC's Paul Kirk and President's Awards, which include a paid trip to a Forensic Science Society Conference. I attended the April 2005 conference in Leeds entitled "Homicide Investigations". To thank the CAC for selecting me for the award, I would like to provide a summary of the meeting and highlight a few of the more interesting papers.

How "Unique" Are Impressed Toolmarks? —An Empirical Study of 20 Worn Hammer Faces Eric R. Collins. 1122 Escobar Street. Martinez. CA 94553

The examination of impression evidence has long been based upon the assumptions that a particular impressed mark may show uniqueness due to its physical characteristics and position relative to other marks or some point of reference. Traditionally, firearm and toolmark examiners have had to rely upon the criteria of whether or not the appearance of an impressed toolmark exceeds the "best known non-match" when drawing conclusions of identity or non-identity. Until now, no study has been performed or attempted to quantify the uniqueness of impressed marks based upon their observable physical characteristics. This has presumably been due to the difficulty with which impressed (or compressed) marks lend themselves to the characterization of their individuality. Rocky Stone recently authored an article in the AFTE Journal in which he provided some theoretical probabilities associated with "idealized" impressed toolmarks that might be found on a hypothetical hammer face. Stone's work also established a model on which an empirical study could be based. This research project represents such a study, the purpose of which was to test the applicability of Stone's conclusions to real toolmarks by examining the nature of actual impressed marks found on the faces of twenty (20) hammers that had been subjected to various degrees of wear and abuse through normal use. In addition, this presentation will establish a foundation for evaluating the practical statistical uniqueness of impressed toolmarks on not only hammer faces, but any given surface.

History of Microcrystal Tests in Forensic Science

Hiram K. Evans, M.Sc., F-ABC, San Bernardino Co Sheriff's Department Scientific Investigations Division, 200 South Lena Road, San Bernardino, CA 92415-0056

The early history of microcrystal tests is the history of chemistry and microscopy. By the mid-1830's toxicologists needed something besides the drastic chemical treatments applied to heavy metal poisons for application to alkaloidal poisons. While any history moves forward in small steps, microcrystal tests in forensic science have a series of watershed dates. 1865 brought Helwig's Das Mikroskop in Der Toxicologie and Wormley's Microchemistry of Poisons. By 1921 and the publication of Behrens-Kley's Organische Mikrochemische Analyse and Stephenson's Some Microchemical Tests for Alkaloids forensic science had expanded to include the identification of controlled drugs. 1934 and 1935 saw the publication, respectivelv. of Amelink's Schema zur Mikrochemischen Identifikation von Alkaloiden and Rosenthaler's Toxicologische Mikroanalyse. From the 1920's through the 1960's, frequent collaborative work was performed and published in JOAC, expanding application and introducing acid reagent media. 1969 was probably the greatest year with publication of E. G. C. Clarke's Isolation and Identification of Drugs and Charles C. Fulton's Modern Microcrystal Tests for Drugs. Publications on microcrystal tests have decreased in number, concentrating on determination of isomeric forms, but the tests remain part of some training programs, are included in new ASTM Standard Guides, and are accepted by ASCLD/LAB for use in accredited laboratories.

Overlooked Clues, Downright Conspiracies, or Just Monday-Morning Quarterbacking: You Be the Judge: An Interactive Presentation

Alan Keel, Forensic Science Associates

Pre-trial and post-conviction peer reviews/re-examinations protect an accused person's constitutional right to confront the evidence used against them at trial. By default, that process also provides the opportunity to assess the work of the prosecution experts who proffered that evidence on behalf of the People. All too often, when shoddy, incompetent, or even purposefully misrepresented work for the government is revealed, that appraisal is dismissed by peers, supervisors, and bureaucrats as unfortunate misadventure rather than as demonstration of systemic training and oversight inadequacies, and criminal justice system corruption. These deficiencies are clearly demonstrated in numerous cases revealed during defense examination by evidence that was:

- Never considered or overlooked pre-trial;
- Discovered pre-trial and ignored;
- Discovered pre-trial and mishandled at the lab bench;
- Discovered pre-trial and misrepresented at various levels.

Due to time constraints, this presentation will focus on evidence that was discovered pre-trial and mishandled at the lab bench, along with the resultant fallout. Cases from California, Nevada, Michigan, Illinois, Maryland, and others will be presented as time allows. The facts and appropriate visual displays of evidence in each case will be provided in an anecdotal summary of the case background and its progress through our criminal justice system. Those in attendance will have the opportunity to recognize the pertinent evidence or clues in each case that is not overtly addressed and voice their appraisal at any time. Causative factors for each "misadventure" will be elicited from the audience as well. This interaction should be educational and entertaining, and hopefully, all in attendance will gain a new perspective for personal introspection regarding one's own impact upon our profession, and the effectiveness of current in-house and legislated oversight methods in our criminal justice system.

Forensic Glass Analysis By LA-ICP-MS: Assessing the Feasibility of Correlating Windshield Composition and Supplier

Abbegayle J. Dodds, * ^{1,2} Donald P. Land,¹ And Edward M. "Chip" Pollock²

¹University of California Davis, Department of Chemistry and Graduate Group in Forensic Science, One Shields Avenue, Davis, CA 95616, ²Sacramento County District Attorney's Laboratory of Forensic Services, 4800 Broadway, Suite 200, Sacramento, CA 95820

Recently, much attention has turned to the use of elemental analysis in comparing glass fragments of different sources, which may appear similar by refractive index measurement. Trace elemental analysis appears to be one of the most distinguishing techniques available and has been established as a forensically valid tool for glass examination. Preliminary results are presented that evaluate the potential utility of associating automotive windshields and manufacturers by trace elemental composition. To our knowledge, a systematic study addressing the variability of trace elements in windshield glass has not been published. This is an important first step in determining if manufacturers and windshields can be associated by composition alone.

A three-part study was conducted. First, windshield glass homogeneity was investigated. Ten windshields, representing both domestic and international manufacture, were multiply sampled across the length of the windshield. Samples were taken such that both layers of glass could be examined. Where possible, windshields suspected to be produced within the same batch were included in this set. Second, the resulting elemental profiles of these individual windshields were then compared to each other. This provided preliminary data regarding what variation in elemental profile to expect among different sources. Finally, batch samples of float glass obtained from a single production line were examined. These batch samples were taken from the left, center and right sides of the glass ribbon, multiple times a day for thirty days.

These analytical results provided invaluable information regarding windshield homogeneity and population variation. We present this data to offer practitioners a basis for assigning significance to elemental profiling of windshield glass.

Police Officer Fatality Shooting Reconstruction

Mark Bennett, Criminalist II, Oakland Police Department, 455 Seventh Street, Room 608, Oakland, Ca 94607

While responding to a home invasion call, a sergeant with the Tallahassee Police Department was fatally shot. The suspect was apprehended a short time later in possession of a Smith & Wesson .357 Magnum revolver, containing six fired cartridge cases. There were no witnesses to the incident and the sequence of events became key to the capital offence trial in which the defense counsel claimed the defendant "saw an unknown figure in the distance and, fearful for his life, shot his gun while running away." Evaluation of evidence, including examination of the victim's gunshot wounds, uniform clothing, location and characteristics of recovered bullets, bullet comparisons, police radio audio tape, and the sequence of cartridges in the suspect's revolver provided a high confidence reconstruction of the sequence of events. The forensic reconstruction was illustrated in court using computer 3D rendering software that graphically showed the likely relative positions of the gunman and officer for each shot.

The Mayfield Case—Anatomy of Error

Kenneth Moses, Director of Forensic Identification Services in San Francisco

In May of 2004, Brendan Mayfield was released from custody as a material witness when the F.B.I. disclosed that it had made an erroneous identification of his fingerprint. This presentation will examine how and why the error occurred as well as future implications to the field of forensic identification.

Y-STRs Come of Age—A Disputed Interpretation

Norah Rudin, 1563 Solano Ave., PMB 506, Berkeley, CA 94707-2116

A case in which DNA was typed using Y-STRs will be discussed. The interpretation of the primary analyst was disputed. Issues include: partial profiles, expectations for duplicated loci, detection of homologous sequences in female DNA, laboratory contamination, and non-concordant amplification results. Working in the military justice system will also be discussed if time permits.

Preparing for an Accreditation Under ISO 17025 Standards

Scott R. Oulton, 2815 Scott Street, Vista, CA 92081

Accreditation is becoming a de facto requirement for the recognition of a laboratory's operation under documented policies and procedures. As such, the objective of this program is to synopsize the procedures undertaken by the Drug Enforcement Administration (DEA) to prepare analysts and laboratories for accreditation under ISO/IEC 17025 standards. An important part of this program will involve discussions of those accreditation requirements which caused a significant degree of concern and fell outside of the "comfort zone" of familiarity with previous accreditation inspections. The program will also describe in detail how laboratory program standards were enhanced to meet the requirements for accreditation. It is intended that the discussions in this program will be candid and the goal is to answer questions and present suggestions for achieving accreditation under ISO.

Identification of an Inoperable Firearm to Bullets and Cartridge Cases from a Homicide Fourteen Years Prior

Ron Nichols, Bureau of Alcohol, Tobacco, Firearms and Explosives, Forensic Science Laboratory - San Francisco, 355 North Wiget Lane, Walnut Creek, CA 94598

A recent case involved the comparison of bullets and cartridge cases from a homicide in 1990 to a firearm recovered from a drainage ditch, approximately 12 years later. The firearm was received in an inoperable condition. The firearm was dismantled and the various parts of the firearm that may be expected to come into contact with either the cartridge case or the bullet were cleaned with gun solvent and rust dissolver.

The breechface of the Raven pistol was cleaned sufficiently to reveal concentric circular tool marks from the finishing process. The firing pin was removed from the pistol and cleaned sufficiently to reveal the surface of the firing pin before it became encrusted with foreign debris. The cast of the breechface was compared with the cartridge cases that were recovered from the scene of the shooting and the firing pin was compared with casts of the firing pin impressions present on the same five cartridge cases. There was sufficient agreement to conclude that the cartridge cases were fired in the submitted Raven pistol.

The barrel of the Raven was cleaned. A cast of the barrel showed significant deterioration of the rifling through most of the barrel exclusive of the muzzle end. I obtained test marks from the muzzle end by swaging a piece of lead into that area and then punching it out of the muzzle end, simulating the exit of a bullet. The lead swage was compared with the bullets recovered from the victim and a significant amount of corresponding striations was observed to permit a conclusion that the bullets were likely fired from the Raven pistol.

Despite the deteriorated, inoperable condition of the pistol, it could be dismantled and adequate test marks produced to compare with submitted bullets and cartridge cases. Sufficient individual markings were present to permit a positive association between the recovered pistol and the submitted bullets and cartridge cases.

Fingerprints and DNA on Cartridges and Cartridge Cases: How Likely?

Terry Spear *, Jeanne Clark, Mike Giusto, Neda Khoshkebari, Michael Murphy and John Rush, California Department of Justice, Bureau of Forensic Services, 4949 Broadway, Sacramento, California 95820

This study examined the likelihood of: (1) obtaining fingerprints on fired and unfired cartridges and cartridge cases [cartridges/cases] and (2) obtaining DNA typing results from any of the cartridges/cases processed for fingerprints. Three types of fingerprints (bloody prints, sweat prints and oily prints) were placed on brass, nickel-plated and aluminum cartridges. Half of the test cartridges were fired after receiving the fingerprints. The cartridges and cartridge cases were then processed for fingerprints using either amido black or cyanoacrylate fuming/dye staining. After the cartridges and cartridge cases were processed for fingerprints, they were swabbed to collect DNA.

No usable prints were observed on any of the twelve smaller (22LR) cartridge cases (N=12) regardless of the type of fingerprint or fingerprint processing method used. In contrast, 6 useable prints were developed on the 9mmP and 45ACP cartridges (N=36). Thus, only 6 prints were classified as useable or identifiable on the 48 cartridge/cases examined.

The swabs used to collect the DNA from the cartridges/ cases were organically extracted for DNA. Since these samples were not expected to yield very much DNA, the extracts were not quantified but were directly amplified for STR markers using Applied Biosystems's Profiler Plus reagent kit. Only 3 STR profiles were obtained from the 48 cartridges/cases that were tested: two profiles from 2 unfired cartridges and one profile from a fired cartridge case. Since fingerprint processing results in the loss of DNA, it is likely that more STR profiles might have been obtained if these cartridges/cases had not been first processed for fingerprints.

Subject's Wallet Found at Scene— How Do the Clueless Leave So Many Clues? Susan Morton

How is it that criminals who have nary a clue to start with strew so many for the discerning investigator to find? This is a philosophical question in need of much pondering. We will examine a number of cases in which it is clear that the perpetrator would lose a debate with your average root vegetable. After hearing this presentation, the audience will come to the humbling realization that we don't catch the smart ones.

SPME vs. Charcoal Adsorption: A Comparative Study of Extraction Methods for Volatile Accelerants Present on Human Skin, or, Colonel Mustard with Gasoline in the Bedroom— Can We Prove It?

Katherine Hutches^{*1}, John D. DeHaan² and Don P. Land³

¹Graduate Group in Forensic Science, University of California at Davis, 1333 Research Park Dr., Davis, CA 95616, ²Fire-Ex Forensics, 3505 Sonoma Blvd, #20-314 Vallejo, California USA 94590, ³Department of Chemistry, University of California at Davis, ¹ Shields Avenue, Davis, CA 95616

When suspects are interviewed during arson investigations, the odor of gasoline or other volatile accelerants is sometimes detected on their hands. Attempts to remove these residues for identification have, in the past, relied on sampling of the hands with either dry or solvent-wetted swabs. These techniques have almost invariably failed due to the low concentration of volatile absorbed into the skin. Methods of non-invasive extraction of fire debris that are widely used in general arson investigation include: charcoal adsorption/elution and solid phase microextraction (SPME). This study sought to determine which, if either, of these methods is suitable for use as a test for the presence of volatile hydrocarbons on the skin and whether there is selective absorption of components by the skin that affect the ratios of extractable volatiles in mixtures such as gasoline. While these methods are currently applied to the extraction of volatile compounds present in fire debris, these methods may show promise in extracting volatiles from skin. Preliminary results demonstrate differences in the utility of each of these two methods in terms of accuracy and viability for use in short-term samples.

President's Desk, cont'd from page 2

After taking on some of these jobs go ahead and jump into the treasurer, editorial secretary, the membership secretary, and the recording secretary job. These jobs get busy, again, at certain times of the year. The membership secretary and treasurer are often busy year around. Once you have attended a year or two of board meetings you will be ready to take on the tasks of president-elect, president, and past president. The years of commitment and the job duties will eventually be posted on the web site; however, until then call me (or the person currently in these positions) to get a list of job duties.

For me, I was Southern Regional Director twice which gave me insight into how the Board of Directors works. I was on the Training and Resources committee for one of my first assignments. However, my experience with the Ethics Committee and the Endowment Committee really helped me gain confidence in my ability to lead this organization.

Becoming an active member of the CAC is the duty of every member. It is also a rewarding way to meet people and establish connections in this field that will help you professionally.

fm Stan

If you see this ad in full color, then you've discovered the **ONLINE** VERSION of the **CACNews**

www.cacnews.org

Decisions, cont'd from page 9

A third characteristic of an opportunity of a lifetime is that it is bigger than your own talents and abilities. This goes right in line with feeling scared when the opportunity and all the ramifications of the decisions are considered. I have shared before that a vision that we could accomplish on our own is a pretty pathetic vision². Nothing truly great has ever been accomplished in a game of solitaire. People and significant relationships are going to be involved in opportunities of a lifetime.

Though some might argue this point, I feel that a fourth characteristic of an opportunity of a lifetime is other-centered. It is something that has as a core value selflessness rather than selfishness. It is an opportunity in which we may rise in stature but that the rise in the stature was not the goal of seizing the opportunity. It is a result of the selflessness exercised in the pursuit and exercising of that opportunity.

So, how do we evaluate these different characteristics to determine the decision that should be made? Good question, reader. Does this little dialogue remind you of the *Moonlighting* episodes in which the characters Dave and Maddie would enter into a dialogue with their audience completely out of nowhere?

First, we deal with this feeling of being scared at the prospects of this opportunity. Sometimes fear can paralyze us into

If opportunities of a lifetime are truly characterized more by selflessness than selfishness, then a true, introspective look into one's own motives is critical.

making a non-decision until the lifetime of the opportunity expires. Generally what follows is regret because we were too fearful to seize the moment. Sometimes, we simply have to be willing to look in the face of the potential obstacle and make the decision to get out of the boat. The biggest miracle for the Apostle Peter was not walking on water it was making the decision to actually get out of the boat. I'm glad he decided to do it before the boat reached dock and the lifetime of the opportunity expired.

Anything that is worth something should cost something. We need to consider that cost. Sometimes the cost can be defined very well. It could be miles added to an already long commute or dollars lost because the opportunity may not pay as much. Then there are the intangibles. It could very well be that this opportunity that has come about might result in having to sacrifice another activity that we enjoy very much. It has been said many times, and therefore probably attributable to no one in particular, that the enemy of the best is actually good, or good enough. Something that is very good could be standing in the way of that opportunity that is best for you and your family. My wife and I recently had to sacrifice an activity that we enjoyed and sensed was good. However, there is only so much time in a given week and a difficult choice had to be made. If we were committed and serious about working towards that to which we feel called, good was no longer good enough.

Knowing that few great things are ever accomplished in a game of solitaire we must be prepared to work with people. If we do not have good relationship skills, now might be the time to start developing those. Without them, opportunities of a lifetime can very rapidly deteriorate into disasters of a lifetime. The first individuals that we have to establish good relationship skills are those around us, our families. Pursuing opportunities of a lifetime is not a solo flight. It is a family opportunity. We then extend that circle to encompass our friends. Have you ever witnessed a successful NASCAR driver refueling himself during a race, changing his own tires, fixing his own car, or getting his own drink? Yes, he is the one driving around on the actual racetrack and pursuing the finish line. But, without his team of support there is no way that finish line would have ever been possible.

If opportunities of a lifetime are truly characterized more by selflessness than selfishness, then a true, introspective look into one's own motives is critical. Any opportunity that is pursued out of a motive that is more selfish than selfless will never be as fully rewarding as it had potential for. I watched the *Phantom of the Opera* last night with my daughter. In the end, the phantom could have made the young lady stay with him, holding her true love as hostage for her affections and indeed did consider doing just that. But, I suspect if the reasons she stayed were a result of that selfish manipulation, in the end he would not have been satisfied. That is why he then said she could go if she did not want to stay.

Most often a good friend, one who sticks closer than a brother or sister, is needed to provide that good accountability sounding board. A friend to whom we can go, present the facts and then give permission to ask motive probing questions. It is easy to deceive our selves with our own good intentions. Sometimes we get too close to a situation. A critical and objective look from one who has our own best interests at heart will go far in helping us to recognize our motives.

With opportunities of a lifetime, we will never be certain of the result before committing to the opportunity. Sometimes we may not know until *Episode VI* is far underway. Let's just hope that we don't have to go back and write *Episodes I, II* and *III* just to fill in the gaps that should have been covered from the very beginning!

Until next time, my best to you and your families.

(Jor

¹ Pastor Fred Franks, Calvary Temple, May 14, 2005.
² Relational Leadership Workshop, CAC Seminar, Oakland, CA, May 2005.



www.cacnews.org

norah rudin & keith inman • the proceedings of lunch

A Hitchhiker's Guide to Accreditation

Forty-two!" yelled Loonquawl. "Is that all you've got to show for seven and a half million years' work?"

"I checked it very thoroughly," said the computer, "and that quite definitely is the answer. I think the problem, to be quite honest with you, is that you've never actually known what the question is."



—Douglas Adams A Hitchhikers Guide to the Galaxy

We have temporarily returned to our old haunt, Pyramid Brewery in Berkeley as it is the halfway point between Hayward and Vallejo, the current location of our lunch guest, John DeHaan. While the menu has changed, the ambiance remains the same, as does our purpose, to discuss topics of current interest. Wisely steering away from the already over-analyzed "CSI effect," we tackle a subject inspired by John's recent editorial in the *Academy News* (DeHaan, 2005), the pros and cons of laboratory accreditation.

The problem with accreditation

An ASCLD laboratory inspection sometimes feels like a season of the TV reality series *Survivor*; between us we have "survived" a number of accreditations in different laboratories over more than a decade. While we support the general idea of basic standards and reasonable oversight, we fear that the both the process and goals of the current iteration of the program may sometimes be counterproductive. Has the science in forensic science become just a trivial and disposable obstacle in the way of a new hyperspace bypass on the highway of accreditation?

In John's article, he proposes that, although professional certification of individuals has worked well to encourage improvement of the expertise and knowledge base of criminalists who choose to undergo the rigorous process, laboratory accreditation has strayed from its original intended ideals and has had far-reaching, if unintended, consequences.

"... this process has come to rely on requiring strict adherence to protocols and procedures manuals. Such protocols often specify what test can be done, with a few options left to the criminalist; others preclude using any test that has not been documented, published, verified, and internally reviewed for acceptability. This latter rationale has led to the stultification of the scientific analysis of evidence, reducing it to a cookbook of "acceptable" tests. The investigative world is far too complex to expect all answers to be found in a cookbook (no matter how comprehensive that cookbook can be made). (Unless the answer to all forensic questions is "42")

John fears that the requirement to use only protocols existing in the laboratory's procedures manual removes both the requirement and ability of an analyst to use science to think her way through an analysis for which no published protocol exists. The consequence is that clients are told that a particular piece of evidence can't be analyzed because the laboratory doesn't have a specific protocol already within its arsenal. He provides an example of the "Ignition Susceptibility Test": does something burn when you light it? As with most simple but powerful observational tests, the "IST" has never been published as a formal protocol, by ASTM or anywhere else. It is the most reliable, least expensive way to confirm that an unknown bulk powder as an incendiary, yet the young criminalist to whom he suggested it replied that he couldn't use it because it wasn't an ASTM approved method. Leaving the issue of observation as credible science for another time, this extreme example highlights the absurd corner into which we have painted ourselves.

Norah remembers a similar example discussed in a previous POL (Rudin and Inman, 2001) in which a DNA analyst noticed an obvious semen spatter pattern on a shirt. Wanting an "expert" opinion, she took it to a blood spatter examiner in her laboratory. This examiner replied that a semen spatter pattern was outside of his area of expertise because he was only trained in blood spatter. What have we come to?

Keith introduces the concept of "children of accreditation." Many young analysts that enter the crime laboratory system today are immediately shunted into a particular specialty and indoctrinated into the accreditation lifestyle, or at least labstyle. They are taught a limited spectrum of methods that are prescribed by the laboratory manual. Rather than being encouraged to pose a relevant question and seek a method of scientific inquiry to answer it, they are implicitly taught to look for questions that can be answered by the available tests. Not only does everything look like a nail waiting to be hammered, they don't even have a choice of a ball peen hammer or a sledge hammer. By limiting the tools available, the risk of providing an answer (42?) to an irrelevant or useless question increases. However, these children of accreditation seem satisfied that, as long as they've done what it says in the protocol checked off the little boxes and filled in the lot numbers, they've performed the analysis correctly, and their analysis is unassailable. They have, however unintentionally, acquired a mentality that requires the safety net of cookbook procedures. The idea of performing and defending original scientific work has become a foreign concept.

Keith also notes that even when he has specifically taught students in crime laboratory training programs how to creatively and rigorously attempt to define and answer relevant questions, they are prevented from using these skills for actual casework. How frustrating is that for a new and enthusiastic young analyst? At a recent AAFS meeting, Norah attended a talk entitled "Education of the Forensic DNA Analyst in the 21st Century." (AAFS proceedings, 2005) An excerpt from the abstract make terrifyingly clear how even academic forensic programs are molding their curricula specifically to meet accreditation requirements.

> "Accreditation of Forensic DNA testing laboratories has now become standard in the field. An important aspect of the accreditation process is the qualifications and training of the DNA analyst. The National Standards has explicit requirements for coursework and training of DNA analysts and Technical Leaders. . . . This program was developed to provide the forensic community with trained personnel, all of who meet and exceed the requirements to be DNA Technical Leaders except for the actual threeyear work experience as a DNA analyst in a forensic laboratory."

How much of this is at the expense of fundamental scientific and critical thinking skills? Graduate school should be a place to expand one's horizons, not limit them. Will the graduates of such programs become the "grandchildren of accreditation," whose scientific thinking becomes limited to approved protocols in the procedures manual even before they enter working crime laboratories?

How did we get here?

Keith and John want to know how we got to this point. They share the old fogey's lament, that the core of criminalistics has been lost, and analysts are no longer willing, or even allowed, to consider evidence in the context of the case and to interpret it appropriately. The collateral damage from this approach is that someone else will. That someone else is typically an attorney (with an agenda appropriate to her role as an advocate, but inappropriate to objective scientific inquiry) or a "crime scene reconstructionist," typically a retired detective, or perhaps a criminal profiler who likes to use bits of physical evidence analyzed by some lowly lab technician to flesh out his view of the crime event. By abdicating a part our responsibilities as forensic scientists, we open the door to far less qualified people who are more than willing to opine on the significance of physical evidence to a crime event. This all too often leads to unsupported extrapolation and blatant speculation, neither of which ultimately assist the criminal justice system in understanding the relevance of the physical evidence analysis to the case.

Norah suggests that the system currently in place has resulted from an over-reaction to some of the "cowboy" forensic science that has been practiced over the last century or so. Forensic science has historically been developed separately from clinical medicine and science, hence was not part of the movement of standards, certification and accreditation that evolved in those disciplines. No unified framework of fundamental concepts for forensic science existed and few professional standards were promulgated. Clearly, the creation of basic guidelines and minimal standards was necessary to establish a framework for oversight as well as to provide the forensic consumer with a set of criteria by which to judge the veracity of the product they were receiving. However, we have now gone overboard. Analysts have been effectively demoted to technicians while those establishing standards appear to have become so disconnected from the everyday practice of criminalistics that

ASTM Standards

It is unfortunate that the ASTM standards pertaining to forensic science appear to be closely guarded secrets. While the purchase price is not unreasonable (\$28.00 for each of the documents discussed here), the copyright restrictions prevent distribution in any shape or form. They are so restrictive that we are almost afraid to print excerpts for the purpose of discussion. This is a shame, because the standards themselves are a valuable resource for the forensic community. Unlike the standards conceived and promulgated by various professional organizations specific to forensic science, the ASTM standards are conceived within the context of the greater scientific community. If forensic science is ever to achieve acceptance and recognition outside of our own small discipline, we must start integrating the fundamental scientific standards promulgated by the greater community into our work.

Ideally, such standards should be freely available, for example posted on a public web site. Their creation and distribution should not be for-profit endeavor; copyright restriction is counterproductive to the very purpose of the standards. Given the *de facto* situation that ASTM does in fact hold the copyright to a number of relevant standards, one way to disseminate them would be for one or more of the professional forensic organizations to enter into a licensing agreement with ASTM. For the purposes of discussion in the body of this article, and hopefully not in violation of any copyright, we reprint limited excerpts of standards E678-98 and E620-04.

ASTM 678 – 98 Standard Practice for Evaluation of Technical Data

3. Significance and Use

3.1 The responsibility of the technical expert in a forensic investigation encompasses identifying significant data pertinent to the incident and related to the expert's opinion, analyzing and correlating the data with respect to the incident, and providing a meaningful explanation of the results to the non-technical as well as the technical community.

It is fascinating to us that the key descriptors of our profession so studiously avoided in the professional standards promulgated by our own profession are clearly listed in the ASTM standards. If we could incorporate only one additional idea into our accreditation guidelines, this would be it.

4. Evaluation Procedure

4.1 This section outlines the basic principles of technical evaluation in accordance with scientific practice and engineering methods

4.1.1 Definition of the Problem

4.1.2 Identification and Validity of Hypotheses

4.1.2.1 The expert shall identify and, if necessary explain the technical hypothesis and judgmental criteria used in an evaluation. The source, technical basis, and relationship to each hypothesis and criterion to known incident data shall be specified.

4.1.2.2 If available data permit alternative hypotheses, the relative technical merits of each shall be addressed.

As we have mentioned in the body of this article, as well as in many previous writings, we believe that actively searching for alternate hypotheses, and testing them, is key to avoiding a biased interpretation.

5. Data for Evaluation

5.1.3 Validity of data

5.1.3.1 Test data developed for an evaluation shall be obtained by relevant standard tests or by tests which replicate the conditions of the incident. If qualified, the expert shall perform or witness tests specifically conducted for the evaluation. As an alternative, the tests shall be performed under the expert's direct supervision. In either case, the expert shall prepare a formal test plan which shall form the basis for the test protocol and reports.

We don't see anything here about a requirement to use only protocols present in the laboratory's methods manual. We do see a requirement to formulate an experimental plan and document the results.

6. Opinions

6.1 After the data have been evaluated, opinions may be formed and conclusions drawn. Conclusions must be consistent with known facts surrounding the incident and with accepted scientific principles.

We specifically point note the requirement to relate the conclusions back to the event in question.

ASTM E 620-04 Standard Practice for Reporting Opinions of Scientific or Technical Experts

4. Report Content

4.3 Opinions and Conclusions

4.3.2 The report shall contain the logic and reasoning of the expert by which each of the opinions and conclusions were reached.

Seems obvious to us—what we can't figure out is why this fundamental and critical requirement is missing from accreditation guidelines and why it is lacking in most forensic reports. (But that is a topic for another time)

One of the more pervasive problems has been uneven interpretation of the standards and worse, the interjection of the personal opinions of individual auditors. their recommendations (which we somehow accept as directives) have become irrelevant to the real-world practice of criminalistics.

Keith remembers that when accreditation was initially conceived, the idea was to create a set of standards for infrastructure and organization. We started with the things that were easiest: personnel, physical plant, safety, and documentation. Within the requirement for documentation was obviously a methods manual that would detail those procedures commonly used by the laboratory. The problem, however, is that those criteria were seen as an end rather than a beginning. The manual of common methods became the manual of permitted methods. Rather than a resource, we are now stuck with handcuffs that restrict us from posing questions if they cannot be answered by a specific method already in the manual. John adds that a challenge arises because no convenient way exists to test for compliance to a "thought process;" therefore we are left testing for what we can, compliance to trivia (e.g. did you cross out errors with a single line and initial). In the end, this does little to legitimately reassure the forensic consumer that we can get the correct answer. And it does not even begin to address incompetent, or worse malicious, practitioners and the organizations that support them.

Leaving aside the requirements of accreditation for a moment, Norah raises the issue of implementation. It has not yet been possible to achieve consistent and intelligent application of accreditation requirements, even as they exist today. One of the more pervasive problems has been uneven interpretation of the standards and worse, the interjection of the personal opinions of individual auditors. Some auditors seem limited by the scope of procedures in their own laboratories - they cannot conceive that another way might be equally as good, or even better, that the ones they employ. In some cases, they are fundamentally unqualified to perform the audit to which they have been assigned. An egregious example of this sort of limited thinking is illustrated in the Sidebar, "ASTM Standards." Of even greater concern are the auditors who take it upon themselves to legislate the use of particular protocols. The most infamous example of this arose from an inspection of a laboratory in which a member of the audit team declared that analysts were prohibited from reporting the presence of human blood unless they had performed a Takayama crystal test. All of a sudden this became law, with no discussion or input from the community. The accreditation body said it was so, and if you didn't comply, you failed accreditation (and faced not only court challenges but the loss of federal funding.) We leave the specifics of that particular discussion for another time, only noting here that accrediting bodies have now started down the slippery slope of not only telling us that we must have written procedures, but which procedures are acceptable. We submit that this is unacceptable.

We note that, ironically, while the powers that be have decided that the only definitive test for blood is a crystal test (in spite of the fact that known false positives exist), a crystal test is apparently inadequate for drug identification. The argument seems to be that the test is not easily reviewable because a paper printout with diagnostic peaks is not produced. In truth, outside of California, few analysts are qualified to interpret crystal tests for drugs because their agencies do not see fit to train them on this definitive and sensitive technique. By extension, most auditors are also not qualified to review crystal tests, so believe the method to be unacceptable. Accrediting bodies now seem to be in the business of legislating protocols. What's next?

What, if anything, has the accreditation program accomplished?

Cautioning ourselves not to throw the proverbial baby out with the bathwater (especially if you do not have your towel¹), we challenge ourselves to look for positive aspects of the laboratory accreditation program.

Norah observes that a failed accreditation is sometimes used as justification to secure funding from local or State government. These labs really are in dire need of updated physical facilities and funding for continuing education. An audit document from an outside agency with a whole bunch of "NOS" can often accomplish that which no amount of pleading via inter-office memo has been successful in securing. This re-enforces the doctrine that the greater distance from which you hail, the more credibility you have, and the more you can charge. Additionally, the documentation requirement can be useful to force a housecleaning in those labs that have operated on sapiential knowledge for decades. If used properly, it can provide an opportunity to review the procedures being used and to think critically about evidence examination and interpretation guidelines.

However, everyone needs to understand that, while preparing for accreditation can bring the general operation of the laboratory up to some minimal standard, it does not ensure (or even claim to ensure) that quality casework is being performed or that correct conclusions are being proffered. And at what cost, both fiscally and in human resources? We all know that preparing for an initial accreditation, and even the subsequent

¹ If you don't get this, we suggest you read *A Hitchhiker's Guide to the Galaxy* by Douglas Adams or see the recent movie by the same name.

internal and external audits, adds a tremendous amount of overhead to already back-logged laboratories. Most of this is administrative and involves generating lots of paperwork. In a way, accreditation has become a parody of itself.

What is the answer?

We try to remember what originally prompted the perceived need for formal accreditation and what, if any, goals were stated. The requirements would seem to be two-fold, 1) to improve actual case work and 2) to convince the forensic consumer that our results are trustworthy. Have we actually accomplished either of these goals? We seem to have convinced the public that accreditation is the answer to assuring quality casework, in spite of several high-profile examples to the contrary. However, those of us who independently review casework understand very well that accreditation is no barrier to poor quality, indeed even poorly documented, casework. Conversely, laboratories that remain unaccredited by any outside agency may be perfectly capable of turning out excellent work. Certainly, we have also seen egregious examples of laboratories so incompetent and insular that only public humiliation has been able to force a systemic change.

It is clear to us that the best use of an accreditation program is to provide an infrastructure within which quality casework can be performed. But that begs the question of what criteria we use to assess casework and whose responsibility is it. We revert to themes which should by now bore readers of this column. We must insist on rigorous academic programs that teach students how to think, not just how to do. We must encourage active debate and discussion, not only in the general community, but within the laboratory about specific case interpretations. We must educate and train analysts to think

When the Auditors Need to be Audited

Shortly after we met to discuss this quarter's topic of laboratory accreditation, Norah received an audit document as part of the discovery materials for a DNA case. Several of the auditors' finding were truly troubling and starkly illustrate some of the issues encountered when individual inspectors are less qualified than the individuals whose laboratory they are inspecting. This particular audit has been so widely distributed so as to have become a public document. Against great temptation, we also protect the identities of the incompetent (auditors.) For obvious reasons, the excerpts are representative rather than comprehensive. For example, we do not lower the level of this discussion to include a malfunctioning door which was fixed before the audit was concluded. For full effect, we also reproduce the auditors' comments exactly as printed, illustrating that, not only are their critical thinking skills lacking, they have trouble forming simple declarative sentences with proper syntax and grammar. This particular audit was DNA specific, but the issues are general ones, applicable to not only the whole of forensic science, but scientific inquiry in general.

The laboratory received "NO's" on the following standards of the Quality Assurance Audit for Forensic DNA and Convicted Offender DNA Databasing Laboratories.

6.1.2 Are evidence examinations DNA extractions, and PCR setup conducted at separate times or in separate spaces?

Comment: Known samples are being extracted before questions. Also question and known samples are extracted at the same time. [sic]

The laboratory response correctly notes that the standard does not specify the order or extractions. While, ideally we would always prefer to extract the evidence sample first, there are instances in which this might not be reasonable or practical. Separation in space and time minimizes the chance of cross-contamination, which is apparently exactly what the laboratory does when occasionally confronted with this situation. The laboratory also notes that no documentation was provided that any evidence and reference samples were extracted at the same time. This is in direct violation of not only the audit requirements, but good scientific practice. critically and work independently; then we must allow them to do so. We must not be afraid to challenge each other. Lives and liberty are at stake.

It is easy to complain and criticize, so we do not get to do that unless we are willing to provide an alternative. This, unsurprisingly turns out to be a non-trivial exercise. The current system has come to be what it is because black and white approaches are relatively simple to codify and to assess compliance. Effective forensic work does not easily lend itself to simplification, yet we agree that there must be some sort of standards and a system of regulation and enforcement.

Keith wonders if another profession might provide guidance. He suggests the sister applied science of medicine, which has a much longer history of professional regulation. As an example, he notes that the doctor doesn't examine the patient

In both forensic science and medicine, over-regulation may increase both the financial and human cost without improving the accuracy of the service.

with the goal of making sure that the chart is filled out correctly, but rather to diagnose and recommend treatment. John counters that, in today's litigious and managed care environment, the scenario that Keith dismisses may be closer to the truth than we would like. In fact, after some discussion, we realize that medicine today looks much like forensic science in an accredited lab. One can still find a skilled, caring physician, but specialization, fear of litigation, and restrictions by managed care have led to similar frustrations and issues, on the part of both the practitioners and patients. In both forensic science and medicine, over-regulation may increase both the financial and human cost without improving the accuracy of the service.

But we promised to stop ranting and attempt to provide a workable solution. John proposes that we change the expectations for accreditation. Accreditation should focus on providing an environment in which analysts are not only free, but encouraged to concentrate on quality case work. Requirements should focus on infrastructure (both physical plant and administrative support), safety, security, funding, and providing for continuing education. They should not stray into legislating acceptable protocols. Technical competence is better assessed and assured through certification of individual analysts.

Norah reminds us that the best check and balance system for any particular case is review, both internal and independent. This addresses the most salient question, was a substantive error made in this case? This is akin to a second opinion in medicine to make sure the illness was correctly diagnosed (what is the question?) and the most effective drug has been prescribed for treatment (do the data support the conclusions and what do they mean in the context of the case?) Keith extends that concept further but introducing the concept of reproducibility. It is clearly impractical to independently test every sample in forensic case work, but independent testing of random samples is an interesting idea. This is, in fact, how many industrial testing operations assess and ensure quality control.

8.1.2 Have novel forensic or database DNA methodologies used by the laboratory undergone developmental validation to ensure the accuracy, precision, and reproducibility of the procedure?

Comment: The laboratory advised that they created an inhouse program for statistics; however, there was no documentation as having performed a correlation study with PopStats to ensure reliability and reproducibility. [sic]

For the uninitiated, PopStats is the program created by the FBI for the purpose of calculating random match probabilities as well as other genetic calculations. There is nothing magical about this program. It is just a spreadsheet that uses standard algorithms that describe population genetics and mines a database of allele frequency information collected by the FBI and other organizations. The laboratory validated their in-house program against the same primary standard as PopStats, the population genetic equations themselves. These equations are readily available both in NRCII (ref) and in any advanced genetics textbook. The auditors only knew that in their own labs, they pushed a button on a computer running PopStats and out popped the ANSWER (hopefully not 42). We would challenge the auditors to identify the correct equations and do even one calculation by hand. This is a stereotypical example of how the "children of accreditation" both accept and expect black-box solutions to scientific problems.

9.1 Does the laboratory have and follow written analytical procedures approved by laboratory management/ technicalmanager/leader?

9.1.1 Does the laboratory have a documented standard operating protocol for each analytical technique used?

Accepting a "NO" answer to these statements at face value suggest that the laboratory is a fly-by-night operation with no standard operating procedures or protocols. A closer look reveals quite a different circumstance; the auditors are apparently unfamiliar with some fundamental scientific concepts, namely the measurement and expression of precision (i.e., the reproducibility of a set of measurements).

Comment: 9.1 (C) Lab extraction require extraction temperatures to be 56°C, documentation listed a temperature of 55C. [sic]

In the laboratory response, they counter that the DNA Procedures manual clearly states the acceptable temperature range for the heat blocks utilized in the extraction process is $(56^{\circ}C \pm 1^{\circ}C)$. Obviously 55°C and 56°C are within 1 degree of each other. Anyone familiar with DNA extraction would also realize that the exact temperature for lysing cells is not critical to within 1 degree; basically, it needs to be warm enough to speed up the enzymes and not so hot as to kill them. While this is somewhat sarcastic, and of course a temperature should be stated and followed, this also illustrates how some particular number can assume more importance

Norah also points out that no matter how many people review a case, and even agree that the results and conclusions are correct, there is no a guarantee of infallibility; we can still be dead wrong. This is a very difficult concept for both scientists and the public to accept. We can regulate and review all we want, forensic casework (again like medicine) does not operate in an arena of absolutes.

Keith proposes the thinking person's casework checklist:

- Has the analyst read, understood, and summarized the case?
- · Has the analyst formulated relevant questions?
- · Has the analyst posed alternative hypotheses?
- Do the examinations and analyses specifically address the questions posed?
- Has the analyst considered the limitations of the sample (the nature of the evidence)?
- · Has the analyst considered the limitations of the test?
- Do the data support the reported conclusions?
- Have the significance of the conclusions within the context of the case been articulated?

John points out that similar standards already exist, they are just not the ones incorporated into ASCLD-LAB or NFSTC audits. Specifically, ASTM E 678 – 98, *Standard Practice for Evaluation of Technical Data* and ASTM E 620 – 04, *Standard Practice for Reporting Opinions of Scientific or Technical Experts* address forensic practice. A quick look at some excerpts from these standards (Sidebar, When the Auditors Need to be Audited) reveals that they look a lot like Keith's checklist. John suggests that incorporating these standards into the accreditation guidelines might go a long way to address some the issues we have been discussing. We decide to close today's discussion on this relatively positive note.

A final quote from John's editorial leaves us with something to ponder:

"We must acknowledge this trend of over-regulation as foolishly counterproductive to the whole intent of forensic science and redirect our energies to ensuring accurate and fair answers to all the questions posed, not just the ones the "gray box" on the lab bench can answer using the approved cookbook methods. Maybe by bringing the science and its compelling curiosity back to criminalistics, we can retain the new generations of criminalists becoming disenchanted today, and improve our true service to the justice community at the same time."

References

DeHaan, J., Academy News, 35(1), pg. 16, January, 2005; http://www.aafs.org/default.asp?section_id=resources&page_id=academy_news

Rudin N. and Inman, K. Specialist vs. Generalist. CACNews, 1st Quarter, 2002

AAFS Annual Meeting, New Orleans, LA Vol. 11, 2005; http://www.aafs.org/default.asp?section_id=resources&page_id=proceedings

than an understanding of the science underlying the method. Even more troubling, it illustrates a lack of understanding of the basic scientific concepts of precision and accuracy.

9.2 Does the laboratory use reagents that are suitable for the methods employed?

9.2.2 Are reagents labeled with the identity of the reagent, the date of preparation or expiration, and the identity of the individual preparing the reagent?

Comment: 9.2 not met because of non-compliance on 9.2.2. As per lab SOP, it requires that all bottles with reagents be labeled with initials, date, safety and lot number. Majority of reagent bottles at analyst's benches were not labeled with safety. Initials, or date. [sic]

The laboratory explained that the 50 ml tubes of various reagents at each analysts bench contained aliquots from a master batch. The QC lot number on each tube could be traced directly to a log book detailing who made the reagent and preparation and expiration details. The lab agreed that safety information should be added to each personal aliquot. While we agree with this formality, we also hope that anyone actually using the reagents has the minimum training in chemistry to know not to spike their tea with the phenol. Again, however, the inspectors showed a very narrowminded view about how things should be done; it the procedure wasn't exactly what they were familiar with from their own laboratory, they apparently could not apply the critical thinking to ask if it still conformed to the audit guidelines.

4.4Does laboratory monitor the analytical procedures using appropriate controls and standards?

Comment: For amplification, analysts routinely dilute and amplify reagent blanks. If reagent blanks are diluted contamination issued could be hidden. This standard calls for using "appropriate" controls and standards to monitor the analytical procedures. [sic]

The laboratory appropriately responded that nowhere in the standard does it specify how reagent blanks are to be treated. They further specify that follow standard scientific protocol in that they treat reagent blanks exactly like evidence samples; the reagent blank associated with an extraction set is diluted to match the least diluted test samples. Again, the auditors exhibited a rigid, black box understanding of appropriate scientific procedures. Additionally, they make perhaps the most egregious error of all, at least in our book: they ask the WRONG QUESTION. The relevant question is not, did contamination occur, but rather, did any contamination occur that substantively interferes with intelligent interpretation of the evidence samples.

For this inspection team, the answer really is always 42, regardless of what the question is.

Identification of a Non-Operable Firearm to Bullets and Cartridge Cases from a Homicide Fourteen Years Prior

Ronald G. Nichols

Keywords: casts, identification, lead swage, non-operable firearm

Abstract

A recent case involved the comparison of bullets and cartridge cases from a homicide in 1990 to a firearm recovered from a drainage ditch, approximately 12 years later. The firearm was received in a non-operable condition. The various parts of the firearm were cleaned with gun solvent and rust cleaner for purposes of casting and obtaining other relevant test marks. Comparison of these casts and test marks with submitted bullets and cartridge cases resulted in a positive association of the firearm with the crime scene.

Introduction

The case involved the homicide of a restaurant owner in 1990 in Central Texas. The victim was shot multiple times with .25 ACP caliber bullets being removed at autopsy. Such bullets were consistent with .25 ACP caliber cartridge cases recovered at the scene. The primary suspect in the case had, at one time, been in possession of a .25 ACP caliber pistol. However, the suspect indicated that the pistol was no longer in his possession.

Approximately 12 years later, an engineer performing survey work came across a rusted firearm in a drainage ditch. The local police force researched the serial number on the firearm and they found that the suspect from the 12-year old homicide was listed as the owner. Considering that the recovered firearm was .25 ACP caliber and that the suspect had been stopped in the area by police on the night of the murder, the pistol was submitted for comparison with recovered bullets and cartridge cases.

Examination

As submitted, the Raven Arms, .25 ACP caliber pistol was in non-operable condition. It was in a badly rusted and pitted condition and missing its grips. Considering the condition of the weapon, it was dismantled for the purpose of cleaning parts of the firearm that come into contact with cartridges as they are chambered and/or fired. See photos 1 through 4 for condition of frame and slide.

U.S. Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives Forensic Science Laboratory, Walnut Creek, CA



Photo 1: Right side frame, Raven pistol



Photo 2: Left side frame, Raven pistol



Photo 3: Right side slide, Raven pistol



Photo 4: Left side frame, Raven pistol

The firing pin and extractor were removed from the slide assembly. The breech face was cleaned using gun solvent and a brass brush. The brass brush is softer than the metal of the breech face and therefore, would not introduce any extraneous tool marks to the surface of the breech face. Sufficient tool marks on the surface of the breech face were revealed during the cleaning and these marks were cast with Mikrosil(r) for purposes of comparison with the five submitted cartridge cases. See photos 5 and 6 for breech face and cast.



Photo 5: Breech face, Raven pistol



Photo 6: Cast of Breech face

The firing pin was cleaned using gun solvent and a brass brush. Further cleaning was performed using a rust dissolver to aid in the removal of the build-up of rust and other encrusted material while preserving the integrity of the metal used in the manufacture of the firing pin. The cleaning was successful in removing a significant amount of the rust and encrusted material to permit a comparison of the firing pin with the firing pin impressions on the five submitted cartridge cases. See photos 7 and 8 for condition of firing pin prior to treatment with rust dissolver and the extractor, respectively.



Photo 7: FPN prior to treatment (right)



Photo 8: Extractor

The barrel was cleaned using gun solvent and a brass brush. Examination of the muzzle end of the bore revealed that the rifling at the muzzle end, and extending into the bore for approximately 1/8 to 1/4 inch, was in relatively good condition. It appears that this area was plugged with dirt. A piece of lead wire, slightly smaller in diameter than the bore of the firearm, was inserted into the muzzle end of the barrel, supported at the breech, and then swaged to fill the bore. The lead swage was then pushed out of the muzzle end of the barrel from behind. In this manner, the marks produced on this lead swage test would be similar to marks produced on bullets as they exited the bore of the firearm. Mikrosil(r) casts were also prepared of the muzzle end of the barrel. See photo 9 for cast and lead swage.



Photo 9: Lead swage and barrel cast

Comparisons

The five cartridge cases were compared and identified as having been fired in a single, .25 ACP caliber firearm having a breech face with concentric circular marks and a firing pin with a defect on the tip.

The cartridge cases were compared with the cast of the cleaned breech face from the Raven pistol. See photo 10 for an example of the correspondence observed. Mikrosil(r) casts of the firing pin impressions on the cartridge cases were compared with the cleaned firing pin from the Raven pistol. See photo 11 for an example of the correspondence observed. Based on significant correspondence of the breech face marks and the firing pin impressions, it was concluded that the five submitted cartridge cases were fired in the submitted Raven pistol.



Photo 10: Breech face comparison



Photo 11: Firing pin comparison

The five bullets were compared and identified as having been fired in a single, .25 ACP caliber firearm, having six lands and grooves with a left twist.

The swage of the Raven barrel and the Mikrosil(r) cast of the barrel were compared. The markings on the groove impressions demonstrated relatively good agreement. Therefore, it was felt that the potential for subclass characteristics could not be eliminated. The markings on the land impressions demonstrated minimal to no correspondence. Therefore, it was felt that while the marks on the groove impressions would be good for phasing, identification, if any, would have to be based upon the markings in the land impressions.

The swage of the Raven barrel was compared with the five submitted bullets. See photos 12 through 14 for examples of the correspondence observed on three different groove impressions. See photos 15 through 17 for examples of the corre-



Photo 12: Groove impression comparison lead swage on left, exhibit on right



Photo 13: Groove impression comparison lead swage on left, exhibit on right



Photo 14: Groove impression comparison lead swage on left, exhibit on right



Photo 16: Land impression comparison lead swage on left, exhibit on right (distorted)



Photo 15: Land impression comparison lead swage on left, exhibit on right



Photo 17: Land impression comparison lead swage on left, exhibit on right (distorted)

spondence observed on three different land impressions. It was felt that the marks on the land impressions were insufficient among themselves to permit a conclusion that the bullets were fired in the Raven pistol. While the markings on the groove impressions corresponded quite well, subclass characteristics could not be ruled out. Therefore, it was concluded that there was a high likelihood that the five submitted bullets were fired in the submitted Raven pistol.

Conclusions

A case in which an inoperable, rusted and pitted, pistol was examined in an attempt to determine if it fired recovered ammunition components was presented. Despite the badly deteriorated condition, the pistol could be dismantled and the parts adequately cleaned to permit not only the comparison but also the positive association of fired ammunition components to the firearm.



Decorate your lab with official CAC merchandise!

T-shirts, coffee mugs, retractable badge holders! Available at any semiannual seminar and direct from the CAC. Contact Curtis Smith <u>curtis.smith@doj.ca.gov</u>

Just in: CAC 14 oz. stainless steel mugs (\$10), CAC Acrylsteel Mugs in Candied Apple Red and Sapphire Blue (\$12), CAC 8 oz. wine glasses (\$5). Please note: Polo shirts and denim shirts will be available if ordered PRIOR to the seminar. We also have a new shipment of navy blue T-shirts "When your day ends... Ours begins" with chalk outline.

U P C O M I N G M E E T I N G S

2005	Fall: Los Angeles PD
2006	<i>Spring:</i> Contra Costa Sherifi <i>Fall:</i> DOJ Riverside
2007	(North-South Host Swap Occurs) Spring: Orange Co. Sheriff Fall: Jan Bashinski Lab
2008	<i>Spring:</i> San Diego PD <i>Fall:</i> Sacramento DA
2009	<i>Spring:</i> San Bernardino <i>Fall:</i> Santa Clara Co.

Can't Find It?

To reduce the costs of publication, the *CACNews* may place calls for nominations and other items that were previously found in the newsletter mailing as inserts ON THE WEB. Visit www.cacnews.org to see what is offered. Content changes periodically, so visit often!

B O A R D O F D I R E C T O R S

President: Jim Stam

President-Elect: John Simms

Recording Secretary: Mary Hong

> Treasurer: Angelynn Moore

Regional Director: (North) Linda Abuan

Regional Director: (South) Wayne Moorehead

> Membership Secretary: Adam Dutra

> > Editorial Secretary: Ron Nichols

Immediate Past President: Pennie Laferty



San Diego Police Dept. Crime Lab 1401 Broadway MS725 San Diego, CA 92101 (619) 531-2605 jstam@pd.sandiego.gov

San Diego Police Dept. Crime Lab 1401 Broadway MS 725 San Diego, CA 92101 (619) 531-2577 jsimms@pd.sandiego.gov

Orange County Sheriff-Coroner 320 N. Flower St. Santa Ana, CA 92703 (714) 834-6383 mmh@fss.co.orange.ca.us

Jan Bashinski DNA Laboratory 1001 W. Cutting Blvd. Suite 110 Richmond, CA 94804 (510) 620-3311 angel.moore@doj.ca.gov

Forensic Analytical 3777 Depot Road Suite 409 Hayward, CA 94545 (510) 887-8828 labuan@forensica.com

Orange County Sheriff-Coroner 320 N. Flower St. Santa Ana, CA 92703 (714) 834-4510 wkm@fss.co.orange.ca.us

San Diego Police Dept. Crime Lab 1401 Broadway MS725 San Diego, CA 92101 (619) 531-2577 adutra@pd.sandiego.gov

Bureau Alcohol, Tobacco & Firearms 355 N. Wiget Lane Walnut Creek, CA 94598-2413 (925) 280-3623 Ronald.Nichols@atf.gov

Orange County Sheriff-Coroner 320 N. Flower St. Santa Ana, CA 92703 (714) 834-4510 pil@fss.co.orange.ca.us



The "CAC logo" is a registered service mark of the CAC and its use is restricted to official communications and by other authorization of the CAC Board.







Preliminary List of Workshops

The Use of Multi-media Technology in Complex Crime Scene Presentations • Marks Affecting Cartridge Case Identification • Recent Developments in Alcohol Impairment Research • DNA User's Group*

Preliminary List of Presentations**

Forensics in Television • Tryptamines Family of Controlled Substances • Re-investigation of Daniel Rohrbough's Death at Columbine High School • The Andrew Luster Case—The Prosecution of the Max Factor Heir • CSI: Vegas/Miami/New York • Making Friends with the Enemy • Case Review of Robert F. Kennedy, Sharon Tate, Natalie Wood and more • An Overall Review of Evidence in the JonBenet Ramsey Murder Investigation • *and more*!

> *Call for DNA Papers – Contact Stephanie Wilson, DNA Workshop Coordinator (213)847-0061 v8796@lapd.lacity.org

> > **Call For Papers – Contact Jon Babicka, Program Coordinator (213)847-0061 g9426@lapd.lacity.org

SMITHS DETECTION IlluminatiR[™]

Rapid Identification Using SWGDRUG Protocols

PERFORM BOTH CATEGORY A & B TECHNIQUES WITH THE ILLUMINATIR

- Visually inspect the sample using PLM
- Collect individual IR spectra of drugs and cutting agents viewed using PLM
- Automatically search drugs, exipients and cutting agents database to identify drug and cutting agents
- Store image of crystal formation
- Produce one page report that includes micrograph, IR spectra and library results
- Save report in Microsoft Access database
- Analysis done in a couple of minutes



smiths

For more information or a demonstration call or email: USA: + 1.203.207.9700 danbury@smithsdetection.com International: +44 (0) 19 2583 8494 SDDInternational@smithsdetection.com