

The CACNews

News of the California Association of Criminalists • Third Quarter 2011



The President's Desk

Worth the Money

Someone recently asked me why they should be a member of the CAC. That's a fair question. Why should someone spend their hard earned money on dues? (If you are spending your employer's money, congratulations!) So, I sat down to make a list of the benefits of membership. The first thing I thought of were the direct financial benefits, such as seminar registration discounts and reimbursement of ABC exam application fees. If you stick around long enough, you may even become one of our Life Members, who need no longer pay either dues or registration costs. You can get good rates on subscriptions to the *Journal of Forensic Sciences* or *Science & Justice*, two excellent publications. We also have awards that help members attend meetings or take exams that they otherwise could not afford.

On thinking further, I realized that most of the advantages of membership are a little less tangible, but no less important. For example, our members get priority for seats in classes sponsored by the CAC. If you aren't a member, you may miss out on some excellent training. Another intangible benefit is falling under the umbrella of our detailed *Code of Ethics*. While this might seem more of an obligation than an advantage, I would encourage everyone to review the Code occasionally and keep it in mind whenever you encounter a situation that strays from business-as-usual. It can be a guide for clarifying difficult issues. Also remember that our ethics obligations are a two-way street. If you should encounter trouble for acting within the bounds of the *Code of Ethics*, the Association is obligated to come to your aid.

I think, however, that the greatest membership benefit is participation. Members get to participate in the Association to a much greater degree than non-members. While anyone can attend the seminars or read the *CACNews*, only members can vote, serve on committees, or be elected to the Board of Directors. This active participation is becoming more and more crucial as forensic science issues receive public attention. As I write this, there is legislation being crafted at both the federal and state levels that specifically affects crime laboratories. The CAC is in a position to have some influence on these matters. What that really means is that each of our individual members has an opportunity to make a contribution. The board will gladly welcome input from any of our members on any issue that affects the profession. I will be encouraging discussion on various issues over the next year in the members-only forums on the website. You can have an even greater impact by serving on a committee that may be tasked to create a response to legislation or regulation. We have even sent people to Sacramento and Washington to have direct input into the law-making process. I have heard criminalists complain that they have no control over changes happening in the profession, but this does not have to be true. Actively participate in your Association, and you can have a voice. If public policy is not your cup of tea, we have many other activities that require the participation of our members. Take a moment to look at the list of committees on the website and see if you might have some ideas to contribute.

So, is membership worth the money? I think so. Try to get the most bang for your buck: come to as many meetings as possible, share your knowledge and opinions, participate in as many ways as you are able. Most importantly, enjoy the interaction with your fellow professionals and the contributions that you can make to our profession.

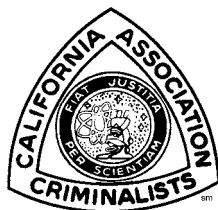
Is membership worth the money? I think so. Try to get the most bang for your buck: come to as many meetings as possible, share your knowledge and opinions, participate in as many ways as you are able.



Kevin Andera
CAC President

A stylized, handwritten signature in dark ink, appearing to read 'Kevin'.

THIRD QUARTER 2011



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Submissions should be made in the form of Windows compatible files on CD or by e-mail. Alternatively, text files may be saved as plain ASCII files without formatting codes, e.g. bold, italic, etc. 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 August 15.

The CACNews

www.cacnews.org



On the cover...

Stephanie Gipson uses a laser tape-measure at the recent CSI sketching workshop aboard the Queen Mary. More photos inside..

INSIDE

"The President's Desk" *President Kevin Andera*..... 2

CACBits / Announcements / Classes 4

Editor's Desk: "Drawing Inspiration from Our Founders"
Greg Matheson 5

The CAC Founders Lecture: "Reflection and Direction"
Lucien Haag 6

Sunday Seminars at Hertzberg-Davis..... 9

Yesterday's News 10

Spring 2011 Seminar Photos..... 12

Spring 2011 Seminar Abstracts 20

Ethical Dilemmas Discussion Corner
Carolyn Gannett..... 27

Book Review: "The Killer of Little Shepherds"
Raymond Davis..... 28

"Identification and Characterization of Glue/Paint Traces Adhering to Transferred Glitter Particles via Synchrotron ATR FTIR Spectromicroscopy"
Robert Blackledge, et al 29

CACBits



CAC members Shawn Kacer (*above*) and Ricci Cooksey appeared in an episode of *Forensic Files* in 2007, discussing their trace evidence recovery inside the automobile of murder suspect Mario Flavio Garcia. (Cooksey was featured in the 3rd Q 2010 issue.)

No "Lunch" in this Issue

Although there is no "Proceedings of Lunch" column in this issue of the *News*, contributors Keith and Norah assure us that there will be one next time. We look forward to the next exciting episode.

Abstract Archive Now Online

At long last, the CAC website now features the abstracts from every paper presented at nearly every CAC seminar since 1954. This archive is searchable by keyword(s) or you can browse the abstracts by individual seminar. Visit: <http://abstracts.cacnews.org> to check it out.

Former CAC Pres., Distinguished Member Faye Springer Retires After 41 Years

Faye's contribution to the CAC and to the field of trace evidence examination is the stuff of legend. Here's what the *CACNews* printed in 1997 when she received a very special honor:

"The California Association of Criminalists presented Faye Springer with the Distinguished Member award at the Spring Seminar held in Sacramento.

"Faye is a criminalist with the Sacramento County Laboratory of Forensic Services.

To be considered for this award a candidate must significantly contribute to the Association. During her 27 year career, most of it with the California Department of Justice, Faye has made significant contributions to the association including: authoring many technical papers, notes and bulletins; chairing the 68th semiannual CAC seminar; serving as president of the CAC in 1987, CAC representative and advisor to TWGMAT and recently winning "Best Paper" at the Sacramento CAC seminar.

"Faye has performed all manner of case work from blood alcohol and narcotic analysis to firearms and impression evidence to crime scene processing and reconstruction to her specialty trace evidence. Those who know Faye comment on her diligence in the profession of forensic science. She can spend countless hours examining all types of trace evidence submitted on complex, challenging and difficult cases. Faye embodies the qualities of the professional, unbiased and selfless criminalist that we hold important when awarding a person as distinguished member. She is always ready to offer help, advice and to share her vast experiences with other criminalists.

"The CAC is proud to honor Faye Springer with the CAC's 1997 Distinguished Member Award. She will join a very special group of previous award winners."

— Shanin Sullivan, Awards Committee Chair



Kirsten Fraser receives the Edward F. Rhodes III Memorial Award from CAC President Kevin Andera.



Stephanie Callian says "He was very excited to get the next issue!"

The Editor's Desk

Drawing Inspiration from Our Founders

Many years ago, the California Association of Criminalists started a tradition which has provided invaluable information and insight for our members. The tradition is the Founders Lecture series. Approximately every third seminar a person is invited to speak about the CAC and criminalistics from their point of view. As the name suggests, the beginning presentations were made by the people who were either involved in the founding of the CAC or were instrumental in the early development of our profession. I have had the opportunity to be in the audience for many of those presentations and have always left with a better understanding of my chosen career and the people who laid the groundwork for what we do today.

As time moved on, the number of founding members available to provide enlightenment has diminished. It is a shame we no longer have them available to remind us of our roots, but it is also a testament to the maturation of our profession. Compared to most professions criminalistics is young, but it has come a long way. To the benefit of us all, the Founders Lecture series has continued. Not with CAC founding members, but with CAC members who have spent their life giving to our profession and our association. They still provide us with information and insight of our progress. Though the name no longer directly identifies the people who are speaking, it helps to reinforce the history and purpose of the presentations. Thanks to the technical capabilities of several CAC members, many of the Founders Lectures can be viewed as video and/or text on the CAC website. The first one available on the web site was given in 1983 and the list continues to the presentation made by Lucien (Luke) Haag at the May 2011 seminar.

I have known Luke for many years and had the opportunity to hear many of his presentations. However, hearing him simply speak about his life, his introduction to criminalistics and his career provided me with new information and insight. I thoroughly enjoyed his presentation. Following his presentation I also enjoyed the opportunity to speak with him and others from his generation. A theme quickly developed in the conversation which continued in a case study presentation made by Luke the following morning. The theme was about the good old days of criminalistics, before accreditation and other limitations to creative analysis and casework approach. A time when criminalists could be true generalists and approach each case in a holistic manner. A time before specialization and the need for doing more with less to ensure productivity meets demand.

In his Founders Lecture presentation, Luke stated "I think about the future; not mine for I'm in the autumn of my life, but I think of yours. And I regret to say that the future of our country and our profession appears dark to me. I hope that I am wrong, but if I am not I sincerely hope that you can do something about it. I submit that you not only have an obligation to constantly learn, to be a teacher but also to speak up and be heard in one way or another on proposed legislation stands to affect our profession as well as the public and the justice system. As experienced criminalists, we know more about the merits and limitations of instrumentation, analytical methods and protocols, than any legislator, panel of academicians who have never worked in a crime lab or gone to a crime scene, or any attorney general, police chief or sheriff. The latter group will invariably cave to political and other pressures when it comes new legislation billed to reduce crime, save lives or improve crime laboratories abilities to detect crime."

In these words, Luke emphasizes what I have stated many times in the pages of the *CACNews*—the importance of getting involved. Though I agree with the pos-

please turn to page 26

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Greg Matheson
CAC Editorial Secretary

THE CAC FOUNDERS LECTURE



Luke Haag

“REFLECTION AND DIRECTION” LUCIEN (LUKE) HAAG

Let me start by saying that I am not one of the “founders” of the CAC but I did *find* the CAC many years ago when I was a student in a two-semester criminalistics course at Cal-State Long Beach in 1963 or ‘64. And my association with the CAC has been a memorable and wonderful relationship for the many years that have followed. By the end of next month I will have been employed as a criminalist for 46 years and a CAC member for 39 years. By the middle of the following month I will be 71 years of age.

I thought that a bit of autobiographical information would be of interest. Not out of some exaggerated sense of self-importance, but because I know that I must seem odd and out of step to many that have some familiarity with me. My constant and seeming all consuming interest in firearms and most anything having to do with firearms may have always troubled some CAC members or made them a bit uneasy. About 10 years ago I offered something of an explanation in the *CACNews* [4th Q 2000] although some of my childhood photographs included in that article may only have increased some readers’ concerns. (I hope that you have noticed that back issues of the *CACNews* have been archived and are accessible on our website going back as far as October of 1971.)

I am a dinosaur; like the dinosaurs, a species that is destined for extinction. But before my kind is gone I’d like you to know how it once was and how I came to be the way I am.

I was born in Springfield, Illinois in July of 1940 and grew up in a small community called Southern View on the south side of Springfield. Everyone there knew everyone. On summer evenings parents sat out in lawn chairs in their front yards. The men shared a beer or two, talked about the recent war, the weather and the government while the women talked about whatever, and we kids chased and captured lightning bugs in jars. At the end of October, my friends and I went trick-or-treating without any parental accompaniment. It simply wasn’t necessary in those wonderful times. In winter we hitched rides with our sleds on the back of cars as they came to a stop on snow-covered streets at one of the local four-way stop intersections. (There were no traffic lights in Southern View.)

None of you here today will ever know or experience these things because of today’s child predators, possible poisoned candy, new laws, regulations, claims and possible charges of child abuse or child endangerment for some of the things our parents did or allowed us to do.

Our parents were patriotic, conservative Midwesterners that had a strong belief in personal responsibility. Mine were strict when they needed to be. I got spanked when I deserved it. My father’s assurances of punitive measures for postulated bad behavior were not idle ones and I took them seriously. At the same time my father would take me hunting, fishing and spelunking dependent upon the time of year; the latter activity taking place in caves in eastern Missouri and northern Arkansas. Whether successful or not, the hunting and fishing trips would usually culminate in some informal target shooting with a BB gun and later a .22 rifle. I came to enjoy the personal challenge of marksmanship starting with my Red Ryder lever action BB gun (that I still have) and my interest in recreational shooting has continued to this day.

How Jean Shepherd, the author of “A Christmas Story” found out about my childhood I will never know, but I am and I was the little boy in that story to include a confrontation and fight with Southern View’s version of Scut Farkus. I also experienced the taste of Lifebuoy soap for unacceptable language on more than one occasion and even broke a lens in my glasses with a BB that rebounded from a beam in uncle Vic’s barn on my very first attempt to rid it of starlings roosting in the loft.

For boy approaching adolescence in the late 1940s and early 1950s to be given a 20-gauge shotgun and a single shot .22 rifle was part of the right of passage. It was also a strong statement of responsibility from my father—I was being entrusted with two firearms that could put some food on the table, or if misused, kill me or one of my friends.

But I think it was the mystery associated with the discharge of firearms and my gradually developing scientific bent that intrigued me the most. Events occur with firearms faster than the eye could follow: ignition, the launch of the projectile and a seemingly instantaneous effect of the bullet many yards down range. I didn’t know it then but my forensic career started the day I straddled a railroad track behind my house on 3rd street and ricocheted a full 50-round box of .22 rimfire bullets off of that steel rail. I searched and searched for one of those bullets without any success although I had a good idea of what they would look like from the oval grey deposits of lead on the rail and the wonderful sound they made as they departed and soon struck the ground at a distance estimated to be 50 or hundred yards down range.

In recent years, I have returned to the village of Southern View several times—Springfield’s version of Mayberry. These visits have a *Twilight Zone* quality about them. The trees have grown taller, the houses have become smaller and the distances between them shorter. The apple orchard next to the

Southern View Elementary School has been replaced with a Dollar Store, Eddie Jansen's family market across the street is no more nor is Pat the Barber's shop next-door to Jansen's where my childhood haircuts cost 50 cents. At least some of the fields and hedgerows that I hunted are still there viewed from a distance but upon closer inspection are no longer accessible having "No Trespassing" and "No Hunting" signs every one-hundred feet or so.

By the time I was in high school my father's work had taken us to Southern California and the small town of Lynwood just a few miles north of where we are today. While others were going to football games, dances, surfing or hanging out at one more of the local drive-ins in pinstriped and flame-job cars customized by Barris right there in Lynwood, my small circle of shooting buddies and I were off to the desert most every weekend.

The high school had a rifle team that I had joined. I became an avid handloader of ammunition for a growing collection of firearms. This is an endeavor that has strong scientific underpinnings and provided continuing opportunities for experimentation, many of which would later become applicable to forensic questions involving firearms and shooting scene reconstruction.

The weekends at various remote campsites in the Mojave Desert to the northeast of Lucerne Valley were more than just opportunities to go shooting; they also involve some basic experimentation in exterior and terminal ballistics.

A few years ago on a drive from Carefree, Arizona to Bakersfield, I tried to get out to one of my favorite campsites only to find it closed to public entry for the protection of some lizard or rat—another closure on a past life that was so memorable and formative.

Just to reassure you, that I wasn't quite so unidimensional as these reminiscences might suggest, I was in the Lyn-

wood High School band where I saw the girl there knew I wanted to marry someday. She is here today just as beautiful as I remember her. Her name at the time was Sandi Svendsen (Svendsen with a D). Sandi was the girl next door in that we lived on the same street and she would walk by my house on her way home from school nearly every day.

Her father was an accomplished marksman and commercial photographer with the nickname of 'Trig', short for 'Trigger' so you can well imagine that we got along quite well. Among other things he was the commercial photographer for Roy Weatherby of the famous Weatherby Firearms Company then located in nearby South Gate, California. But before I convinced Sandi to marry me, I went away to Cal Berkeley for a few years to get a degree in chemistry convinced that she would be smitten by some handsome jock on the football team or accomplished musician. That didn't happen and I'm still not sure why but I have been so much the better for it and our marriage of 47 years.

It's probably hard for most of you to believe that even Cal Berkeley had a rifle team in 1961 but my studies and other activities kept me too busy to participate. I was able to keep one of my high-powered rifles at the residence hall, a 6.5x55mm Mauser equipped with an awesome telescopic sight in the off chance that I might go hunting with a friend in the mountains of northern California. This rifle and its handloaded ammunition were kept in the housemother's residence at Bowles Hall. Now it's probably a felony to be within a certain distance of any school with a firearm and today the taking of even a cased one out of the trunk of my car at that residence hall would no doubt result in a response from a SWAT team.

Unlike a number of the CAC's founders, I did not know of Paul Kirk and his program when I was graduated from Cal in 1963. My degree was simply in chemistry. I wouldn't discover criminalistics and find the CAC until the fall of that year. This was when I went to Cal-State Long Beach with the idea of becoming a teacher. One of my former shooting buddies, now a Lynwood police officer, urged me to take Dewayne Wolfer's criminalistics course. This I did and this was followed by the second semester course. During this time Dewayne invited me to attend a CAC meeting somewhere here in the area (Long Beach-Newport Beach) and even give a paper (which I did—a presentation on the separation of dyes in ballpoint pen inks by paper chromatography). At this meeting and possibly a subsequent CAC meeting I met Jack Cadman, Tony Longhetti, Larry Ragle, Marty Klein, Jim Brackett and other senior members of the CAC. Their presentations and personal encouragement were inspirational. Dewayne also invited me down to the LAPD crime lab where I met Ray Pinker and had a chance to see what criminalistics was all about. I was hooked. All that remained was, where could I find a job in a crime lab? I had taken and passed the written test for positions at the LAPD, the LA County Sheriff's lab in the Ventura lab when DeWayne once again entered my future when he told me about an opening in a one-man lab in Phoenix Arizona. I took and passed various tests for the City of Phoenix and started there as an entry-level criminalist in June of 1965. That laboratory grew exponentially in the years to come as did Phoenix. By 1973 I became the supervising criminalist with a number of criminalists under me. I had worked in all sections of the laboratory but the firearms section was my favorite for obvious reasons. This was the age of the generalist another species that is probably destined for extinction.

“Dewayne also invited me down to the LAPD crime lab where I met Ray Pinker and had a chance to see what criminalistics was all about. I was hooked.”



(l-r) Matt, Luke, Sandi and Mike Haag.

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CAC Founders Lecture, cont'd

The City of Phoenix was very supportive of professional advancement and I had joined the CAC, AFTE and the American Academy of Forensic Sciences by this time and had attended a number of meetings held by these organizations. These meetings broaden my contacts with other criminalists such as John Thornton, John DeHaan, Jan Bashinski, Faye Springer, Jim White, Ed Rhodes, Al Biasotti, John Davis, David Burd, Chuck Morton, Jerry Chisum and Peter Barnett to name a very memorable few.

"Money should be the fringe benefit of working in a field or profession you enjoy."



Luke Haag

I started writing and presenting in the early 1970s. This arose out of a desire to do so and what I felt then, and still believe today is an obligation of every criminalist.

I left the City of Phoenix Crime Lab in March of 1982 and entered full-time consulting. Today I am gradually entering some form of retirement. This involves less and less casework and the opportunity to engage in more experimentation and writing. I can only hope that when I depart this life, it will be with remaining projects and experiments to do and things yet to be written. These I will leave to some of you.

Some closing thoughts:

Court appearances and testimony are often the end result of our work and can be the most daunting and stressful aspect of it. One of the actors in this arena is a facilitator; there to elicit your findings favorable to his or her position. The other actor is your detractor, or cross-examiner. This person's role may simply be to point out the limitations of your findings and those relevant matters in the case that you could not answer. But it may also extend to personal attacks, suggestions of bias, intellectual dishonesty and/or unethical conduct.

You should realize that there're often as many as 3 to 4 truthful answers to certain questions put to you in court. How would you answer this question from your cross-examiner? Isn't it true that you are an advocate? "Yes" or "No" could both be truthful answers. But the question is ambiguous so an alternative, still truthful answer might be, "In what way do you mean?" or "An advocate for what or whom?" But asking a question as an expert witness sitting on the witness stand may precipitate an admonition from the judge to answer the question. My answer to this question posed to me many years ago was "Yes, absolutely, but not in the way your question would seem to suggest." This prompt, affirmative response accomplishes at least two things: One, it exposes the ambiguity in the question and either forces the cross-examiner to allow you to explain (and remain in control), or two, it forces him to drop it immediately, realizing that he has been bested, and it will allow the attorney who has called you to the witness stand to have you later explain your answer.

One additional comment on this courtroom exchange; a seemingly similar answer "Yes, absolutely, but not in the way you mean," will probably get you in trouble in that it puts you in the role of a mind reader. My point here is that words and how we use them are absolutely critical in our role as criminalists and expert witnesses. You must devote time to choosing just the right words for a report and answers to questions put to you in trials and depositions. Transcripts of poorly worded testimony and badly written reports seldom go away.

John Murdock once commented in a telephone conversation, "I've never lost a case", and after a short pause "I've also never won a case." I immediately understood and have never forgotten his wise and thoughtful statement nor should you.

Don't take a jury's decision as an affirmation of your work or the correctness of your findings when the jury rules in favor of the side that called you to the witness stand. If the jury appears to understand what you did, how you did it and what you found, this should be the test and your only concern as a forensic scientist.

So for whom do you work? Who pays your salary or fees? The answers to these two questions are not, or at least should not be the same. In a profession I would hope that you work for yourself. Someone else, a government agency, a private institute or a law firm pays for your efforts.

On being a teacher and a student:

To be a good criminalist you must also be a good teacher. The qualities of a good witness at trial are also those of a good teacher. Your class is the jury.

The preparation and presentation of papers at professional meetings is an important aspect in developing communication skills from the witness stand. I would even view it as an obligation to the profession.

There is also a complementary matter of being a good student. You should come away from every trial, every deposition, every interview and certainly every CAC meeting with something special, something new to remember or consider in your future work and testimony.

In this new age of specialization, CAC and other professional meetings give you the chance to gain a better understanding of what occurs in other areas of criminalistics and the sorts of analytical questions they can answer. Such knowledge is absolutely essential to being a competent criminalist.

From a broader, long-term viewpoint, one can never be sure where teacher's influence will lead or end but the objec-

tive should be clear. It is to see that future day or time when the student teaches the teacher. This is as it should be. It is how we advance.

Our future direction:

I think about the future; not mine for I'm in the autumn of my life, but I think of yours. And I regret to say that the future of our country and our profession appears dark to me. I hope that I am wrong, but if I am not I sincerely hope that you can do something about it. I submit that you not only have an obligation to constantly learn, to be a teacher but also to speak up and be heard in one way or another on proposed legislation stands to affect our profession as well as the public and the justice system. As experienced criminalists, we know more about the merits and limitations of instrumentation, analytical methods and protocols, than any legislator, panel of academicians who have never worked in a crime lab or gone to a crime scene, or any attorney general, police chief or sheriff. The latter group will invariably cave to political and other pressures when it comes new legislation billed to reduce crime, save lives or improve crime laboratories abilities to detect crime.

I also regret that you will probably never know how it once was; to receive a case with new issues and one or more types of evidence for which there was no established and validated method of analysis. We had to think out an analytical strategy, perhaps do some empirical testing before we tackle the actual evidence. It was exciting. After 45 years I'm still enamored by the notion of how science can aid the courts in the pursuit of justice. Please note that I did not restrict this statement to the criminal justice system. They are also civil actions that have scientific issues and consequences for our profession; the *Daubert* case being the most notable example.

In those times long before ASCLD/LAB accreditation and now ISO-whatever, we used our intellect to design and conduct our analysis. We noted what we did and would ultimately explain and defend our analysis in court. In my view the jury is still out as to whether there have been more benefits than detriments as a result of accreditation.

I wish that every one of you could see the things that I have seen and have met the various founders of this organization from so many, many years ago. In my mind I can still hear their voices and see them at the podium at some long past CAC meeting.

Some closing thoughts and advice:

Money should be the fringe benefit of working in a field or profession you enjoy.

As long as you have a functioning mind, you should continue to learn from your experiences, your observations and the work of others. Find out what others in the field are doing and how it might relate to your own area of special interests. Learn as if you were to live forever.

Read anything and everything written by John Thornton, John Murdock, Ron Nichols, Peter De Forest, Keith Inman and Norah Rudin. They are some of the CAC's finest thinkers and writers. Review the many ethical dilemmas written by Pete Barnett and the late Parker Bell. These were published in the CACnews in the early 1980s and are very worthwhile and I would hope that they could all be available someday in a single place on our website. Better still you should consider Pete's book, *"Ethics in Forensic Science: Professional Standards for the Practice of Criminalists"* published in 2001 by the CRC press. Follow Ed Blake's advice given some years ago at a CAC banquet (which I hastily wrote down on a paper napkin): "If in your analysis, you do not consider reasonable alternative explanations for an event, what you are doing is not science." Digest and adopt John Thornton's advice regarding evidence given many years ago during a CAC ethics discussion or investigation: "It's not your evidence or my evidence but the court's evidence which we hold in trust should the court choose to accept it."

As for my personal hopes for each of you as criminalists, may all your days be filled with childlike excitement for what lies before you. That is how mine has been.

So now you needn't ponder—"Luke we get the clear impression that you've been a criminalist all your life." And ask, "Is this true?"

You now know the answer, and it is: Not yet!



Don Johnson

Sunday Seminars at Hertzberg-Davis

The Hertzberg-Davis Forensic Science Center has become a weekend public attraction. Professor Donald Johnson of the School of Criminal justice and Criminalistics has partnered with the Los Angeles Visionaries Association (LAVA) and Esotouric™ to offer Sunday seminars on forensic science for the general public. The proceeds from the events support graduate student research projects. Our event on April 17th featured Senior Criminalists Lynne Herold of the Los Angeles County Sheriff's Department, who gave three insightful lectures to an audience of over 80 people at the Center. Dr. Herold discussed the basics of trace and bloodstain pattern evidence, which served as a foundation for her crowning presentation on the Phil Spector case. To complete the day, workshops were conducted on trace, footwear, and blood evidence by our criminalistics graduate students to offer the attendees hands-on experience with forensic techniques. Many attendees additionally purchased "spatter art" to support the graduate program. We wish to thank Dr. Herold for her support of our program. For further information on these events, please contact Don Johnson at djohnso5@exchange.calstatela.edu.

Yesterday's News

- 40 YEARS AGO IN THE CACNews...

"MAKE SURE YOUR VOTE IS CAST AT THE NEXT CAC BUSINESS Meeting October 1971

Our organization now has 134 members, and this number will be increased at the next business meeting. Since we are now such a large organization and since many members are not able to attend the semi-annual meetings, it is becoming difficult to obtain a quorum. I am sure that all members are interested in the association, otherwise membership would be small. If you find that you cannot attend the next business meeting, PLEASE clip the form below and give it to a member attending, along with instructions as to how you wish your vote cast. This is your organization and I am sure you wish to have a voice in its future."

—Gerald Mitosinka, *Ed Sect'y Oct, 1971*

- 30 YEARS AGO IN THE CACNews...

"The CAC is something of which we can be proud. It is the oldest of the regional forensic organizations and people all over the country look to it for leadership in new and better ideas.

It's not without its warts, however. We have had some rocky times recently. But things are rarely smooth for the pioneers and we have been pioneers in establishing and testing a code of behavior. We've made some mistakes; but we learned from each one. We are now better able to handle new challenges more quickly and more fairly than ever before. The recent controversy in England about Clift and Horncastle shows us just how much better off *we* are. Our esteemed colleagues in the Forensic Science Society are now, bitterly divided and have turned against their Board of Directors. Some have radically demanded instant and complete ouster and a tree-stump election of new officers. Respected scientists have made outrageous statements to the press about their own colleagues. The turmoil surrounding the Society and its members is in marked contrast to the "troubles" within the CAC.

A professional organization is a ship that requires many years to build and fit. It takes energy to get it moving and keep it moving and needs an able crew to keep it on course. The parallels are striking: The Academy, seaworthy as it is, so large-and massive of inertia that mere mortals can no longer change its course. It is the supertanker of organizations. Requiring a large crew, it is not speedy or responsive but it does get the job done. Newer forensic organizations are small sailing craft—still drifting about to find their course; a bit leaky as they cross the same rough seas the CAC has crossed; and easily swamped. The CAC is the largest and fleetest of the "Cape Horn" sailing ships. Requiring a steady hand on the wheel and an eager crew, that's true. But capable and efficient in the face of rough weather, it is indeed. . . ."

—John DeHaan *Dec., 1981*

- 20 YEARS AGO IN THE CACNews...

ASSISTANT FORENSIC SEROLOGIST

No experience, but requiring a minimum of a Bachelor's degree in Biology, Molecular Biology, Biochemistry, Chemistry or Forensic Science. Other major science degrees may be considered. We are looking for a person with a genuine interest in forensic serology and having completed course work or projects(s) in this area will be useful. Salary is \$26,000 plus benefits.

—SERI *job announcement Winter 1991*

- 10 YEARS AGO IN THE CACNews...

". . . The show opens appropriately with "Who Are You?" by *The Who*, while dramatic lighting and quirky camera angles along with a tense, pounding musical score heighten the drama. The mood is dark and there's a feeling of grim responsibility weighing heavily on our heroes—"We have so much power in this job," one sighs. But criminalists are made to look like wizards, reaching conclusion after conclusion with little actual analysis. If only it were so! Scientific-sounding commands are barked out, "Reverse algorithm on that tape and then enhance it!" These are followed by quizzical looks on the faces of the ever loyal detectives who follow the energetic scientists around. Kind of the *Mod Squad* of forensic science.

C.S.I.'s executive producer is Jerry Bruckheimer, an old hand at making action films including *Beverly Hills Cop* and *Enemy of the State*. And, like any good mystery, there's a payoff scene at the end where the suspect/victim/witness is confronted by the scientist with proof of what really happened. How I long for a show about forensic science that is realistic and true. There have been some great shows on cable, *Medical Detectives* being one, but as popular as those shows might be, they are like preaching to the choir. The millions of viewers that only casually watch a show like *C.S.I.* and then open up their jury summons are the ones I want to influence. . . ."

—John Houde *1st Q 2001*

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EXPLORING THE DEPTHS...

The CAC's first-ever shipboard seminar was launched with great anticipation. As this meeting was a joint CAC/Forensic Science Society effort, the ship that made so many trips between the US and UK seemed especially apropos. 157 "passengers" and 21 vendors made the journey without a single case of seasickness being reported. The week got off to a busy start with armorer school, crime scene sketching, QA management, DNA and tape examination workshops. Jamie Daughtee and Kirsten Fraser led a team of dedicated personnel —Betty Urizar, Luis Olmos, Cheryl Anderson, Christine Pinto, Anny Wu, Byron Turner, Karia Taylor, Jan Jones, George Hou, Nathan Lind, Eric Wahoske and graphic design by Lynn Willers— from the LA county sheriff's lab in creating an unique meeting atmosphere, one sure to be talked about for years. If you missed it, plan now to attend the next CAC seminar!



The Queen Mary experience began with a check-in at the host's table (left), a board of director's meeting (below) and workshops (top and next page).





WORKSHOPS!

(clockwise from top left) Discussing CSI sketching strategy, Ruger armorer's course, CSI sketching, pressure-sensitive tape exam, DNA, QA management.

The general meeting set sail with LA Co. Sheriff Baca's welcome, vendor's exhibits, technical presentations, a business meeting and a chance to catch up with friends over wine and cheese...





One of the best parts of the CAC/FSSoc joint meeting was getting to make new friends and colleagues from the UK.



Cecilia von Beroldingen (above) along with Fred Tullen-ers will be your co-hosts for the upcoming fall 2011 CAC seminar.



New faces on the CAC Board: Treasurer Laura Silva, and President Elect Todd Weller.





Seminar Poster Session presenters:(clockwise from top left) Catherine Aldoriso, Christopher Dal Chele and Maryam Nickooshiam (with CAC President Kevin Andera). See Abstracts in this issue for details on their presentations.





The exchanging of the gifts: CAC President Adam Dutra presents framed memorabilia from each of the joint meetings. FSSoc President Ann Priston presents a plate with our respective organization's logos engraved in silver.



The torch (well, coconut) is passed as outgoing CAC President Adam Dutra welcomes incoming President Kevin Andera.



Todd Weller receives the Alfred A. Biasotti Most Outstanding Presentation Award for his paper on Ruger breechface microscopy delivered at the fall meeting in Oakland.

Also receiving CAC Service Awards:

Chris Coleman (Training and Resource Comm.)
 Carolyn Gannett (CACNews contributions)
 Connie Milton (Training and Resource Comm.)
 Eric Wahoske (Financial Review Comm.)
 Mary Hong (Immed. Past President)
 Michael Parigian (Treasurer)
 Suzette Sanders (Ethics Comm.)
 Todd Weller (Endowment Comm.)



***For their contributions in creating the
 online database of CAC Abstracts:***

Annette Kiewietdejonge; Ariel Lising; Chris Coleman; Elizabeth Thompson; Eric Halsing; Joseph Cavaleri; Veronica Chiquillo; Jim Stam; Connie Milton and Nancy Marte.

And then there was the banquet!



CAC/FSSoc Spring Meeting Abstracts

The Murder of LA County Police Captain Sparkes

Christina Gonzalez¹, J.J. Cavaleri¹, James Carroll¹ and Phillip R. Stirling²

¹Los Angeles County Sheriff's Department Scientific Services Bureau; ²Los Angeles County District Attorney's Office

On August 10, 2004, Captain Michael Sparkes of the Los Angeles County Office of Public Safety was shot and killed when he identified himself and attempted to take action against two suspects as they attempted to rob him while he was off duty. Captain Michael Sparkes was taking a predawn bike ride near his home in South Central Los Angeles when he was confronted by two gang members. One of the suspects was armed with a high powered rifle. Shots were exchanged between Captain Sparkes and the suspects. Despite being mortally wounded, Captain Sparkes was able to provide a description of the two suspects. The Captain was transported to Harbor General Hospital, which was a location he had been assigned to protect. Tragically, he succumbed to his wounds at the hospital. Fortunately, the exchange of gunfire provided a variety of strong associative evidence including ballistics, trace and DNA evidence.

Visualizing Latent Blood at Crime Scenes Using a Prototype Mid-IR Imaging System

Stephen I. Morgan, Michael I. Myrick*, Heather Brooke, Megan R. Baranowski, Jessica N. McCutcheon

Dept of Chemistry and Biochemistry, Univ. of South Carolina

Current visualization methods for blood and semen are not specific, require dark conditions, potentially contaminate the crime scene, and may not always be sensitive. High discriminating power is important at crime scenes so that time and resources of forensic investigators are not wasted on the collection and analysis of false positive samples. We have designed a prototype portable system based on mid-infrared (IR) diffuse reflectance for visualization of latent blood stains. Lock-in amplifier techniques are used to construct the contrast image of the scene on a pixel-by-pixel basis in real-time, using techniques designed to enhance visualization of blood. An infrared source (e.g., a small heating plate, glow-bar, or space heater) is employed to illuminate a scene with IR light. Light reflected from the scene is employed to achieve imaging by chopping the light source and digitally processing each pixel by a lock-in amplifier approach, to produce an output that is proportional to contrast between stained and unstained regions. Factors involved in optimizing discrimination with optical filtering include, but are not limited to, the detector response, optical throughput of the system, optical properties of the samples, and optical properties of the materials for sensitizing films/filters. The infrared camera response is sensitized to spectral regions where blood compo-

nents (e.g., proteins) show absorbance using a combinatorial simulation-driven design process that selects chemical filters to maximize discrimination between blood-stained and unstained surfaces.

This approach has produced acceptably high signal-to-noise ratios and enabled visualization of blood well below bOX dilutions with visible contrast, while providing discrimination against some substances reported to give false-positive response with other techniques. Besides being rapid, IR imaging for bloodstain detection offers advantages: examiners are not exposed to chemicals, the technique can be used indoors or outdoors under ambient light, patterns are not smeared, and stains are not diluted or altered by chemical reagents. Most importantly, sampling for potential blood stains can be limited to areas producing image contrast indicative of blood. We have concurrently conducted fundamental studies to advance the scientific basis, and our understanding of, infrared imaging for crime scene visualization. Although additional instrument development and validation is required to realize our goals, this work has opened novel and intriguing forensic applications for imaging based on diffuse reflectance in the mid-infrared region of the spectrum.

Density Detennination via Magnetic Levitation

Matthew R. Lockett¹, Katherine A. Mirica¹, Charles R. Mace¹, Robert Blackledge*, George Whitesides¹

¹Dept. of Chemistry and Chemical Biology, Harvard University

Density is one parameter that may be used to characterize a trace object. Although the formula for density (or specific gravity) is simply mass divided by volume, this is not so easily done for tiny, irregularly-shaped objects. In the past the density of small objects has been compared/determined using the sink/float method of Paul Kirk. When the tested objects suspended in a liquid medium neither rose to the surface nor sank to the bottom, their density was the same as the liquid. This could be a slow process as the liquid medium was gradually made less or more dense by the addition of drops of either a miscible heavier or lighter liquid followed by mixing. Once this equilibrium point had been reached, one could determine the density of the liquid and hence the density of the object by removing sufficient liquid to fill a previously-weighed pycnometer and then weigh the now full pycnometer. One could then obtain an actual value of density that could be entered into a database.

This talk will introduce an entirely different method of obtaining density that is quick (just a few minutes), requires no expensive instrumentation (not even a source of electrical power), does not require highly-trained operators, does not destroy the sample, is readily calibrated with a series of density standards, provides values that can be entered into a searchable database, and that can distinguish between samples whose density differs by as little as 0.0002 g/cm³. The method is based on magnetic levitation (MagLev) and involves placing diamagnetic samples into a container filled with a paramagnetic fluid, which is then placed between two permanent magnets. The vertical position of the sample, in the presence of the magnetic field, correlates with density. The vertical position of the sample is independent of mass and/or volume, and thus eliminates the need for standardized sample sizes. Results will be shown from eleven different

glitter samples, six different commercial smokeless gunpowder samples, and glitter particles extracted from a brand of commercial nail polish. And lastly, for any do-it-yourselfers in the audience, we will show you how to easily and inexpensively make your own MagLev (such a deal!).

Forensic Discrimination of Dyed Textile Fibers Using UV/Visible Microspectrophotometry and Micro-extraction/Liquid Chromatography/Mass Spectrometry

Stephen I. Morgan, Oscar G. Cabrices, Scott J. Hoy, and James E. Hendrix

Dept of Chemistry and Biochemistry, Univ. of South Carolina

Trace evidence has taken on a role of increasing importance in forensic investigations. The principle that "every contact leaves a trace" establishes the potential value of minute traces of evidence found at the crime scene, or found on a victim or suspect. Fiber evidence is class evidence (*i.e.*, not unique), because many fibers from different sources could be indistinguishable. The discovery of a fiber and its identification as a particular fiber type (*e.g.*, acrylic, cotton, nylon, polyester) may not, of itself, provide much support for a forensic investigation. The probative value of particular fibers found at a crime scene depends on their uniqueness relative to the background of fibers normally encountered at that location in the absence of the crime. What is often required is information that makes the trace evidence more specific and discriminating.

Our research has addressed the task of achieving greater discrimination between trace evidence fibers in two different ways: by the use of UV/visible absorbance and fluorescence microspectrophotometry (MSP), and by micro-extraction/capillary electrophoresis (CE) and by CE/mass spectrometry (MS). In forensic fiber comparisons, when spectra of known and questioned fibers are consistent, the hypothesis that the fibers originate from a common source should not be rejected.

We have applied pattern recognition techniques to fiber spectra and found MSP to exhibit high discriminating ability for comparisons among different fibers. However, fibers dyed with different dye formulations can have similar color and spectra; MSP does not identify the dyes present and cannot guarantee chemical equivalence of two fibers. After extraction of dyes from a fiber, however, LC/MS can separate extracted dye components and provide semi-quantitative estimates of dye amounts as well as qualitative information to identify the dye present (via the molecular weight and mass spectra).

Although this approach is destructive to the sample, only an extremely small sample is required (~1-2 mm of a single 15 μ m diameter fiber). Automated micro-extractions and CE offer analysis with %RSDs ranging from 5-25% and with limits of detection in the picogram range.

Forensic Examination of Clothing

Jane Moira Taupin

Forensic Consultant Melbourne, Australia

Clothing items are part of everyday life and thus are one of the most commonly encountered exhibits in crimes of violence. The construction of clothing means that it can be a repository for a wide variety of useful information. Garments may retain various types of evidence that have been deposited

onto them in a wide variety of ways, most importantly during the crime event, often for many years and even decades. Clothing items have most often been worn on the body and consequently special features need to be considered. The garment may have travelled from one scene to another, may not have been stationary during the commission of the crime, or may even have been worn by someone else prior to, or subsequent to, the crime. There may be damage associated with deposits and deposits associated with particular actions and movements. With the advent of DNA profiling and the analysis of 'wearer' DNA, clothing items hold even more evidential value. The examination of clothing may not only provide associative evidence with persons or locations, but also tell the examiner a "story" as to what happened during a crime event, similar to a crime scene reconstruction. In some cases, a garment or a series of garments may be considered a 'crime scene'.

This presentation will describe some important aspects of clothing examination and a preferred approach using the scientific method. One of the critical aspects of clothing examination is the observation or 'searching' process. Searching for evidence is more than looking for a target evidence type. Successful searching requires presumptions, expectations and preliminary hypotheses. If the search for evidence is also reduced to a 'screen' then one of the most important phases of clothing examination is also reduced in importance.

Qualified criteria in clothing examination will be described which include hypothesis testing and testing decisions that can withstand scrutiny. Knowledge of clothing construction is also desirable especially when examining trace evidence or clothing damage. A holistic approach to clothing examination will be discussed that considers all elements of evidence recovered from the clothing examination and the how and why of the relationships between that evidence. In this way, maximum evidential value may be obtained from clothing exhibits related to a crime.

Crime Scene Evidence Dynamics

Jerry Chisum

The following two cases were presented to me for reconstruction, both were looked at by publicly employed criminalists. They did not support the DA's theory in either case. An outside expert was employed by the DA. In the first case, a man was accused of shooting his wife. The prosecution expert said it was obvious that it was a homicide. The scene was confused by the movement of the body and the physical evidence. The second case was re-studied after 15 years. The DA decided to prosecute. The same outside expert was hired. He failed to note the evidence dynamics in the case and concluded that the position of the body was because the defendant held the victim in a wrestling hold while the other one shot the victim in the head twice. The defendant had studied martial arts.

Validation off Perma-Gel® for Ballistic Testing

Joanna Law

Los Angeles Co. Sheriff's Dept. Scientific Services Bureau

The study of terminal ballistics plays a vital role in ammunition selection for law enforcement. In order to study ammunition performance, many bullet manufacturers and law enforcement ballistics researchers have tested various hu-

Abstracts, cont'd

man tissue simulants, such as paraffin, soap, wood, and clay. Among such simulants, it has been found that the 10% gelatin composed from organic swine matter and water displays characteristics that are most similar to human tissue when struck with projectiles of small firearms. However, the preparation of the 10% gelatin has varied among researchers as gelatin manufactures lacked to provide detailed instructions and research that has shown that the gelatin needs to be stored at 4°C for no more than 36 hours. Due to such limitations, many manufactures have advertised new ballistic tissue stimulants—among these companies is PERMA-Gel®.

PERMA-Gel® claims to have developed a ballistic gelatin that not only has the ability to be stored at room temperature for a limited amount of shelf time, it can also be reused up to fifteen times and is also more elastic in nature, mimicking the human tissue's elasticity much more than the traditional 10% ballistic gelatin.

In this study, the claims made by PERMA-Gel® will be validated by comparing the results of terminal ballistics of PERMA-Gel® to that of the 10% ballistic gelatin. Penetration and bullet diameter after impact of 9mm Speer Gold-Dot ammunition shot from a Model 19 Glock were compared. It was found that the depth of penetration is much more with PERMA-Gel® than the 10% ballistic gelatin; however, this does not affect bullet expansion.

PERMA-Gel® was also much more transparent and elastic than the 10% ballistic gelatin, making it easier to visualize bullet performance. Discoloration of the PERMA-Gel® gelatin is associated with overheating during the re-melting procedure, and even then it is still much easier to visualize bullet performance, when compared to the 10% ordnance gelatin. Despite over heating during re-melting, PERMA-Gel® was still reusable up to ten times.

The second focus of this study is to determine if PERMA-Gel® can be used to study what happens to a hollow-point bullet when shot through several layers of clothing mimicking what a human target might be wearing. Using the same ammunition and gun as in the first part of the study, one block of PERMA-Gel® was placed in contact with a couple of layers of denim, a layer of sweat shirt material and cotton. It was found that that the hollow-point bullet nose became clogged with the fabric as it passed through the gelatin obtaining the flight characteristics of a full metal jacket or a round nosed lead bullet. Due to the results in this study, PERMA-Gel® is deemed a valid gelatin for ballistic studies.

The Forensic Science Society as a Professional Body

Dr. Carol Ostell

CEO Forensic Science Society, North Yorkshire, UK

I will aim to discuss what is meant by a professional body and how the Forensic Science Society has progressed since becoming a professional body in 2004. The contribution of the Society to quality standards and its impact in the educational arena will be detailed. Recent developments in regard to the introduction of chartered status and the Forensic Science Society Register of Chartered Forensic Practitioners will also be covered. Finally, the importance of collaborative and partnership, working our representation on national committees and contribution to debates will draw the presentation to a close.

The Confocal Microscopy Analysis of Ten Consecutively Manufactured Ruger P95 Breech Faces

Todd Weller

Oakland Police Dept. Crime Laboratory

This presentation will show the results of confocal microscopy analysis often consecutively manufactured pistol slides. Confocal microscopy allows one to collect and numerically record, three-dimensional topography. The purpose of this study was to use this technique to study test fires recovered from pistols with consecutively manufactured breech faces. This study provides numerical, objective validation that consecutively manufactured firearms can be distinguished from each other using the marks left on fired cartridge casings. Additionally, this study provides objective validation that cartridge cases can be associated to a firearm through the comparison of these same markings.

The Jasmine Fiore Homicide

Jeanne Putinier

Orange County Sheriff-Coroner Department Crime Lab

On the morning of August 15, 2009, the nude and mutilated body of a female was discovered in a suitcase inside a dumpster at an apartment complex in the city of Buena Park, CA. The body was later identified as that of swimsuit model Jasmine Fiore based on the serial numbers associated with her breast implants. The case gained international attention when it was discovered that reality TV personality and Canadian citizen, Ryan Jenkins, was the prime suspect. The search for evidence (and Jenkins) led Buena Park Police detectives from San Diego, CA to Blaine, WA, where Jenkins was able to escape to Canada on his boat. Jenkins was discovered by Canadian authorities after taking his own life in the hotel where he was hiding.

Details of the crime scene investigation, autopsy, vehicle examination, and police investigation will be presented along with the results of toolmark and trace evidence examinations of Fiore's remains, toxicology findings, and DNA analysis.

QA and ISO Roundtable Discussion

Karla Taylor¹, Pennie Laferty², Jan Jones², Jasmine Jefferson³

¹Los Angeles Co. Sheriff's Dept. Scientific Services Bureau; ²Orange County Sheriff-Coroner Department Crime Lab, ³Long Beach PD

This presentation is designed to allow the attendees to ask questions about Quality Assurance in general as well as specific questions about ISO 17025 Accreditation. There will be three members on the panel with varying levels of experience with the ISO process. The transition to ISO 17025 seems to be an overwhelming task at the beginning. It our hope that being able to ask questions of colleagues who are going through the process, or who have completed it, will help others with practical advice to address their concerns.

Evaluating Knife Evidence for DNA

David Jackson

San Francisco Police Department Criminalistics Laboratory

Knives, or similar weapons that are used in stabbing events, may not show the presence of blood or tissue on obvious surfaces such as the blade, and in many cases may need to be dismantled to expose other surfaces containing possible blood or tissue. Stab wounds of solid organs may result in the absence of blood because the pressure of the knife prevents bleeding.

The SFPD Criminalistics Lab has documented the results from several cases involving knife blades that show negative results for blood upon the initial visual examination, and initial chemical presumptive blood testing, even when multiple stab wounds are reported. However, in subsequent DNA typing, the SFPD Criminalistics Lab has developed single source DNA profiles from such cases. In one knife case, during microscopic examination, possible opaque tissue was observed and may be attributed to the adipose tissue of the victims' torso. Dismantling techniques of various types of knives has also provided biological material proven to be the key investigative lead in several other cases. In particular, the examination of concealed portions of box cutter blades, knife blades, and internal surfaces of knife handles has led to the recovery of probative DNA profiles, even when biological screening has yielded negative results.

It is our conclusion, supported by documented casework experience and medical reference material, that implements used in stabbing events may, on a regular basis, show no, or discreet signs of the presence of blood or tissue but could yield a probative DNA profile. Therefore, these items should be subjected to the DNA typing procedure. The lack of blood evidence on such implements should not solely be regarded as an indication not to progress with genetic analysis. The various casework approaches that have been adopted and documented by SFPD criminalists involving the biological screening and subsequent DNA analysis of knives will be presented.

Scientific Evidence in the Courtroom

Tracy Lopez

Los Angeles Co. District Attorney's Office

A discussion of current legal topics of interest to criminalists, including the impact of *Melendez-Diaz v. Massachusetts* (2009) 129 S.Ct. 2527, and other cases regarding scientific evidence which are also pending before the Supreme Court.

The presentation will also include common courtroom issues, including discovery, which arise in typical criminal cases which employ scientific evidence.

Enabling Extraction-free Processing of Reference Samples

Andrea Carbonaro*, Dennis Wang, Chan Zhong, Mary Ma, Lisa Calandro, Lori Henessy
Life Technologies

Laboratories worldwide are developing or expanding forensic DNA databases and are looking for simple, robust, high throughput workflows to efficiently process their single source samples. Direct amplification from blood or buccal cell

samples deposited onto FTA® cards is routinely being done using the AmpF STR® Identifier® Direct PCR Amplification Kit. To further expand the direct amplification workflow to samples deposited on non-FTA® substrates, we have developed a lysis buffer to simplify the upstream sample preparation protocols. The lysis buffer chemistry eliminates any incubation or heating steps and generates STR profiles of higher quality as compared to other on-market lysis protocols for the direct amplification workflow. Addition of 1.2 mm punches to the lysis buffer from buccal samples collected on the Bode DNA Collector™ or a sampling of cellular material collected from swabs added to the lysis buffer yielded results comparable to profiles obtained with samples on FTA® cards. Results from external testing of the lysis buffer using the Identifier® Direct kit showed a >90% first pass success rate using a peak amplitude threshold of 50 rfu. Quality STR profiles were obtained with the average intralocus balance at >65% and the average intracolor balance at >40%. Comparative studies were performed to demonstrate that the new lysis chemistry and workflow generated higher first pass success rates and better data quality over other current on-market lysis protocols for the direct amplification workflow. The lysis buffer effectively enables direct amplification for samples on non-FTA® substrates. Additional experiments demonstrate an improvement in profile quality using the lysis buffer for direct amplification in conjunction with the AmpF STR® NGM™ and NGM SElect™ PCR Amplification kits.

Improper Arson Packaging and its Ability to Retain Ignitable Liquids

Eric Wahoske

Los Angeles Co. Sheriff's Dept. Scientific Services Bureau

There is a large amount of literature covering the correct packaging of fire debris evidence. The literature does a good job at showing how fire debris should be packaged, but there are deficiencies in the research regarding improper packaging material such as polyethylene bags.

Occasionally improperly packaged fire debris evidence is submitted for analysis, and the analyst must be aware of any deleterious effects resulting from the packing material. While polyethylene bags and regular Kapak bags (not FirePak) may not be the best bags for fire debris evidence, each was examined for its ability to retain ignitable liquids and deter cross contamination.

The study showed that regular heat sealed Kapak bags did a good job at retaining ignitable liquids while heat sealed polyethylene bags were extremely permeable to ignitable liquids.

Forensic Science in Violent Crime Investigations

Ignacin Quinones¹, Denise Syndercombe-Court², and Barbara Daniel²

¹Dept. of Forensic Science and Drug Monitoring, Kogn's College, London; ²Blizard Inst. of Cell and Molecular Science, Barts and the London School of Medicine and Dentistry

To combat violent crime, police forces have turned to DNA profiling as recent advances have enabled the use of minute traces of biological material, such as fingerprints, to be used as a source of DNA. This investigation aimed to improve

Abstracts, cont'd

our understanding of how DNA is deposited through touch and to explore relevant applications for use in the criminal justice framework.

The results have shown that sloughed skin cells yield no DNA and that touch DNA comes from either the transfer of nucleated cells from elsewhere (eyes; mouth) or as cell free DNA exuded in sweat. The amount of DNA deposited is highly variable both between and within individuals. DNA extraction methods that ensure both cellular and non-cellular DNA is recovered maximise the potential for DNA profiling. It is postulated that in hand to hand fighting, DNA may be recovered from clothing.

In a collaborative study with Joanna Fraser, from the University of Avertay, Dundee, we used vacuum metal deposition to locate hand marks and followed this with localised extraction to maximise DNA recovery.

Polythinking: Does It Still Have a Place and a Chance in the Modern Crime Lab?

Lucien Haag

Forensic Science Service~ Caretree, AZ

This Officer-Involved Shooting (OIS) incident was witnessed by multiple individuals each of whom had a different account of the events immediately prior to and during the fatal shooting of a subject. These accounts also differed from that of the shooter. If we still believe as Kirk once said that reconstruction is the ultimate goal of criminalistics, then at the very onset of our involvement in the case, we need to know the context of the case and employ "polythinking". Polythinking requires a thoughtful selection of the appropriate tests and a sequence of these tests to properly evaluate the accounts of the witnesses and shooter with the multiple goals of eliminating the impossible or improbable and either establishing the probable, or ideally establishing those matters that are certain. Polythinking is the antithesis of following rote, standard protocols dictated by some laboratory procedures manual. But what if there is no validated procedure in the laboratory's procedures manual for one or more tests that are deemed necessary to answer certain questions in the case? Must analytical thinking stop and the pursuit of true criminalistics end? After a brief presentation of the alleged events of this shooting, the attendees will be asked to think and contemplate what tests, and in what order would they be done. Who will conduct these tests and can the laboratory carry out a test for which there is no validated procedure in its procedures manual? The observations and tests carried out by the author along with a summary of the initial laboratory findings of others will conclude this presentation.

CSI School Kids: Lessons Learned in Product Development from the Classroom to the Crime Scene

Philip Morton BSc.¹ and Professor John P. Cassella FFSSoc²*

¹Product Development Manager, SciChem International, Research Fellow, Staffordshire Univ., UK; ²Department of Forensic Science and Crime Science, Faculty, Staffordshire Univ., UK

This presentation will summarise the achievements of a two year 'Knowledge Transfer Partnership' (KTP). The KTP

was funded by regional governmental funding, and was a collaboration between forensic science academia at Staffordshire University and SciChem International, a commercial company in the Midlands. Initially tasked with producing a series of 'Forensic Investigation' classroom activity kits, the KTP created a new department within the company which now designs, develops and produces science-based resources covering a broad range of science applications for learning and teaching. The product development process, developed as part of the KTP, enables fast, reliable resource development. This innovative process was awarded the prestigious "Lord Stafford Award for Innovation Achieved" in 2010. Alongside the development of physical resources, techniques were developed for teaching pupils of all ages, key practical skills in forensic science. These techniques have been delivered in literally thousands of school classrooms over the last two years, discounting popular 'CSI-Effect' myths, and educating the UK juries of the future. This project between commerce and academia has successfully and robustly developed forensic science resources for both 'Higher' and 'Further' education levels within the UK. A high quality, low cost apparatus for training and research has been developed within this project and this has demonstrated that there is opportunity for innovation in the 'low-tech' side of the forensic science supplies market. Previews will be shown of upcoming resources for several different forensic disciplines.

The Statistical Evaluation of Torn and Cut Duct Tape Physical End Matching

Kaitlin McCabe

Univ. of California, Davis

Duct tape is often found in association with criminal activity, most commonly in abductions, homicides, and the construction of explosive devices. As such, forensic scientists are frequently asked to analyze and compare duct tape samples in order to establish possible evidentiary links between a suspect and victim, a suspect and a particular crime, or multiple crimes. Through duct tape end matching, analysts can reunite separated fragments. Based on the principle that each tear is unique, this type of matching has a significantly high evidentiary value and is considered to be one of the strongest associations in forensic science comparative examinations. Physical end matching of duct tape is common in crime laboratories, yet the process of physical end matching remains undefined and the reliability and error rates associated with these generally accepted procedures are unknown.

This study was designed to research duct tape physical end matching through an examination of criteria to describe the matching process, development of a protocol for training analysts in physical end matching, and statistical evaluation of the associated error rates and overall accuracy. Each trial evaluated the variation in inconclusive rates, error rates, and accuracy rates due to: differing brands, grades, and colors of duct tape; differing analysts; and differing separation methods. In addition, the design also helped to assess the reliability of the protocol through the reproducibility of the end results provided by blind peer review, as well as allow assessment of conditions that could restrict its validity.

The experimental design consisted of a blind study looking at four different methods of separating duct tape: hand torn, Elmendorf machine torn, scissor cut, and box cutter

knife cut. Three Graduate Student Researchers (GSRs) were selected to work as duct tape analysts for the entire study. The GSRs produced individual results from the same sets, and the possible outcomes of a hypothetical peer review between analysts was assessed.

This study confirms that it is possible to use physical end matching to identify duct tape samples as matching or non-matching and that differences between analysts, brands, tape grades, tape color, and method of separation have varying contributions to misidentifications or inconclusive results. This research looked at 1800 torn tape specimens and 400 cut tape specimens. Overall, it seems that the brand and tape grade are more important than color in their effect on an analyst's ability to correctly identify duct tape end matches. Scissor cut tapes appear more difficult to analyze than hand torn tapes, but there is no significant difference in difficulty between hand torn tape and tape cut with a box cutter knife. Finally, consistent tearing conditions do not seem to affect an analyst's ability to correctly identify duct tape end matches.

This study also demonstrated the importance of peer review in duct tape analysis and its ability to greatly reduce the number of misidentifications made by analysts.

Alcala Murders

Malt Murphy¹ and Gina Satriano²

¹Orange Co. District Attorney's Office; ²Los Angeles Co. District Attorney's Office

For a decade, Rodney James Alcala deceived everyone, law enforcement and mental health professionals included, with regard to his narcissistic and sexually sadist nature. For three decades, he eluded the justice system with respect to the extent of his criminally sexually violent conduct. Forensic science and the development of DNA technology eventually caught up with Rodney Alcala's over 10-year devastation of lives.

From 1968-1979 he was involved in the solicitation of teenage girls, the brutally violent sexual assault of 8 and 15 year-old girls, the kidnap and torture murder of a 12 year-old girl, and the brutal sexual assault torture murders of four adult women. Justice for these acts was not ultimately realized until 30 years later.

During a unique joint county prosecution between the Orange County and Los Angeles County District Attorney's Offices, Rodney Alcala represented himself at trial. He cross-examined his live victims and the family members of his murder victims. He was convicted of five murders and sentenced to death. This result is primarily due to the forensic evidence analysis presented during trial which was performed by crime labs including the Los Angeles County Sheriffs Department, the Los Angeles Police Department, the Orange County Sheriffs Coroner Department, and private crime labs.

POSTER SESSIONS

The Effect of Substrate on the Analysis of Ignitable Liquids

Christopher Dal Chele

Calif State University, Los Angeles

The analysis of ignitable liquids is a well documented

and researched field of forensic science. Various patterns and identification techniques have been established in an attempt to detect a variety of ignitable liquids. These patterns are dependent on various characteristics of the liquid in question; the amount present, the temperature or climate it has been exposed to, how long it has been allowed to evaporate, and many more.

One key attribute that can influence the pattern observed is the substrate the ignitable liquid is present on. Utilizing well established PHCE techniques with activated charcoal, the relationship between the pattern that is observed on a chromatogram and the effect the substrate has is analyzed. It is found that the pattern can be significantly changed when the substrate is a plush analogue of a stuffed animal. Additionally, there is also an observable effect when the analogue of an automotive seat is analyzed.

Determining the Time of Deposition of a Bloodstain using UV-VIS Spectrophotometry

Catherine Aldoriso*, Katherine A. Roberts, Donald J. Johnson
Calif State University, Los Angeles

Recent scientific advances have allowed forensic biologists to obtain a wealth of information from bloodstains deposited at a crime scene. Conventional serology can confirm that the stain is blood; immunoassays can determine whether the source is human or animal; while STR-based DNA typing can provide a STR profile from the bloodstain, which includes information on whether the donor is a male or female. However, at the present time, one crucial piece of information eludes criminalists. Currently, no method exists to reliably estimate the time of deposition of the bloodstain. This information could be very useful for investigators, as it would indicate whether or not the bloodstain is relevant to their case. For example, determining the time of deposition would help address the question of whether the stain was deposited during the commission of the crime or if it pre-existed the event. Hanson and Ballantyne (2010) conducted a study that proposes the use of ultraviolet-visual (UV-VIS) spectroscopy as a reliable method for determining the time since deposition (TSD) of a dried bloodstain. This method was found to have high resolving power and was demonstrated to distinguish between bloodstains that were deposited minutes, hours, days, and weeks prior to analysis. The method analyzes the Soret band ($\lambda_{max}=412nm$) of hemoglobin; as the bloodstain ages the Soret band appears to undergo a "blue shift" to a shorter wavelength. The authors also found that the extent to which the shift occurred was related to the environmental conditions (temperature and humidity) during storage.

The purpose of the study proposed here is to further validate the use of UV-VIS as a reliable method for determining the time since deposition of a bloodstain. This study will focus on the use of a portable spectrophotometer (NanoPhotometer™ Implen, Inc., LABREPCO, Horsman, PA), to evaluate its usefulness in field investigations. The focus of the study will be to determine the time since deposition (TSD) of a bloodstain by measuring the UV-visible spectrum of hemoglobin (dependent variable). The following four independent variables will be evaluated in order to measure their effect on the UV-visible spectrum of hemoglobin: Time since deposition (TSD), temperature, % relative humidity, and substrate used to deposit the bloodstain.

Recovery of DNA from the Interior of Footwear and Gloves

Maryam Nickooshiam, Katherine A. Roberts and Donald J. Johnson
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Los Angeles

This study investigates the factors influencing the success of recovering DNA profiles from interior surfaces of footwear and gloves. Samples were tape lifted prior to DNA isolation and mitochondrial and nuclear DNA analysis. Overall, gloves yielded fewer DNA profiles when compared to footwear. A higher number of full mtDNA profiles were obtained from items that were older, were less-frequently used, and had a shorter time elapsed between the last use and sampling. A comparison of typing methods demonstrated that mtDNA typing appears to be more sensitive and can successfully genotype samples containing low levels of nuclear DNA.

This study was successful in recovering mtDNA and STR profiles from interior surfaces of footwear and gloves using tape lifting as a sampling method. Thus, DNA obtained from such items may be used by investigators to associate the perpetrator to the item and or crime scene when other methods prove inadequate

profession is the same, the world is vastly different than it was even 15 years ago and the way we deliver forensic science services must also change. The number of analysis requests has never been greater and the level of scrutiny by the courts and the media is unprecedented.

When I started my career the Los Angeles Police Department had 22 criminalists. I started on a Wednesday and by Friday the following week I was in charge of the laboratory's DUI toxicology program. The only procedures for analysis were in each analyst's personal notebooks. In my first 10 days I was taught how to perform drug toxicology screens on bloods and urines by watching the current expert, writing down what I saw him do, and then repeating the process on the next batch of casework samples. In 10 working days I was deemed to be the expert, expected to analyze cases and testify in court to my results. Though today's process of training and competency testing can be quite lengthy and at times seemingly excessive, it is a much better process than existed in my laboratory when I started my career.

In my experience, accreditation generally protects the individual criminalist from many of the poor practices of the past. Much of accreditation involves established procedures and documenting what has occurred. Requiring standardized procedures and specified levels of documentation protects the criminalist from supervisors, laboratory management and agency managers pushing too hard to get more cases done in less time, or in other words to cut corners that should not be cut. Accreditation also protects the laboratory system and other criminalists from forensic scientist that do not hold the same ideals, work ethic and personal ethics expected of a professional scientist. Finally, accreditation mandates a process for dealing with problems or issues. I know I have personally used accreditation mandates as a valuable reference point to convince the parties directly involved and department management that specific steps must be followed and time consumed to properly identify a problem, determine the cause and develop a fix.

I totally agree with Luke that one of the drawbacks of accreditation is that on the surface, it can inhibit creativity and it changed the way we use our intellects to design and conduct our analysis. Though there are significantly more controls or processes over how someone might approach using their intellect to design and conduct the analysis, they ultimately are not excluded from using the same mind set which made our "founders" the exceptional criminalists they were. The challenge today's criminalists face is to use accreditation and the boundaries it has created to improve the overall product while still using their minds and avoid becoming simply technicians. Within the boundaries of accreditation, every laboratory should have a procedure for performing tests for which a procedure does not already exist.

Finally, Luke stated "In this new age of specialization, CAC and other professional meetings give you the chance to gain a better understanding of what occurs in other areas of criminalistics and the sorts of analytical questions they can answer. Such knowledge is absolutely essential to being a competent criminalist." I couldn't agree more. Learn from others, share your knowledge, use accreditation as a tool not a crutch, and remember the mind set of those that helped criminalistics grow and mature and become one of today's "founders."



The Editor's Desk

cont'd from page 5

sibility that "the future of our country and our profession appears dark" I am also optimistic that you, the new generation of criminalists will not allow that to happen. Many changes have occurred in our profession since Luke started his career, some good and some not so good. It is the natural progression that things will change. It is our duty to ensure that the change is for the benefit of the public and our profession. By listening closely to how things were "in the good old days" and learning the thought processes of our predecessors you can determine what should be retained and what should be changed to achieve improvement.

Luke also stated "I also regret that you will probably never know how it once was; to receive a case with new issues and one or more types of evidence for which there was no established and validated method of analysis. We had to think out an analytical strategy, perhaps do some empirical testing before we tackle the actual evidence. It was exciting. After 45 years I'm still enamored by the notion of how science can aid the courts in the pursuit of justice. Please note that I did not restrict this statement to the criminal justice system. They are also civil actions that have scientific issues and consequences for our profession; the *Daubert* case being the most notable example.

"In those times long before ASCLD/LAB accreditation and now ISO-whatever we used our intellects to design and conduct our analysis. We noted what we did and would ultimately explain and defend our analysis in court. In my view the jury is still out as to whether there have been more benefits than detriments as a result of accreditation."

My career covers the times Luke discusses so I "know how it once was" and I know the advantages and difficulties of practicing forensic science in today's reality. I can see why Luke and others feel that accreditation has resulted in difficulties criminalists of today face when trying to be innovative. However, though the basic function and mission of our



Ethical Dilemmas

DISCUSSION CORNER WITH CAROLYN GANNETT

UPDATE: In the previous installment of this series, it was stated that AFTE's Code of Ethics did not mandate reporting breaches of ethics. Whereas this was true of AFTE's previous document, which at the time of publication of the last CACNews was listed as the current Code of Ethics on the AFTE website, its true **current version**, ratified in June of 2009 does, under certain circumstances, mandate reporting (see IV.E – IV.G).

Do any ethics codes or guidelines state that a written report must be issued?

The Scenario:

You learn that a colleague, a private criminalist, does not prepare written reports when working for the defense in criminal cases. Instead, she presents her results verbally to her client. Working in an ASCLD/LAB-accredited lab, you are aware that criterion 1.4.2.19 (E) mandates a written report. But the colleague, as a private consultant, does not work in an accredited lab. And, there are no legal statutes that she is violating by reporting her results verbally and not in writing. But, are there any ethical considerations?

Discussion:

Here are the discovery rules, in a nutshell: the prosecution must discover all reports to the defense; the defense need only discover a written report to the prosecution if the defense expert is listed on the defense's witness list. And, if no written report exists, then there is nothing for the defense to discover.

I have not been able to find any ethics code or guideline that clearly and explicitly mandates the creation of a written report. But, there is some content that offers potentially related ethical factors for consideration. I'll first discuss the CAC Code of Ethics in detail, and then I'll give a word about other associations' codes or guidelines.

CAC Code of Ethics

Nowhere in the CAC Code of Ethics have I found a mandate to produce a written report. However, there is some content that alludes to the preference that a written report be produced. Below are several excerpts (my stress in bold) from the code that are related to production of a report, followed by comments.

Preamble, paragraph 3: *These findings of fact, conclusions, and opinions should then be reported, with all the accuracy and skill of which the criminalist is capable, to the end that all may fully understand and be able to place the findings in their proper relationship to the problem at issue.*

"Should then be reported" carries a different meaning from "shall" or "must"—the latter indicates mandates, the former, merely a recommendation. In addition, the paragraph does not state that the report must be written; verbal reports are not ruled out.

IV. D. *Generally, the principle of "attorney-client" relationship is considered to apply to the work of a physical evidence consultant, except in a situation where a miscarriage of justice might occur. Justice should be the guiding principle.*

Here, a potential miscarriage of justice supersedes "the principle of 'attorney-client' relationship" (whatever that means), followed by the assertion that "Justice should be the guiding principle." This can be interpreted to state that, as criminalists, our commitment to justice over-rides our responsibilities to our clients. It could be argued that allowing for disclosure of defense expert results by providing a written report serves justice better than providing only verbal results, while providing only verbal results may sometimes serve the client better than it serves justice. The written report allows the prosecution time to consider the defense expert's results in order to present a more considered cross-examination of the defense expert in front of the jury.

III. G. *It is not the object of the criminalist's appearance in court to present only that evidence which supports the view of the side to which he or she is employed. The criminalist has a moral obligation to see to it that the court understands the evidence as it exists and to present it in an impartial manner.*

It could be argued that fulfilling this "moral obligation" would be hindered by not disclosing defense expert results in a written report—that a verbal (only) report is not an impartial manner of presenting the results. Seeing that the court "understands the evidence as it exists" may be hindered if only one side is aware of the evidence as it exists up until the point at which the defense expert testifies.

III.H. *The criminalist will not by implication, knowingly or intentionally, assist the contestants in a case through such tactics as will implant a false impression in the minds of the jury.*

Not providing a written report could be considered a tactic. Disallowing consideration of the defense expert's results by the prosecution prior to that expert's testimony could, conceivably, result in implanting a false impression in the minds of the jury under some circumstances.

IV. C. *It shall be regarded as ethical for one criminalist to re-examine evidence materials previously submitted to, or examined by, another. Where a difference of opinion arises, however, as to the significance of the evidence or to test results, it is in the interest of the profession that every effort be made by both analysts to resolve their conflict before the case goes to trial.*

cont'd next page

Mens Rea

Book Review

"The Killer of Little Shepherds: A True Crime Story and the Birth of Forensic Science," by Douglas Starr.

I have come upon a fascinating book to recommend at your earliest convenience. This story takes place in the last decade of the nineteenth century and I found it informative and compelling. Learn about the search for and the apprehension of the first modern day serial killer; Joseph Vasher. After reading Mr. Starr's novel, some questions spring to mind for the reader.

Have you ever wondered who Edmund Locard's mentor was? Who he studied under? Have you ever considered the nexus between criminalistics and criminology? Do you know who coined the term 'criminalist'?

Do you know what the preferred methodology was for identifying suspects in the latter part of the nineteenth century? Were you aware of the controversy surrounding Lombroso's theory of criminality? Do you know what presaged the modern use of biometrics?

These questions and more are answered by Mr. Starr's extensive research. You will also learn how the media played an important role (unlike today) that helped authorities bring the killer to justice. And, how, despite absolute proof, innocent people were hounded unmercifully by their neighbors when they fell under suspicion.

You'll learn that medical scientists could identify human blood by a chemical reaction and confirm the presence of human blood by measuring the diameter of the red blood cells to distinguish them from animals, birds and fish. The use of the microscope plays an important role assisting pathologist and the early forensic scientists alike.

You will also learn about the French system of justice where the judge plays the most important role leaving the prosecutor and defense attorney to play supporting roles.

There is one figure that towers over the others in this drama. A man of great intellect, unwavering search for the truth, teacher, expert witness, a truly renaissance man; Alexandre Lacassagne. Our profession owes him a debt of gratitude for his efforts to establish the profession of criminalistics. Enjoy!

—Raymond Davis
CourtSkills

Douglas Starr is codirector of the Center for Science and Medical Journalism and a professor of journalism at Boston University.

First Edition, Knopf, 2010 ISBN 978-0-307-2669-4
Hardcover, 320 pages
\$26.95

Ethical Dilemmas *cont'd*

Regarding the bolded sentence, this cannot be done without disclosing the results prior to trial, which would require a written report from the defense expert. The recommendation to attempt to resolve conflicts of opinions prior to trial alludes to the notion that, as criminalists, our interest should be to present the most accurate results to the court, rather than serving the interests of the client.

Other Associations' Codes and Guidelines

Most associations' documents list content that should go into a report, without specifying whether the report is written, verbal, or even required. One has ambiguous wording—readers are roughly split between understanding it to say whether a report must be written. That document is ASCLD/LAB's *Guiding Principles of Professional Responsibility for Crime Laboratories and Forensic Scientists*. Paragraph 15 states (my stress in bold):

The ethical and professionally responsible forensic scientist and laboratory manager...

15. Make and retain full, contemporaneous, clear and accurate records of all examinations and tests conducted, and conclusions drawn in sufficient detail to allow meaningful review and assessment of the conclusions by an independent person competent in the field. Reports are prepared in which facts, opinions and interpretations are clearly distinguishable and which clearly describe limitations on the methods, interpretations and opinions presented.

The passive wording lends ambiguity. "Reports are prepared in which..." could mean that, if a report is prepared, it should contain the items listed, or it could mean reports must be prepared, period. Regardless, it is not clear whether "prepared" means "written"—it could also mean "verbal."

Summary

It appears that there may be ethical grounds for defense experts to produce a written report, but there is no clear, explicit declaration in any code or guidelines of which I am aware that mandates that a defense expert produce a written report.

Many defense experts are aware of the considerations discussed above. I know of one who refuses to agree to work on a case without prior agreement that a written report will be received by the client, regardless of the results. Others may agree to produce the written report only upon being placed on a defense client's witness list. Still others may opt to not produce a written report under certain circumstances, or, ever. I'd love to hear your thoughts on this topic—go to www.ethicsforum.cacnews.org and share your knowledge and ideas with the membership!

Last, but not least, thanks go to Pete Barnett for providing some insights.

Share your dilemmas at
ethicsforum.cacnews.org.

Identification and Characterization of Glue/Paint Traces Adhering to Transferred Glitter Particles via Synchrotron ATR FTIR Spectromicroscopy

Robert D. Blackledge, Principal Researcher

Team Members: John A. Reffner, PhD, Michael C. Martin, PhD, Hans A. Bechtel, PhD, Laetitia Vernoud

Background

Whether glitter is used in cosmetics, in making arts and crafts items, or is applied as decoration to clothing items (fabrics), it is typically in some type of vehicle (glue, paint, crayon, etc.) The vehicle helps form a bond to the intended substrate so that the glitter particles will adhere and be less likely to fall off. In the event that glitter is transfer evidence possibly indicating an association between the victim, suspect, and crime scene, any possible association would be strengthened if it could be shown that not only does the glitter from all three compare but also do any vehicle traces.

Vehicles may be incorporated with the glitter as purchased, or the vehicle may first be applied to the substrate and then glitter sprinkled over while the vehicle is still tacky. Therefore, both types of samples were acquired and examined.

Examinations

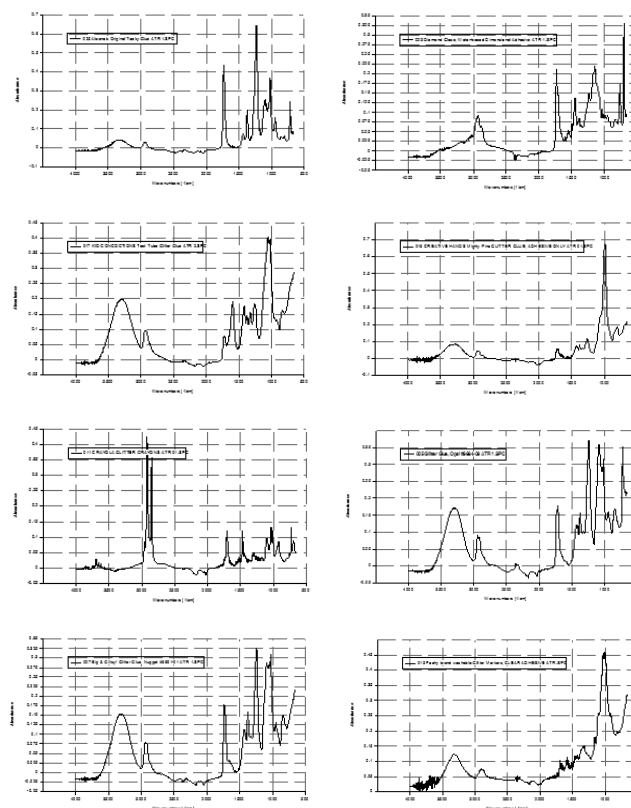
Samples 004 through 025 were examined at the 1.44 beamline at the Advanced Light Source (ALS) at Lawrence Berkeley National Laboratory, Berkeley, California [<http://infrared.als.lbl.gov/content/beamline-1-4/144>]. The 1.44 beamline is equipped with a Nicolet Nexus 870 FTIR bench coupled to a Continuum XL imaging microscope having a single element MCT A* detector (liquid nitrogen cooled). Although the MCT A* detector has great sensitivity, its spectral range is limited to 800 - 10,000 cm⁻¹.

Some samples were examined using the ATR objective on the Continuum XL microscope and making physical contact between the diamond crystal on the objective and the sample. Our rationale was that in an actual case it would be glitter particles that would be recovered and any traces of glue or other vehicles would likely be a thin residue on the surface. ATR would primarily detect what was on the surface. These samples may be identified by the presence of "ATR" in the file name.

Some samples were acquired using the all-reflecting microscope objective to obtain in transmission the FTIR spectra. Small amounts of these samples were placed on a low-e glass microscope slide. These slides have a thin layer of low-e glass over regular glass. The glass is transparent for light in the visible region and therefore allows for high quality optical images. Light in the mid-infrared, however, is reflected by the low-e glass surface, collected by the same objective, and directed to the infrared detector. The result is a double-pass transmission FT-IR spectrum, which is advantageous for thin samples with little absorption. Samples acquired by this method may be identified by the presence of "TRANS" in the file name.

This research was partly funded by the CAC McLaughlin Endowment. We present an excerpt from the final report to the CAC. The published article is cited as L.Vernoud, et al., Characterization of multilayered glitter particles using synchrotron FT-IR microscopy, Forensic Sci. Int. (2011) —Ed.

FTIR spectra of samples 004 through 025 were rapidly collected during the first two days (Tue., 23 June & Wed., 24 June 2009) of our allotted four days of beamline time. Sufficient variation was seen between the various glues and other potential glitter substrates to assure us this information would greatly add increased discrimination in the comparison



son of Questioned glitter particles and glitter particles from a Known source in an actual criminal investigation (for example, see the eight infrared ATR spectra illustrated below).

Infrared ATR spectra of eight different glitter glues acquired at the ALS illustrate the variation between different commercial brands.

However, these spectra could have been collected using a normal bench FTIR source rather than having to rely on the increased brightness and small spot size afforded by the synchrotron source at 1.44 Beamline at the ALS. It was decided that the best course of action would be for my collaborator, John Reffner, to return to New York and include these spectra in a searchable library that we would make available to the CAC and other forensic scientists. John (or with his students at John Jay College of Criminal Justice) will acquire the spectra of additional glue brands and assemble a searchable library that will be made available to forensic science (method of publication and dissemination not yet decided). The files of the glitter glue spectra acquired at the ALS are on a CD provided with the hardcopy version of this report and are also in a folder included with the electronic version.

In the event that we would finish early with our examination of the glue samples, I had also brought with me several glitter samples that from previous work I now consisted of three or more separate layers. Most glitter has at least three separate layers and some many more. Glitter particles are cut from rolls of film having multiple layers. Most often these lay-

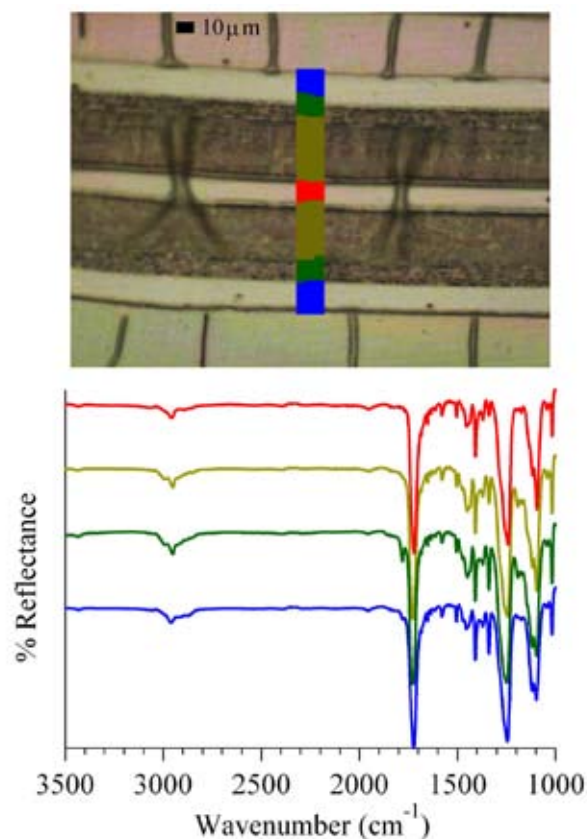
ers are polymers, but some may also be vapor-deposited aluminum. The machines that cut the film into individual small glitter pieces do not make nice sharp clean cuts. Therefore it is usually not possible to stand an individual particle on edge and under high magnification count and measure the thickness of the individual layers. I reasoned that if one made thin cross-sections and using an FTIR microscope were able to obtain a clear magnified visual image of the cross-section, then one could count the number of individual layers, measure the relative thickness of each layer, and obtain the infrared spectrum of each separate layer. This additional information should greatly increase the ability to discriminate between similar yet different individual glitter particles.

My initial attempts at using a single edge razor blade to prepare thin cross-sections of these samples were unsuccessful. Therefore we contracted with the Electron Microscopy Laboratory at the University of California at Berkeley to prepare cross-sections approximately 0.5 μm thick. The glitter particles were to first be embedded in a resin before they were microtomed with a glass knife. Although the EM Lab could do this (for a price), they could not do it in the only two days of my assigned beamline time that remained. In the two previous days John Reffner and I had met Laetitia Vernoud, a graduate student from a university in France who for a period of several weeks was visiting the 1.4 Beamline as a student intern. She had shown a great interest in our work. She had beamline time assigned her in the coming weeks and she was looking for a project to work on. So, it was a marriage made in heaven! I turned over my multilayer glitter samples to her and with very capable assistance from 1.4 Beamline scientist Hans Bechtel, in the following weeks the samples were microtomed and the thin slices examined.

They obtained outstanding results! Their work clearly demonstrates the advantages of using as your infrared source the beamline off of a synchrotron. The separate layers in a glitter particle may be quite thin. If one tried to examine their thin cross-section using a regular bench-top IR source you would have to greatly reduce the aperture to try to just focus on a single layer. The reduced aperture would greatly reduce the intensity of the beam passing through the sample and this would greatly decrease the signal to noise (S/N). Even without the use of a beam from a synchrotron there are advantages to preparing thin cross-sections of multilayered glitter particles. Various microscope methods of sample illumination may reveal important details. For example, the image below left was acquired with the 15x objective. Seen is a cross-section surrounded by the embedding resin. The image below right is the same cross-section viewed under darkfield. Although not available at the ALS, polarized light microscopy (PLM) under

crossed polars might well illustrate separate layers due to differences in birefringence.

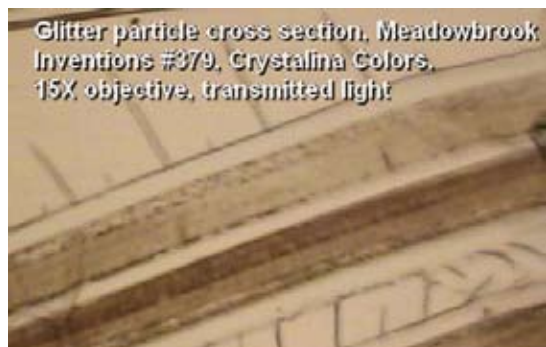
Below shows the path followed with this same sample as spectra were acquired every 0.5 μm . Seven distinct layers may be seen for this cross-section. The vertical bar indicates the line followed in accumulating spectra and the various colors represent the results of a hierarchical cluster analysis (with the spectra representing the average of the spectra for each cluster). The areas at the top and bottom (beyond the two ar-



reas designated dark blue on the vertical bar) are the embedding resin.

I have already partially reported on this examination of multilayered glitter particles with an oral presentation, "Characterization of Multilayered Glitter Particles", given at the CAC Spring 2010 Seminar.

I wish to express my sincere appreciation to the CAC and especially to the Endowment Committee for their support of this study.



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