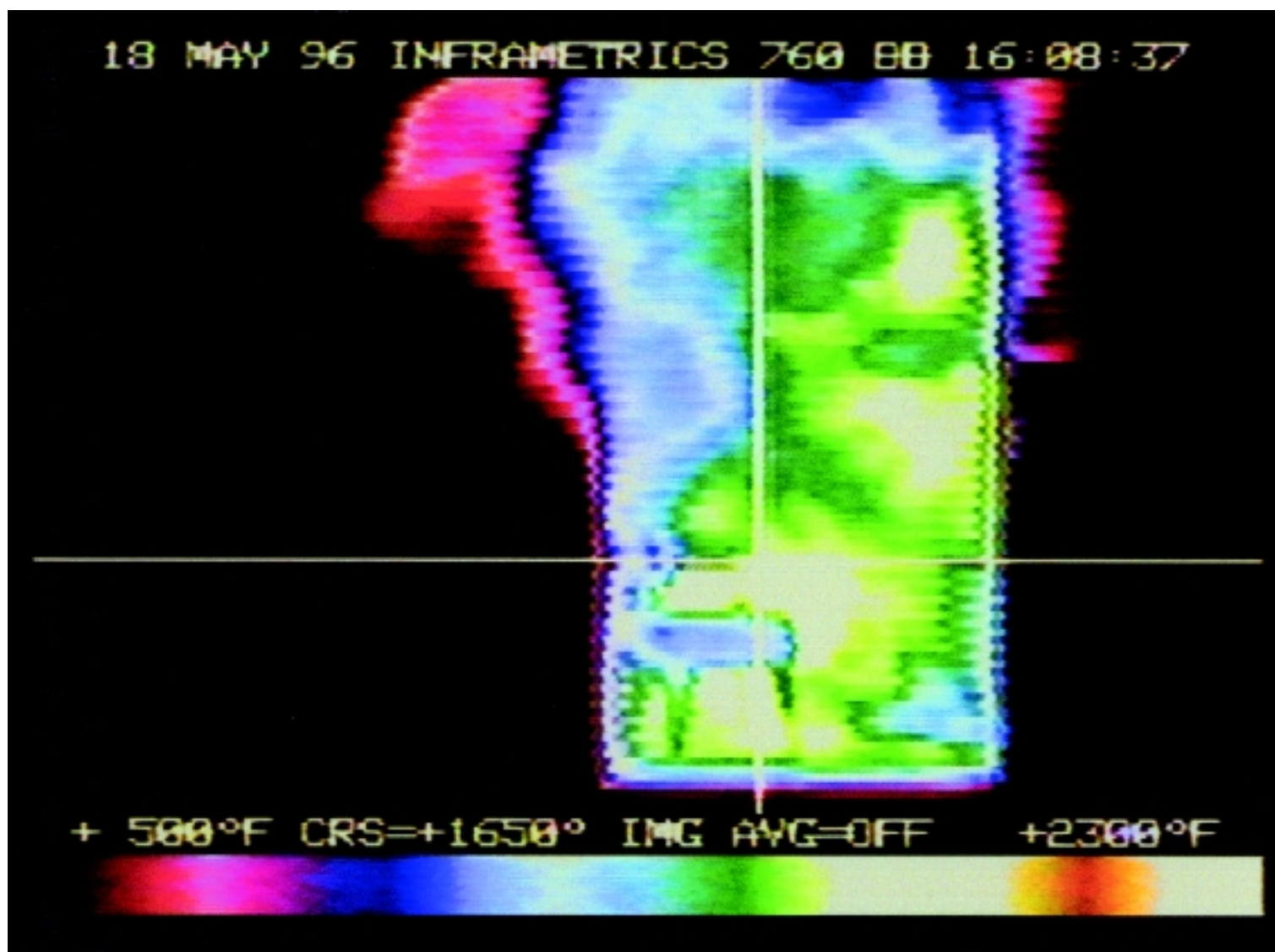


# The CAC News

*News of the California Association of Criminalists • Second Quarter 2001*



# JOHN SIMMS

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## Quality Assured

---

### Watch Out For Those Ants

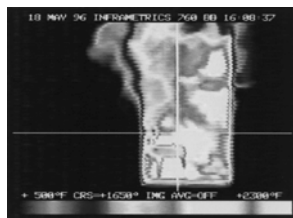
**A**nne Morrow Lindbergh said, "Only in growth, reform, and change, paradoxically enough, is true security to be found." I submit that this is the heart of quality assurance. QA causes us to continuously assess and monitor our processes and make changes to improve the quality of those processes, thus providing better service and a better product. Sometimes the change can be in huge steps but usually the QA process involves small, incremental steps that are not always individually distinguishable. Along the way, we must strive to avoid "stepping on the ants" as it was recently phrased on our national Internet quality network. If we spend too much time stepping on the ants, we will run into the trees we do not see because we are so minutely focused downward. Where do we draw the line? Each system is different and thus has different requirements. Does your system need to calibrate the rulers you get from Fisher scientific or the office supply store? Does your system need to calibrate the flasks or graduated cylinders that are used in your methods? Perhaps yes, perhaps no. How precise do your measurements have to be? Each system has to decide for itself if it is necessary to start stepping on the ants and, if so, which ants to step on. My own personal feeling is that I will avoid stepping on the ants for as long as possible. There is a point at which checking, calibra-



**Does your  
system need to  
calibrate the  
rulers you get  
from Fisher  
Scientific or  
the office sup-  
ply store?**

tion, certifying, logging, etc., becomes pointless, wasteful, and crippling to our work. Speaking of change and personal perspective, this is the perfect segue into the next evolutionary phase of this column. I am going to step away from the helm of this project for two reasons. 1) It is time for other QA managers to present their own perspectives in this forum. Starting with the next column, the authorship of the QA column will rotate to a different person for each newsletter. I believe this will provide a rich tapestry of viewpoint and opinion. 2) I will be running for editorial secretary at the May meeting although I will not be present due to a commitment I made to be on an ASCLD/LAB inspection. As editorial secretary, I would be responsible for the editor's column and could not and should not do both the QA and editor's column. Even if I do not become editorial secretary, the authorship will still rotate since this will be a change from which we will all benefit. I have enjoyed writing this column. I hope I have stimulated thought and provided helpful information and useful insight. Even if I have moved you to disagreement, that in itself is a good thing. Thank you. I look forward to benefiting from the multitude of other QA voices.

## Second Quarter 2001



*On the cover... A sample print taken from an infrared thermal imaging video camera. Related article by John DeHaan inside this issue.*

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## Southern Regional Director's Report

February 26, 2001

The Orange County Sheriff's Department hosted the last luncheon study group meeting at the Hacienda Restaurant in January. The luncheon attendance numbered 86 people and featured guest speaker Sergeant Charlie Stumph of the Bomb Squad. The topic was "Post Blast Trauma". All of the study groups, except the Arson Study Group (which met earlier in the quarter) participated. I would like to thank Rob Keister, who did a great job in putting the meeting together. The facilities and the luncheon were excellent. The reasonable prices and the central location helped bring in people from all over the region.

The Ventura County Sheriff's Department will host the next scheduled meeting in either March or April. San Bernardino will host the June meeting.

The Trace Evidence Study Group chairperson is now Wayne Moorehead, who is reassuming an old duty. I want to thank Wayne for volunteering to reassume the chair of this study group. I also want to thank Gene Lawrence who chaired the Trace Study Group for at least three years.

Mark Traugher has requested to be replaced as chair of the DNA Study Group. Thanks Mark for your work during the last three years. The new chairperson will be Connie Milton, who has graciously volunteered to help coordinate the DNA meetings.

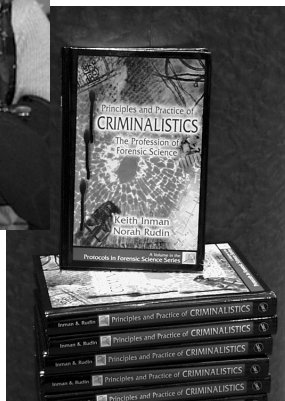
There have been a number of requests to keep the Crime Scene Study Group from conflicting with the other study groups as people would like to attend both. I have not figured out a good way to avoid conflicts other than to rotate the Crime Scene Study Group so it doesn't conflict with different groups each meeting. Any ideas will be appreciated.

It is important that people continue to participate in the programs we put together. Often the information disseminated at the meetings are not as important as the chance to network with one another. The problems experienced in casework and court are often very similar from jurisdiction to jurisdiction.

*Jim Stam*



*Smiling faces were everywhere at the recent AAFS meeting held at the Seattle Convention Center. Norah Rudin (above, center) co-authored the book, Principles and Practice of Criminalistics, which could be found at the CRC booth.*



## More notes from CAC Study Group, September 28, 2000

Breaking news—ok, it's a little late but you know what they say. Well, it has been a banner year for GSR analysts. Our second successful meeting for the year 2000 was held at Berkeley's DOJ Lab, a total of 12 participants. Topics of discussion ranged from ASTM Guidelines to the shelf life of adhesives on stubs. An unusual case of a PbSbKFe particle was presented in a .22 cal analysis request. In addition, Sacramento's lab (go, Faye go!) has a number of GSR-related projects in the hopper, including environmental studies such as how much GSR lingers in the back seats of patrol cars (not much—call Faye for details). A proposal for CCI to host a GSR class was bandied about and as soon as we decided it would be nice to have a round robin testing sample, CTS delivered a GSR sample aka 00-555! That's service with a smile. Mostly, I wanted to take the opportunity to say thanks for your support to my fellow-GSR folk (northern & southern) and wish happy holidays to one and all.

*Pam Hofsass*

## CAC Financial Reports Available

Fiscal year financial reports are published yearly. For interim financial information, please contact the treasurer: Michelle Fox, 510-887-8828, mjf@forensica.com.

## Employment

### Questioned Documents

Department of Oregon State Police  
\$2685-3877  
Personnel Services Section  
400 Public Service Bldg.  
Salem, OR 97310  
FAX Application (503) 378-2360

### Supervising Forensic Scientist

County of Ventura  
\$4504-6320  
800 S. Victoria Ave. #3300  
Ventura, CA 93009  
(805) 654-2375

### ATF Firearms Positions

Rockville, MD, Atlanta, GA, Walnut Creek, CA  
\$23,304-83,481  
Contact Althea Jacobs (202) 927-8630

### DNA Specialist-Forensic Analytical

3777 Depot Rd. Suite 409  
Hayward, CA 94545  
Contact Ron Nichols (510) 887-8828 ext. 148

### Criminalist/Senior Criminalist

\$2571-5506  
California State Department of Justice  
Testing and Selection Office  
P.O. Box 944255  
Sacramento, CA 94244-2550

## Upcoming Meetings and Courses

**Southeastern Association of Forensic Document Examiners**  
April 5-7, 2001, Atlanta, GA

**Digital Analysis of  
Bite Mark Evidence**

Two day Instructional Course, April 6-7, 2001, Santa Barbara, CA

**Medicolegal Death Investigators Training Course**  
April 23-27, St. Louis, MO

**Bloodstain Pattern Analysis  
Workshop**  
April 23-27, 2001 St. Paul, MN

**Mid-Atlantic and Southern Associations of Forensic  
Scientists Joint Meeting**  
April 24-27, 2001, Williamsburg, VA

**Spring Bloodstain Evidence Institute**  
April 30- May 4, 2001 Corning, NY

**Forensic Applications Symposium: Scanning 2001**  
May 5-7, 2001, New York, NY

**Advanced Bloodstain Pattern Analysis  
and Expert Witness Workshop**  
May 7-11, 2001, Miami, FL

**California Association of Criminalists 97th  
Semi-Annual Seminar**  
May 11-12, 2001, Tahoe City, CA

**California Association of Toxicologists  
Quarterly Meeting and Workshop**  
May 11-12, 2001, San Diego, CA

**Association of Firearms and Toolmarks  
Examiners 32nd Annual Conference**  
July 8-13, 2001, Newport Beach, CA

**Masters 9-Advanced Death Investigation Conference**  
July 23-26, 2001, St. Louis, MO

**Basic Forensic Pathology for Law  
Enforcement, Death Investigators Course**  
August 13-18, 2001, New Orleans, LA

**American Society of QD Examiners Meeting**  
August 19-22, 2001, Des Moines, IA

**Bloodstain Patterns and Violent Crimes Course**  
August 20-25, 2001, New Orleans, LA

**19th International Congress on Forensic Genetics**  
August 28-September 1, 2001, Munster, Germany

**Medicolegal Death Investigators Course**  
October 1-5, 2001, St. Louis, MO

**The International Association of Bloodstain  
Pattern Analysts Meeting**  
October 3-5, 2001, Tucson, AZ

**California Association of Criminalists  
Fall Semi-Annual Seminar**  
October 16-20, 2001, Universal City, CA

**Southwestern Association of Forensic  
Scientists Fall Meeting**  
November 5-8, 2001, San Antonio, TX

**Forensic Clues in Death Investigation Course**  
November 14-16, 2001, New Orleans, LA

**Bloodstain Analysis Workshop**  
December 10-14, 2001, Miami, FL

## CCI Courses:

**Tire Impression Evidence\***  
April 2-6, 2001

**Courtroom Presentation of Evidence**  
April 4-8, 2001

**Latent Print Comparisons**  
April 9-13, 2001

**Firearms Safety**  
April 10-12, 2001

**Crime Scene Investigation II\***  
April 16-20, 2001

**Microscopy of Explosives**  
May 14-18, 2001

**Basic Practical Microscopy\***  
May 21-25, 2001

**Technical Writing for Criminalists\***  
May 30-June 1, 2001

**Bloodstain Pattern Interpretation**  
June 4-8, 2001

**Latent Print Techniques**  
June 11-15, 2001

**Basic Forensic Serology**  
July 10-13, 2001

**Basic Forensic Serology**

*please turn to page 31*

## Congratulations to:

**Bill Carlton**  
*on his retirement*

**Nicola Shea**  
*on the birth of her son*

**Fred Tulleners**  
*on his promotion to  
Laboratory Director  
(DOJ Sacramento)*

**Jill Spriggs**  
*on her promotion to  
Assistant Lab Director  
(DOJ Sacramento)*



# NANCY MCCOMBS

## Eight Issues Later

**H**ow bizarre it feels writing my last submission as Editorial Secretary of the *CACNews*. It has been a pleasure the past two years serving the board for such an outstanding organization. The time has come to pass this opportunity on to another fortunate soul. I will miss many things, primarily meeting many exceptional individuals as a result of the job. This was a major perk.

I would like to thank my predecessor Raymond Davis for caring enough about the *News* to guide me into a smooth transition. I do not consider my tenure complete until I do the same for the next editor. I would also like to thank my hard working staff, Mark Traughber, First Ever Webmaster, Frank Healy, Advertising, Suzanne Preseaux, Technical and Greg Matheson, Features.

A special thanks goes to our Art Director John Houde. If the *CACNews* did exist without him, it would be a fright to see! Issue after issue he has an amazing passion for quality and creativity. Not many are aware that John's contributions to the *CACNews* are at his own time and expense. There are few people as generous and as dedicated. It has been



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a pleasure getting to know John and his wonderful wife, Donna.

For those who contribute to the contents of the *CACNews* and website, your efforts are appreciated, and for those who actually read your newsletter, our sincerest thanks.

It has been exciting being the editor of the *News* as we have entered the new millenium. It has been a joy witnessing the birth of an official website, [www.cacnews.org](http://www.cacnews.org), reading your articles, letters, Courtroom Calamities and receiving your phone calls and e-mails.

In the eight issues I have been responsible for, I have focused my editorials on personal issues we encounter as a result of our profession. Because we are humans first then scientists we face far more issues as a result of our character than as a result of our work. I will end my last editorial with something a good friend told me once, "We cannot control the way people treat us, only the way we treat people."

I look forward seeing you at the May CAC seminar.

With heartfelt gratitude,

*Nancy*

F E E D B A C K

The *CACNews* prints letters to the editor that are of interest to its readers. We reserve the right to edit letters for brevity and clarity. All submissions to this page become the property of the *CACNews*.

### Not a Razorback

Editor,

I am most happy to report that photographer John Houde was NOT present when Marty Fink and I unloaded the porcine carcass at the LA County Coroner's office for 'final disposition.' The picture is this: Marty and Hiram unloading a dead hog into a wheelbarrow from a pickup truck with Arkansas ("Go Hogs") license plates amid a half dozen sedate Cadillac hearses driven by somberly attired gentlemen of the mortuary director persuasion. The things I get poor Marty into! If true (tell me it isn't!), that you don't intend to run for re-election as CAC Editorial Secretary, I'll be most sorry for your absence. Firearms examiners do keep us mortal criminalists honest and the *CACNews* has never been better!

Hiram K. Evans

### ABA Card Problems Reported

Editor,

Kay Belschner from the Eureka lab informed me of some problems encountered when the Eureka staff evaluated the ABACard Hema Test.

(1) ABA CARD BODY FLUID IDENTIFICATION TESTS FOR HEMOGLOBIN AND P30

Hemoglobin test

The most problematic results were positive reactions [false positives] from: (1) chicken blood, (2) cat blood and (3) cow blood. Although the laboratory was not able to duplicate all of these results, some of these false positive reactions were duplicated (cow). In addition, the Eureka laboratory tested body fluids other than blood and (like CCI's evaluation) obtained positive results. However, in addition to saliva, semen & urine

etc., Eureka also tested sweat samples and got positive results with some samples. Considering the potential presence of sweat on clothing items, this should give us all pause.

#### **P30 Test**

I was just recently contacted by staff from the FBI laboratory regarding their concerns about false positive results from ABA card p30 tests. This is a concern that I had expressed after our evaluation of this card.

My conclusion after looking at all this data and discussing this test with staff in several laboratories (FBI, Illinois and California) is that these tests should not be used as confirmatory tests. I think that the reason a lot of these results have not been duplicated is that the cards vary, not only between different lots but also within a lot. If this is true, the specificity of these cards can never be guaranteed.

#### **(2) SALIVA DETECTION**

In a recent internal (body fluid identification) proficiency test (SA2K) a 20ul neat saliva stain was spotted (along with a 10ul semen stain and two 5ul bloodstains) on a piece of fabric. Seven (6 BFS labs and one other) labs examined this fabric for body fluids.

In 6 of the 7 participating labs, saliva was not detected: 2 labs did not test for amylase/3 labs got negative amylase test results/ 1 lab got inconclusive amylase results. One examiner from each of these labs participated in the test.

In the laboratory that detected the presence of amylase, 5 examiners participated in the test. Four examiners out of a total of 5 examiners tested for amylase and detected amylase. Of the 4 examiners that detected amylase, only one examiner felt that there was sufficient levels of amylase to indicate saliva.

Given the difficulty of locating saliva stains, the "target" proficiency test answer did not require the examiners to either locate or "identify" this body fluid. This test, however, does point out a couple of things: (1) saliva is very difficult to find and most methods of visually searching for this body fluid will probably fail to detect it (2) the amylase overlay (at least in its present forms) method is not very sensitive and will not necessarily detect a neat saliva stain, (3) the amylase diffusion test is more sensitive than the overlay (if you can locate a stain) and (4) even when the amylase diffusion method was used and amylase was detected with a neat saliva stain, the interpretation guidelines followed by 3/4 of the examiners did not permit them to say "indicative of saliva."

*Terry Spear*

## Send us your Archives

*The CAC is attempting to gather and catalog all of the archival documents and materials members have accumulated over the past 40-50 years. We're especially interested in board of director papers, membership documents and old photographs and videos.*

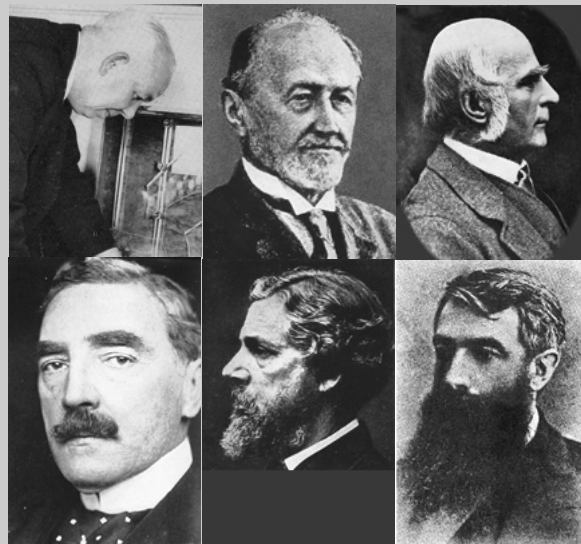
### **MILLENNIUM SPRING CLEANING!**

Ever run across CAC materials from committees, board meetings, seminars, etc.? You don't want to throw them away but you don't want to keep them until the next millennium. Members of the board and the historical committee would like to take those pesky materials off your hands. Please contact Lisa Brewer regarding reports, photographs, objects or anything else that is of interest to the CAC.



**Lisa Brewer (408) 299-2224 x2575**  
**[lisa.brewer@crime.lab.co.santa-clara.ca.us](mailto:lisa.brewer@crime.lab.co.santa-clara.ca.us)**

## ED JONES' FACE GAME



## Historical Fingerprints

Try to identify these famous and not-so-famous pioneers in the development of fingerprinting.  
*Answers inside this issue.*

# The “Luck Factor” in the Investigation

by Morris Grodsky

It is interesting to note that when we read texts dealing with criminal investigation procedures, authors will usually discuss certain important elements or components. These will include *information*, whether from witnesses, victims, or suspects, *information* from archives or other formalized sources, and the application of *technology*, essentially the forensic sciences. Only rarely is the element of luck included. One exception that I have noted to this is the book “Criminal Investigation” by James W. Osterburg and Richard H. Ward. Here the role of luck is discussed and some examples are presented.

My own experience has led me to accept luck as an important factor in the successful investigation of many criminal cases. I am convinced that if it were possible to analyze each successful investigation, we would discover that a lucky circumstance exists in many of them.

One thing that I feel I must make quite clear at an early stage in this discussion, is my conviction that the existence of a lucky circumstance does not diminish the role of the investigator in any way. Indeed, I would state that quite often a skilled and imaginative investigator is essential for the recognition or interpretation of the usefulness of the lucky circumstance. What I would like to stress is that no investigator need feel threatened or devalued by the acceptance of luck as a factor in the investigation.

When we talk of luck in this context, we are speaking of good luck, a fortunate occurrence which may help us arrive at the solution to a crime we are investigating.

It may help us solve a crime which otherwise might never have been solved. Or it may allow us to arrive at a solution much more rapidly than would have been the case had the lucky circumstance never occurred.

The lucky factor is something which is not within our control. If we do control it, it would not be classified as luck. Let me use an example to illustrate this point.

Imagine that there is a burglar who is very active in a region which includes several towns and cities. He has committed burglaries in the different jurisdictions and though burglary investigators

have accumulated considerable information, no one has yet been able to identify a suspect.

Imagine now that two investigators from different police agencies who are not even acquainted, are invited to a party at the house of a mutual friend. As they meet and converse, they realize that they are in the same line of work and in fact are both working on cases in which the same perpetrator appears to be involved. As they exchange information, they each provide links which enable them to complete a picture which leads them to a suspect.

The meeting of these two investigators was simply a lucky break which resulted in the identification and possibly the successful prosecution of a suspect. However, what if police administrators in the several jurisdictions have decided to create a Regional Association of Burglary Investigators, a group which meets once a month for the specific purpose of exchanging information of mutual benefit. Now the exchange of information has been formalized and would hardly come under the heading of luck since the administrators themselves set up the mechanism for just this kind of exchange to occur.

When we think of luck in association with gaming or gambling, it seems that we are really talking about probability or rarity. And we can quantify the circumstance.

If a gambler rolls eight sevens in a row with a pair of dice, we can place a numerical value on that probability. In this case chances are something less than one in two million, and we can exclaim how lucky the man is. Or a poker player draws

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the one card in the deck which can complete his straight flush, the lucky so-and so. A bridge player who tries three finesses and succeeds with all of them while playing a hand and making his contract, might declare himself lucky. And we could determine just what are the probabilities of doing these things. So in this kind of situation, it appears that there is a mathematical basis to the phenomenon that we call luck. Usually we can think of it as some-

thing which happens outside the norm, something exceptional.

Of course, if it is to our benefit, we call it good luck. If, to the contrary, it is detrimental to us, we characterize it as bad luck.

When we are considering the criminal investigation, it may well be that there is also some mathematical foundation to the existence of lucky events, and someone may have the ability to articulate and create equations to explain it, but I personally would find it beyond my capability.

Let me try to illustrate some of the possibilities or situations where luck may be a factor, possibly the key factor in determining success or failure in the investigation.

## Criminal Behavior:

This is a very large category. We do not control the behavior of the perpetrator. So what he does or does not do becomes a matter of luck. Allow me to use an illustration from an actual case. A policeman was shot and killed on an isolated highway sometime after midnight. The officer's weapon, a 38 caliber Smith & Wesson revolver was missing. There were no witnesses. A license plate number which had been submitted to the dispatcher turned out to be a plate which had been reported stolen. A blood spattered receipt found next to the body had a name and address which had also been written on the officer's clipboard. However, investigation disclosed that the name and address were completely fictitious. Six bullets were recovered from the body of the victim. These had been fired from a .32 caliber Colt revolver.

Now a tip regarding a potential suspect was received from a detective in a nearby town. This led to a successful search for a suspect who was eventually located and arrested in another state. When he was arrested, he had a .32 caliber Colt revolver in his possession. This weapon was examined, and fired bullets were matched successfully with the evidence bullets. This case was prosecuted and a conviction was obtained.

Sounds like a normal case, so where's the luck? Well, what if the perpetrator had decided to get rid of the revolver, which he might easily have done by simply dumping it into the ocean, or a lake, or burying it in the desert? This was a key piece of evidence in the case. Without it, we had nothing. It turned out that the culprit was enamored with this engraved and gilded weapon, and so



luckily we did get our opportunity to make the identification.

I recall the burglar who decided to take a bite out of a piece of cheese and left some excellent bite marks which we could compare successfully with the teeth of a suspect some months later.

Why did he bite the cheese? How fortunate for us that he took a bite but didn't eat it all. These are the burglar's decisions, uncontrollable by us, and ultimately of critical importance in establishing proof of involvement in the crime.

I have no doubt that any investigator who takes the time to think about it will recall cases in which some critical piece of evidence was available or, conversely, not available because of a lucky circumstance.

### **Time and Place:**

We have already talked about the fortuitous meeting of the two burglary investigators who were able to exchange useful information leading to an arrest. How many times have we seen cases where a key witness just happened to be in the right place at the exactly right time to see the crime occur? This is not planned, not foreseen, it's just plain luck.

I recall what seems to me a lucky confluence of time and place that allowed me to arrive at a conclusion as to the common origin of two letter bombs.

In the late sixties and early seventies we had seen a remarkable growth in world wide terrorist activities. One of the terrorist weapons which appeared on the scene at this time was the letter bomb. An Israeli attache in the London Embassy was killed opening one of these devices. A US Post Office employee was injured. Anyone in the field of law enforcement who had anything to do with bombs and explosives was anxious to learn details of the activating mechanism of these letter bombs.

At this time I was involved in a program of training assistance for police in developing countries. One of my duties was to teach the officers how to deal with explosive devices. So I had a definite interest in the letter bombs.

About this time, information began to flow from government sources. Also I received an envelope from one of our police advisors in Bolivia. A letter bomb had been sent to the Israeli Embassy in La Paz. It had been intercepted, rendered safe and disassembled. Photographs had been taken during each step of this process, and the envelope contained a set of these photos. These would be very help-

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ful in my teaching efforts. It was apparent that this letter bomb had been posted from Amsterdam. This took place in 1973.

Late in 1975, my organization, the Office of Public Safety, had been eliminated by a congressional action. As I was between jobs, I accepted an assignment from the State Department to go to Brazil and to evaluate a request for laboratory equipment which had been put forward by the Brazilian government. During this assignment, I visited the National Institute of Criminalistics in Brasilia.

In the institute was a exhibit of a number of cases in which the federal police had been involved. On one easel was a collection of photographs relating to a letter bomb which had been sent to the Israeli Ambassador in Brazil. This device had been deactivated, its components separated, and photographed. It seemed somehow familiar to me and I received permission from my Brazilian colleagues to take some pictures of this display.

When I returned home, I had an opportunity to compare these pictures with the ones of the Bolivian letter bomb which I had in my files. I found that both letter bombs were sent from Amsterdam with postmarks indicating the same post office branch. Both had the same kind and denomination of postage stamps which had been placed on the letters with the same orientation. Finally, a comparison of the manuscript writing led me to the conclusion that both had been sent by the same person.

Consider the factor of chance or luck that is involved in this little episode.

1. In 1973, because of the nature of my work, I, in Washington, D.C., receive photos of a letter bomb sent to Bolivia.

2. On a completely different assignment in 1975, I find myself in Brazil looking at and photographing a display of a letter bomb sent to Brasilia.

3. Having worked in the area of

questioned documents, I was able to carry out comparisons and arrive at conclusions of similarity of origin.

### **Inanimate Objects:**

At this point, I'm thinking of the behavior of inanimate, non-sentient objects, materials, or things. If you imagine that I am entering into the realm of the paranormal, or metaphysical, I'm not. I'm just describing things that can happen which turn out to be beneficial to us.

Imagine an armed robber making his getaway. He jumps into the stolen car, turns on the ignition, and the car refuses to start. So he is captured.

Years ago, we had a bank robbery. Two guys pulled the job, jumped into a stolen car, drove around the corner, transferred to another vehicle, and took off. Everyone was running up and down the county trying to catch these two.

I received a call in the lab asking me to go check out the first, abandoned vehicle for fingerprints. I went to the place where it was parked at the curb and began to process for fingerprints. I recovered quite a few and checked the glove compartment, beneath the seats, etc. for a possible abandoned weapon. I packed up my gear and was preparing to return to the lab. I decided to take one last look. This was a two door sedan and, as was very common in those days, there were cloth seat covers protecting the upholstery. I was at the door on the driver's side, and to check the rear compartment, I had to push down or fold down the back rest of the driver's seat. I did this, looked thoroughly once again, and found nothing. I turned away, pushed the seat back into its upright position, and took a last glance. Now I was amazed to see a brown paper lunch bag resting on the rear compartment floor that had been clear a moment before. When I opened the bag gingerly to avoid leaving prints, I could see that it was full of money. I was a young criminalist and all alone at that scene. I took a picture of the bag with the money showing. I didn't even want to touch it at that point. I stopped a passing citizen and had him call my office. In a few moments cars came screaming up, our guys, the FBI agents, the whole circus. They immediately reached in, grabbed the bag which I had so carefully preserved for prints, dumped the contents on the hood of the car and counted out ten thousand dollars which was what had been stolen from the bank. As you can imagine, the bag had been stuffed under the seat cover, and had fallen out when I let the seat back

fall back into its upright position. I'm sure the money would have been discovered eventually. But by whom? If nothing else, the discovery was swift and good for headlines, "FBI Recovers Stolen Loot." I, luckily, was saved the embarrassment of failing to discover this evidence.

The case that to me truly epitomized these thoughts about inanimate objects had to do with a killing by request that took place on the coastal highway south of San Francisco. We had received a missing person report which had been dormant for perhaps six or eight weeks. Our next notice relating to this was that the missing person's car was in the hands of police in Oregon along with a small gang of youths, street hustlers from San Francisco. They had been arrested for having been involved in some felony. A young female gang member confided to a matron at the youth detention facility that one of the gang members had killed a man in San Francisco. This young hustler admitted that he had shot the victim, our missing person, but it was only because the man had begged him to do so. In return, the willing victim had given the kid whatever money he had and his car also. The young man described the place where the shooting had occurred and drew a crude map as well.

From the map and the description, we decided that the site was on the coast highway, south of San Francisco, a loca-

tion known as Devil's Slide. This is a place of steep cliffs going down to the ocean. At the base are sharp rocks and a churning maelstrom of pounding waters. We located a likely spot, and after a few days of rainy, inclement weather, we arrived there on a sunny day. We had a tow truck with a winch and a leather harness.

My partner, a detective lieutenant, harnessed himself in this rig and was lowered down the slope looking for cartridge cases, torn pieces of clothing, buttons, any item of physical evidence which might substantiate the story we had received.

Of course, as my partner disappeared from our view, we had hopes of finding the body of the victim down below. A short time later, the winch pulled up an empty harness. We noticed a white object on the harness, but when it arrived at the top, there was nothing there. I hooked myself up and was lowered down the sloping cliff. Scanning the surface, I was unable to see any item of evidence. Then over to my right on a little sandy outcropping, I saw a piece of paper. It was the note which had been attached to the harness. As I angled my way over to it and bent over to pick it up, my eye caught a tiny glimmer of gold. There, almost buried in the sand was a gold man's wrist watch. As I was still in view of the top, I yelled up and had our photographer snap a picture establishing the

location. I then bagged it and tagged it and continued on down. There below in another sandy area we found three unsmoked cigarettes bunched together as though they might have fallen from the package. These were a mentholated brand, the very brand used by the victim and the gold watch was identified as one which had been a birthday present to him from his mother.

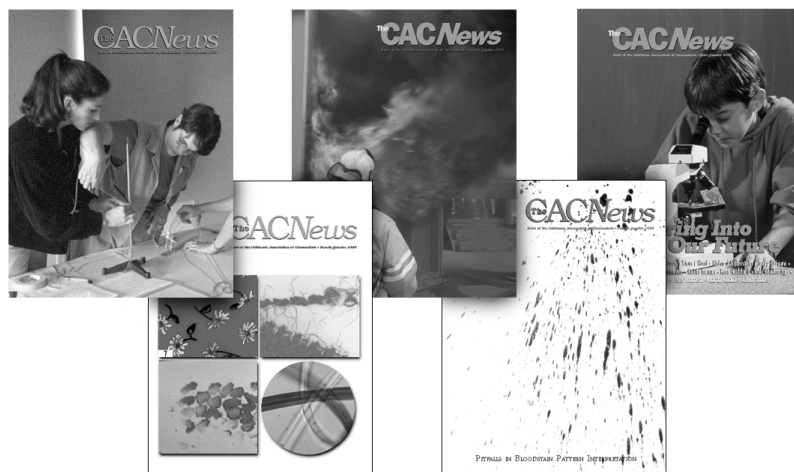
The body was never recovered, but the young perpetrator of this unusual request killing was convicted of the crime. The watch was a critical piece of evidence. Would I have found it had the note not fallen practically upon it?

I doubt that I would have seen the almost buried watch. Certainly my partner had missed it. To this day, I consider it a very lucky circumstance that the white piece of paper fell just where it did.

I have no doubt at all that if it were possible to make contact with seasoned investigators, each one with a little thought could come up with incidents or investigations in which luck was a critical factor. Admission of this should in no way detract from the ability or the professional status of the investigator. In the final analysis, it still takes a good investigator to recognize and utilize whatever lucky break comes his or her way.

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# Keep in touch.



# Candidate Statements



*Stamm*



*Simms*



*Parigian*



*Fox*

## For Regional Director (South)

### MARIANNE STAM

For those of you who don't know me, I have been a criminalist for 15 years at the California Department of Justice Riverside Laboratory and I have been a member of the CAC since 1986. I come from a family of criminalists—many of you know my *older* brother Jim of the SDPD crime lab and my husband Paul Sham, who works with me.

Since joining the CAC, it has taken me several years to "emerge" and become a part of the CAC family. I have always enjoyed attending the Semi-Annual Seminars and getting to know many of you. That's why I would like to become Regional Director South. As the Southern Regional Director, I will have the opportunity to interact with many of you and assist in organizing study group meetings. I will also be one of your representatives on the CAC board. I plan on continuing with the "Lunch" meetings and to solicit any suggestions from you regarding these meetings.

I hope that you will consider me for the position of Regional Director South, and I look forward to the opportunity to represent and serve you.

## For Editorial Secretary

### JOHN SIMMS

Many of you already know me from my column, "Quality Assured," a regular feature of the *CACNews*. I am grateful for having been a part of our organization's publication for at least the last two years. Regrettably, Editor Nancy McCombs is moving on to other projects. I welcome the opportunity to serve our forensic community in this new capacity.

I have been a CAC member for many years, contributing first to the trace evidence study group, then chairing the alcohol study group, and then finally initiating and chairing the quality assurance study group.

I will work with vigor to maintain the quality standards set by previous editors. I also hope I can find other ways to introduce new elements into our publication for continued improvement.

Your vote for me as editorial secretary will be a vote for a passion for excellence, a commitment to hard work, and a promise to get the job done.

P.S. Nancy, thank you for doing such a great job.

## For President-Elect

### MICHAEL PARIGIAN

I have been a member of the California Association of Criminalists (CAC) since I began my career in forensic science 14 years ago. I have been directly involved in the Association at various levels, including serving on the Board of Directors as Treasurer from 1995 to 1999. I believe that the CAC makes a significant contribution to the field of forensic science in that it provides a forum for learning, teaching, and other opportunities for information exchange. I feel that it is my obligation and privilege to serve the members of this Association by continuing to exemplify the goals and standards set by the previous leadership. Thank you for your consideration of my candidacy.

## For Treasurer

### MICHELLE FOX

I've been the acting treasurer for the past two years and have enjoyed my position on the Board. I believe I have made some positive changes and would be happy to serve the CAC for another term.

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# Greetings From Old Bailey Road



Diane Burns

Being a budget minded student, I can hardly afford to take in the upscale London theatre scene. No need to, really. When in the mood for theatre, I simply ditch my books and park myself in the public gallery down at the central criminal court, otherwise known as the Old Bailey.

Oh yes, there is a good deal of acting down at the Bailey, to be sure. Unlike their California counterparts, British lawyers are not expensively coifed, brown loafer

wearing, BMW types. No. What I witness at the Bailey is wig headed barristers dressed in extravagant silk costumes delivering over-the-top speeches. According to a former Old Bailey juror, they do so with the arrogance that comes from being licensed to interrogate strangers about their most private affairs and call them liars to their faces. [1] "Of course this is all nonsense, isn't it?" they will say. "The truth is, and you know it, that it was you who blah blah blah... Didn't you?" I have also had the pleasure of hearing a Bailey lawyer tell the jury that the defendant was the type of person who would allow his dog to foul the sidewalk, which I thought was a nice touch. There is, of course, one factor that distinguishes the Old Bailey from the Piccadilly playhouse. No one leaves the theatre to start a life of imprisonment.

Some of the most influential lawyers in British history have performed at the Bailey. Edward Marshal Hall is considered England's greatest criminal defender. "Three clerks always preceded Hall into court, one carrying a pile of clean handkerchiefs, the next with a carafe of water and the third with an air cushion. If the prosecutor's evidence was impressive Hall would blow his nose loudly on the handkerchiefs; if it got more dangerous he would knock over the water; if it looked like it was becoming fatal he would slowly and deliberately blow up the air cushion to attract the jury's undivided attention," according to lawyer turned journalist John Mortimer. [2] Clearly, it seems to me, legitimate use of theatrical techniques in the courtroom.

Hall was also known to end his final speech by holding out his arms to represent the scales of justice. "Evenly balanced, until you put on one side that small feather, the presumption of innocence. "And then"—and here one arm sank — "the scales come down on the side of the defense," relates Mortimer. Judges were always relieved when Hall came to his scales

of justice act, because that meant his speech was almost over.

Of course, they don't call them lawyers in England. Instead, you are either a barrister or a solicitor. Basically, solicitors do not present cases in criminal court. Barristers are the courtroom advocates and they are also the one's who wear those archaic wigs. A newer, whiter wig is indicative of an inexperienced junior barrister. The yellowed slightly dishevelled version is a sign of a crusty veteran of at least ten years. Wearing one slightly askew is not uncommon. The more important the case, the more wig hair there will be in the courtroom. Trevor Grove, in his excellent book *The Jurymen's Tale*, summed it up quite neatly when he said that during an important trial at the Bailey "there is enough wig hair in the courtroom to stuff a double mattress."

The name Bailey comes from the Norman 'Baille' meaning fortified place, which is a suitable description. There is a slight resemblance to the original castle at Disneyland, sans the moat. However, instead of Tinkerbell there are dour faced jailers casting suspicious glares at visitors. Upon entry you are greeted with the facts: 'The Old Bailey attracts the most

notorious of criminals, the most odious of crimes, the most eloquent of advocates and some of the finest judges,' says a sign mounted on the outside of the building.

Inside, the Bailey décor is a friendly amalgamation of a police station and your great grandmother's parlour. Under its roof are nineteen courts hearing 1700 cases a year. There's a jail in the basement for the defendants. Upstairs there is an apartment for the most senior judge who sits in Court 1, the largest court at the Bailey. The distance between the two must have been prudently planned so as not to permit a lost and straying murderer the embarrassment of witnessing the judge curling his wig in the morning before gavel time.

When seated inside the public gallery of Court 1, the atmosphere can become highly charged. For several months I have been following one of the longest murder trials to ever take place in this country. Standing (UK witnesses are not permitted to sit) inside what the British refer to as 'the most famous witness box of any courtroom in the world,' I hear a forensic scientist testify, "my conclusion is the DNA could have come from the defendant. The chance that it could of come from someone other than him is one in a billion." Immediately I turn toward the defendant in time to see all the blood leave his face. His wife of twenty-five years is sitting next to me. Her despair is audible.

Trial by jury has existed in these islands since the 1300's in one form or another. In a nice little twist of irony, pre-Revolutionary America borrowed the English jury system to legally cut its ties to the Queen and English colonial power. Since then, the jury has been a mainstay in American justice, viewed as an almost God-given right for a fair trial. Interestingly, the English jury system is not a British invention. It was taken from the French. Why twelve jury members? No one re-



**There is a slight  
resemblance to the original  
castle at Disneyland,  
sans the moat.**



ally knows. According to Grove, there were twelve apostles and twelve tribes of Israel and twelve pennies to the shilling. If not one of these explanations, then the real reason for twelve jurors has been lost to antiquity.

The United States also adopted the adversarial system of justice from English Common Law.

These are laws that were never actually written down anywhere and are based on tradition and custom. The main rationale behind adversarialism is any party has the right to confront their accuser as well as the evidence against him or her. For those not familiar with the true meaning of adversarialism, it may simply be defined using a five-letter word that starts with the letter f, as in f-i-g-h-t. That's right, two sides going at it like hooligans during the closing minutes of an England and Ireland soccer match. The defense and prosecution only call those witnesses likely to advance their own cause and both are permitted to attack the credibility and reliability of the witness testifying for the other side. What's more, they both can not be right. Someone is not telling the truth. The Edwardian courtrooms of the Old Bailey have witnessed some of the greatest liars who ever lived.

A fight requires rules of engagement, and the British have done a bang-up job on this. The right to a public trial; the right to know the nature of the charges and of the evidence; the presumption of innocence; proof of guilt 'beyond a reasonable doubt'; the defendant's right to silence; the right to representation by a lawyer; the right to appeal – all are extracted from English Common Law. The actual justice of the verdict along with the virtuous concept of truth takes a back seat to these rules of engagement. During my courtroom coursework at King's College, we are taught to recognize that a criminal trial is about proof, not truth.

A colleague of mine writes that without the criminal justice system, the forensic scientist would have no role. [3] Seminars, courses, and books are offered on the topic of proper courtroom presentation, typically focusing on the awkward association between science and the law. Crime labs spend precious time and resources training suitably selected staff in courtroom preparation and most interviewing panels ask the "What would you do in court if..." question.

You give better testimony if you feel comfortable. You feel more comfortable giving testimony in a system you understand. As many of us diligently make attempts to improve our forensic knowledge, a little appreciation of the history of our criminal justice system can only enhance our efforts. Look no further than across the pond.

On a personal note, my studies continue at breakneck pace. The British expect more from their students than did my professors back in the States. Demanding lot. Beginning in May, I will in Edinburgh, Scotland, for a lab placement with the Edinburgh Police Crime Laboratory. I will send my final correspondence from there in the next issue of *CACNews*. Cheers!

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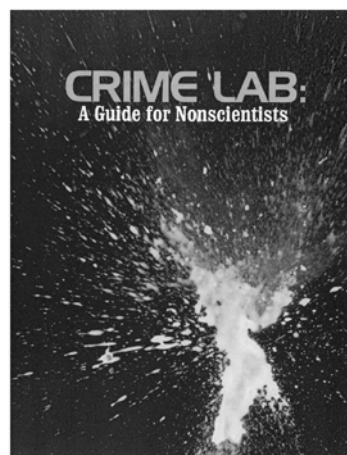
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# Full-Scale Compartment Fire Tests

*John D. DeHaan, Ph.D.*

## Abstract:

This paper will describe a total of ten fires set by various means in furnished compartments and discuss the observed fire spread and the temperature data collected. Temperature data were collected using both fixed thermocouples (in six of the tests) and infrared imaging video camera in the remaining four. Fires in all ten compartments were allowed to go to flashover. Maximum temperatures in the range of 1800-1900°F (982-1,038°C) were measured. Such high temperatures were observed in both floor and ceiling levels in post-flashover fires that were started with flammable liquid accelerants or not.

## Introduction:

Fires in compartments follow a predictable path. From ignition the fire grows to involve the first fuel package. If the flames from that first fuel come into contact with other combustibles, the fire will spread to other fuels. The fire is growing by flame spread across and then between fuel packages in the room. The hot gases generated by the combustion are buoyant and rise, losing heat by radiative and convective processes. If they are hot (buoyant) enough, they will reach the ceiling and begin to spread out to fill the room from the ceiling downward. Upon contact with the ceiling and walls, the gases will lose even more of their heat to these surfaces. If the fire is large enough (i.e., heat release rate or kilowatts of heat output high enough), the layer can increase in depth and its temperature will rise, despite these losses, even if some of the hot gases are spilling out through the tops of window and door openings or other vents. Objects located high up in the room will be immersed in the hot gas layer first and will begin to soften, melt, or even scorch as the temperature rises. In most fires fueled by ordinary combustibles, there is a distinct horizon or interface between the hot gas (or smoke) layer and the normal ambient air beneath. The height of this interface will depend on the size of the room, the number, size, and location of openings and the size of the fire. The temperature of the gas layer will also depend on those factors, with the size of the fire controlling the height of the flame plume. The taller the flames, the hotter the gases will be when they arrive in the hot smoke layer. As the temperature of the gas layer increases, so does the intensity of the radiant heat coming from it and striking all the exposed surfaces in the compartment. As the intensity of radiant heat increases, the higher the surface temperatures of those exposed surfaces become. They will proceed from being warmed to the point where their surfaces start to pyrolyze and scorch, then char, then finally to the point at which they can be ignited, either by a pilot flame from a nearby fire or by auto-ignition. When all of the exposed fuels in a compartment are on fire, the compartment is said to be fully involved. The future growth of the fire is then dependent on the amount of ventilation the compartment has. At this point the fire is said to have undergone

flashover, and the temperatures measured throughout the space can be very high as the flames engulf the room and pyrolysis gases from surfaces are turbulently mixed and burned throughout the room. The highest temperatures and heat fluxes will then be expected where the ventilation, and therefore the mixing, is the best, rather than in proximity to a particular fuel package.

When a flammable liquid (accelerant) is involved as the first fuel ignited, the highest temperatures will at first be expected low down in the room nearest the pool(s) of liquid fuel. The heat release rates of liquid fuel pools can be very high, and therefore, there, will be a great deal of turbulent mixing, with little if any development of two discrete layers. If the fire is extinguished before it goes to flashover, the distribution of damage can be readily distinguished from the "top-down" involvement of a typical ordinary combustible fire.

These compartment test fires will allow reproducible fires to be set in rooms of the same approximate size, material and ventilation conditions, so the effects of fuel and manner of ignition can be observed, and the temperatures monitored. Thermocouples will allow the measurement of average temperatures at fixed points, while the infrared video is expected to yield information about the dynamics of moving gases in the compartment under both pre- and post-flashover conditions.

## Experimental

The first set of experiments to be described here were conducted in Moses Lake Washington in April 1998. A series of six freestanding cubicles were built by members of the Washington State Patrol and other fire investigation agencies (as seen in Figure 1). These consisted of 1/2" (13mm) plywood floors over wooden pallets, with walls and ceilings framed of 2x4 lumber and covered in 1/2" (13mm) gypsum board (drywall). Each compartment was approximately 8'x8'x8' (2.4m x 2.4m x 2.4m) in size and had a single door approximately 6'8" (2m) high and 40" (1 m) wide. Each cubicle was fitted with wall-to-wall synthetic pile carpet (jute backed) over a rebond polyurethane rubber pad. There were two small viewports cut into side and back walls then covered with window glass so as not to affect ventilation. A total of four Chromel-Alumel (Type K) thermocouples were used in each room, two on opposite sides, away from the door, each approximately 1' (0.3m) from the ceiling, and two immediately beneath the ceiling thermocouples, approximately 1' (0.3m) from the floor. Each thermocouple was connected to a digital panel meter that had been calibrated to convert millivolts of output to degrees Fahrenheit. All four panel meters and a digital clock were mounted on a control panel that was monitored by a video camera. Each fire was started by an electric match triggered by the experiment monitor at time  $t = 0:00$ . The results of each test were recorded by two hand-held video cameras, moved between the door of the compartment and one or both of the viewports. Each fire was allowed to progress to flashover, and then burn approximately 1 minute beyond flashover before extinguishment using water fog spray. Each scene was then preserved for the fire investigation class to evaluate. At the end of the session, the thermocouple monitor videotape was played and stopped at intervals so that the readings on all four panel meters could be recorded and entered into an Excel™ spreadsheet for later plotting. The videos were then synchronized and edited on a time lapse basis to demonstrate key features of the fire's development. All six compartments were furnished differently and different ignition scenarios were run in each, as listed in Table 1.

The second set of experiments to be discussed here were

*Fire-Ex Forensics, Inc. Vallejo CA*

conducted in May 1996 at the San Jose (CA) Fire Department training facility, with cubicles built and furnished by members of the Santa Clara Co. Crime Lab (Gerald Arase, Mark Moriyama) as part of the Semi-Annual CAC Seminar Workshop Program. The cubicles were built in the same manner as those described previously and were the same size (as in Figure 1). The fire behavior in each test was monitored by a tripod-mounted video camera and the temperatures were recorded via an Inframetrics™ ThermaCam Infrared imaging video system. This system uses a thermomagnetically cooled sensor to record an infrared image for each pixel of the viewing field and then assign a "false-color" to it. Mapping of complex thermal images can then be accomplished via video even as they change from second to second. Times for various events were established by manually timing (via stopwatch) time elapsed on the visual (VHS) videotape from the moment of ignition. The scenarios and ignition conditions for these experiments are shown in Table 2.

## Results:

The times for various events in each fire are shown in Table 3 as min.:seconds elapsed from time of ignition, as recorded by visual analysis of the edited videotape record. The temperature/time plots from Tests 1 - 6 are shown in Figures 2 - 7. Note that the time axis is truncated in Figure 6 due to the incubation time for the smoldering fire. The freeze-frame images from different times for tests 9 and 10 are shown in Figures 8 - 12.

## Discussion

The time-temperature plot for Test 1, seen in Figure 2 showed a gradual increase in temperature at the ceiling (T1) as the fire grew slowly into the vinyl covered chair. It was not until the interior of the recliner was involved at between 4 and 5 minutes, that there was a significant change in the ceiling temperature. When the pillow on the chair ignited (at 6:05), and the exterior of the backrest became involved, the ceiling temperature began to rise much more quickly. The lag time between T1 and T2 was the result of the "filling time" for the hot gases to travel upward to affect T1 (at ceiling level near the chair) and then across the compartment to affect the temperature on the opposite side (T2). The dramatic rise at 7:00 occurred as the chair became fully engulfed and roll-over was observed at 7:10. As the ceiling layer temperature rose above 1200°F (650°C), the radiant heat flux was enough to ignite the carpet, with the corresponding rise in temperatures at floor level (T3 and T4). Flashover was observed from the door at 7:25. Post-flashover temperatures were measured at 1500-1975°F (815 - 1080°C) at the ceiling, and 1350 to 1800°F (730 - 980°C) at the floor. Extinguishment was carried out at 8:30 after 1 minute of post-flashover burning.

Thermocouple data from Test 2 were shown in Figure 3. Here with alcohol ignited as the first fuel (as an accelerant) the temperature at the ceiling directly above the trailer (T1) starts to rise immediately, with the ceiling temperature across the room following the same course about 45 seconds later. Shortly after 2:30 there was a rapid rise in ceiling temperature as the bed clothes ignited. This event was accompanied by the observation that flames were extending across the ceiling of the compartment, followed by roll-over (ignition of the entire hot gas layer) at 2:52. As the ceiling temperature exceeded 1200°F (650°C) at ≈3:00, the floor temperature began to rise as carpet

and other low-level fuels began to ignite. Flashover was declared by observation at the doorway at 3:30 but the data shows it was about 30 seconds later before high temperatures (1700 - 2000°F, 927 - 1093°C) were established in both upper and lower regions of the compartment as the flashover process was completed throughout.

Thermocouple data from Test 3 is shown in Figure 4. Here with paint thinner ignited as the accelerant, temperatures start to rise at the side of the compartment where the accelerant was poured at both ceiling (T1) and floor (T3) levels. The temperature rise is not quite as abrupt as in Test 2 due to the paint thinner's higher flash point and slower flame spread rate. The very rapid temperature rise from 0:20 to 1:00 was supported by the flames spreading across the bed clothes. About 30 seconds later, the temperature at the ceiling on the opposite side of the compartment (T3) rose, also at a fairly rapid rate. Rollover was observed at 0:45. Ceiling temperatures exceeded 1200°F (650°C) during rollover at ≈0:50 and the floor temperatures on the far side began to rise as the carpet and furnishings ignited. Flashover was observed from the doorway at 1:05 and it was about 30 seconds later that maximum temperatures were measured throughout the compartment ranging from 1500 - 2000°F (815 - 1093°C) at the ceiling and 1600 - 1725°F (870 - 940°C) at the floor.

Temperature data from Test 4 is shown in Figure 5. In this test, there was no measurable increase in ceiling temperature (T1 or T3) until the fire in the wastebasket under the desk became large enough to be visible from outside the compartment (estimated 50 - 75kW fire) at about 3:00. Temperature increases were minimal until the fire penetrated the back of the desk and began to escape from the front of the knee-hole at ≈13:30. Once the desk and the chair cushion were fully involved (at ≈14:00) the increase in ceiling temperature was very rapid. Rollover was observed at 14:15 and this corresponds to the ceiling temperature (T1 and T3) rising to 1800°F (982°C) and triggering ignition of the carpet which occurred between 14:00 to 14:30. Flashover was noted at 14:47 as the carpet in the doorway ignited. By that time temperatures throughout the compartment ranged from 1600 to 1900°F (890 - 1038°C). One interesting note was the ignition and flash-off of the varnish on the wooden chair arm at 14:04, followed about 6 seconds later by ignition of the wood itself. The striking observation of this fire was the rapidity of transition from what appeared to be a small, nuisance fire under the desk to a fully involved room fire which occurred in just over one minute (13:30 to 14:47).

Temperature data from Test 5 is shown in Figure 6. The compression of the time scale should be noted, as with smoldering cigarettes used as ignition sources, nearly 53 minutes passed before there was a significant increase in ceiling temperature. During the early stages of the fire, an area of charred cloth overlying the location of the cigarette grew gradually with smoke output increasing. By 36 minutes it was noted that the smoke being generated was not sufficiently buoyant to create two distinct layers. The smoke was mixed throughout the compartment making direct observation of the process impossible. The room was not tenable without breathing apparatus. The temperature at ceiling level increased to approximately 500°F (260°C) as the smoke output became very pronounced. At 54:30, there was a very rapid increase in ceiling temperature (T1 and T2). (Since this was probably when the chair went to flaming combustion, which occurred at 55:30 on the videotape, it suggests that a computational error resulted in an error of one minute on the plotted data prior to 54:30.) By 56:00 on the vid-

eotape, the chair was fully involved, fire spread by direct flame contact to adjoining wall-hangings, and rollover was observed at 56:30, and flashover was complete by 58:00. The rapid increase in temperature at floor level (T3 and T4) shown at 56:00 in Figure 5 was the transition to flashover. It appeared from the data from T3 that flashover was not complete on the far side of the room (T3) when the fire was extinguished. There was also very little fuel (except carpet) on that side of the room, and the flame plumes from the carpet may not have been in direct contact with the thermocouple. Temperatures near the floor on the other side of the room (T4) reached 1900°F (1038°C) during post-flashover burning and were considerably higher than the ceiling temperatures, 1500 - 1750°F (815 - 855°C).

Temperature data from Test 6 is shown in Figure 7. In this test, a polyurethane foam cushion covered with a synthetic fabric was ignited by direct flame. With its vertical orientation, flame spread across the cushion was very rapid: by 1:30 there were measurable increases in ceiling temperature (T1 and T2). By 2:00 the cushion was completely involved and nearby surfaces of the sofa were ignited. Flame spread was enhanced as the synthetic fabric melted, charred, and shrank away, exposing the polyester layer and urethane foam. Molten, burning droplets of fabric cascaded down the front of the sofa, falling to the floor, where their flame plumes could impinge directly on the susceptible fabric, thus increasing the rate of involvement. Ceiling layer temperature exceeded 1200°F (650°C) by 2:30 by which time rollover had been observed. The increased radiant heat from the now-burning layer caused the ignition of other fuels in the room (primarily carpet) and flashover was observed in the doorway at 3:00. Maximum ceiling temperatures were 1575 - 1650°F (855 - 900°C) while one floor temperature thermocouple (T4) reached 1875°F (1024°C) just before extinguishment. It is interesting to note that the other floor reading (T3) reached a maximum just as flashover took place and then dropped. It was thought that this was the result of ventilation in the room, as the fire in the doorway consumed so much of the air that could enter, that the rest of the compartment was underventilated. This was supported by the post-fire observation that while the entire sofa and carpet were burned, the end of the sofa nearest the door was burned more heavily than the end furthest away, even though the fire had been ignited at the far end, and had consequently burned for some 2.5 minutes longer.

Due to a technical fault there was no infrared data recorded for Test 7, but the observed fire behavior warrants discussion. Ignition of the intended first fuel package (the ottoman just inside the door) occurred as expected. However, the synthetic carpet proved to be susceptible to ignition by the modest flames of the wax paper trailer. The carpet pile supported the combustion to the extent that the fire spread horizontally across the carpet and helped involve other fuel packages in the compartment. (This carpet was not identified at the time of the tests, but subsequent tests by this author indicate that it was one of the new generation of low-cost carpets made with polypropylene face yarn that will support self-propagating flame spread.) As the external radiant heat applied to the carpet from the combustion of other fuels increased, the rate of spread of flame across the carpet increased and flames could be seen extending across the exposed carpet surface. At 3:30, all of the fuels visible below the very dark smoke layer ignited. This meets the criteria established for flashover. It was 10 seconds later when the hot smoke layer itself ignited (a process aided by the increased thermal input and turbulent mixing from

the burning carpet and furnishings below. Flashover was estimated from visual evaluation to be completed by 3:50. Normally one observes ignition of the hot smoke layer (rollover) to occur first, the added radiant heat from the now-burning layer adding enough radiant heat to bring everything else to flame (flashover). In this test, flashover began first, followed by rollover.

In Test 8, ignition was carried out accelerated with gasoline spread across the floor and furnishings. As a result, the fire grew very large very quickly. Major fuel packages such as the chair and dresser were involved within 42 seconds of ignition. Rollover was observed at 0:45 and flashover was identified from observations at the doorway to have occurred by 0:51.

In Test 9, ignition was by direct flame applied to potato chips and newspaper on the bed (comforter). The fire grew very slowly and thermal imaging showed a hot gas layer at the ceiling after about two minutes that deepened and grew hotter as the fire spread across the comforter and involved the wooden night stand. Figure 8 is a frame capture from the thermal image video approximately 6 minutes after ignition, just before rollover was observed. There was a region of high temperatures (>1500°F, 815°C) on the lower right portion of the door that demonstrated the flame plume arising from the fire between the side of the bed and the night stand. The hot gas layer temperature was approaching 1200°F (650°C). It is more pronounced on the left side because the large flame plume from the bed (which cannot be seen from this angle) was spreading across the ceiling of the small compartment and "banking down" against the left wall. Figure 9 was taken 47 seconds later just after flashover occurred. Very high temperature regions were visible now at floor level next to the chair and extending up into the center of the room as a result of the extremely turbulent mixing that resulted from post-flashover fires. Figure 10 was taken 28 seconds later. Extremely high temperature gases (flames) were visible throughout the compartment extending from the carpeted floor (whose combustion was being aided by the air being entrained into the bottom of the doorway) throughout the upper portions. The two layers or zones have completely broken down and the very turbulent mixing of air and combustion gases have produced very high temperatures throughout the compartment. The high temperature zones are not the same as those shown in Figure 9 and this reflects the instability and chaotic nature of the combustion in post-flashover fires.

Figure 11 is a frame capture made from the infrared video of Test 10 just 3 seconds after ignition. As typical of fires involving a flammable liquid accelerant, the flames and highest temperatures were at first low in the compartment, near floor level, in the vicinity of the first fuel ignited. Within 10 seconds the flames had spread throughout the compartment and flashover was observed at 17 seconds after ignition. Figure 12 was taken at 2:44 after ignition and showed the same compartment in post-flashover. The high temperatures were no longer confined to the vicinity of the gasoline but rather were established throughout the compartment. They demonstrated the same high temperature distribution and turbulent, chaotic mixing as seen in the nonaccelerated compartment test burning in post-flashover fashion.

## Conclusion:

The response times of thermocouples are on the order of a few seconds (if the thermocouple wires are to be mechanically robust enough to survive such fires) so their data, even

under the best conditions, will represent something of a time-average of temperatures to which they are exposed. In addition, the temperatures measured by fixed thermocouples such as these will be subject to the variables of their position in turbulent flame plumes and their position relative to fuel packages involved, but the following conclusions can be reached.

(1) An ordinary combustible fire will produce a vertical plume of hot gases that can affect materials in immediate contact with it (by melting, scorching, charring or ignition). This plume of buoyant gases rises to the ceiling of the compartment and spreads out. If the temperature of the hot gas layer reaches 1200°F (650°C) or so, the radiant heat can then ignite other materials throughout the room.

(2) It is clear that temperatures at floor level can match and even exceed the temperatures measured in the upper layer during post-flashover burning. This is supported by the infrared images.

(3) In a fire involving a flammable liquid, hot gases are generated (with the same temperatures as observed in ordinary combustible fires). These flames and hot gases are at first localized at floor level in the vicinity of the fuel but quickly spread throughout the room.

(4) As more ordinary fuels become involved, the growth of the accelerated fire follows the same path as an ordinary combustible fire with the same temperatures produced (particularly in post-flashover rooms) but on a faster time scale.

Unfortunately still images cannot capture the dramatic turbulence of the hot gases burning in post-flashover compartments in the same way as videos can but these images reveal two important features of fire behavior in compartments.

(5) If a fire goes to flashover, the two layers or zones characteristic of slowly growing (i.e., normal combustible) fires no longer exist and very high temperatures exist throughout the compartment. These very high temperatures are in the same ranges whether the initial fire was accelerated or not.

(6) If a fire goes to flashover, the high radiant heat fluxes resulting from the mixing of air being entrained into the compartment and combustion gases (pyrolysis products being generated by every solid fuel in the room) is not stable and changes in intensity and location with every second. The regions of highest heat flux will generally be in the vicinity of the inlets for fresh air, but are no longer associated with the fuel packages themselves.

It is hoped that the results of these tests will be kept in mind when the post-fire indicators of fire behavior are being evaluated by forensic investigators. Old (but tenacious) theories about flammable liquid fires *always* being hotter than ordinary combustible fires, and floor level burning *always* being the result of flammable liquids still hold sway with some investigators.

## Acknowledgments:

The author would like to extend his sincerest appreciation to Grant Baynes, Glenn Brauteset, Glen Johnson, Jim Stewart, Duane Van Beck and the other members of the Washington State Region 8 Arson Task Force that organized the 1998 Seminar and built and furnished the cubicles studied here. The same appreciation and gratitude is extended to Mark Moriyama, Gerald Arase, Raymond Davis and other CAC members who extended the same extensive efforts on behalf of the CAC Seminar, and to Capt. Jeff Weber and other members of San Jose Fire Department for making the facility available for the tests reported here. The author is also deeply indebted to

Peter Blevin of Peter Blevin Associates, LaJolla CA for providing technical support with the InfraMetrics™ Thermal Imaging Infrared System. None of this would have been possible without the co-operation, participation and counsel of Monty McGill of McGill Consulting and Investigations, Willits.

## Table 1: Scenarios and Room Content, Washington State Patrol Tests

Scene 1: Simulation of a child's playroom with a bookcase, toys and a vinyl-covered chair with a pillow. Ignition was by open flame, a small pool of alcohol simulating ignition by a book of paper matches held against the base of the side of the chair.

Scene 2: Simulation of a bedroom with a single bed, a wooden dresser, an overstuffed chair, a child's mattress under the single bed frame and a pile of clothes near the bed. Ignition was by a trail of rubbing alcohol across the clothes and bed (spite fire).

Scene 3: Simulation of a bedroom with a single bed with bedclothes, wooden night stand with radio and lamp and a trail of clothes from near the door to the bed. Ignition was by a trail of paint thinner across the clothing trail and onto the bed.

Scene 4: A simulation of an office with a particle board wood desk, computer, wood chair with separate backrest cushion, plastic wastebasket with papers and cardboard, wood and vinyl chair, and suitcase. Ignition was by open flame of contents of wastebasket in knee-hole of desk.

Scene 5: Simulation of a lounge room with a platform rocker (cotton/synthetic blend fabric over latex foam in seat cushion and kapok fibers in backrest cushion), footstool, wooden bookcase and plastic suitcase. Ignition was by placing a burning (glowing) tobacco cigarette into the kapok filling of the back rest and another into the latex foam of the seat cushion.

Scene 6: Simulation of a lounge room with a large polyurethane-cushioned sofa, covered with synthetic fabric, extra P.U. foam cushion arranged vertically at one end, and a wooden dresser. Ignition was by open flame applied to the bottom of the vertical cushion.

## Table 2: Scenarios and Room Contents for CAC Tests

Scene 7: Synthetic fabric-covered sofa and ottoman (has-sock), wooden dresser, wooden chair. Synthetic carpet on floor. Ignition was by wax-paper trailer into door to ignite ottoman.

Scene 8: Single bed with bedclothes, wooden dresser and chair. Synthetic carpet on floor. Gasoline was poured in moderation across the bed and carpet and ignited by open flame (road flare).

Scene 9: Single bed with synthetic fabric comforter, wooden night stand with plastic resin lamp, upholstered wooden chair. Synthetic carpet. Ignition was by open flame applied to pile of potato chips and crumpled paper on bed.

Scene 10: Single bed, wooden side table, vinyl covered chair. Gasoline was spilled (in moderation) from floor onto bed

and ignited with a time delay using swimming pool chlorine and glycerin.

**Table 3: Visual Observations and Elapsed Times**

<b>Test</b>	<b>Elapsed Time</b> (mins :secs)	<b>Observation</b>
<b>1</b>	0:00	Ignition of alcohol by electric match
	3:00	Flame attacking vinyl side of recliner
	4:00	Side panel of recliner well involved
	5:00	Fire inside recliner established
	6:05	Pillow on seat ignited as flames extend over arm
	7:10	Rollover occurred (hot smoke layer ignited)
	7:16	Chair in doorway ignited by radiant heat
<b>2</b>	7:25	Flashover completed as carpet in doorway ignited.
	0:00	Alcohol ignited by electric match
	2:40	Flames seen extending across ceiling
	2:52	Rollover noted
	2:59	Top of dresser ignited by radiant heat
<b>3</b>	3:01	Bed fully involved as radiant heat accelerates spread
	3:30	Flashover completed as carpet in doorway ignited
	0:00	Paint thinner ignited by electric match
<b>4</b>	0:20	Flames spread length of trailer to involve bed
	0:45	Rollover occurred
	1:05	Flashover completed
<b>5</b>	0:00	Paper contents of waste can ignited by electric match
	3:00	First flame visible under desk
	13:30	Flames escape from front and back of desk
	13:45	Cushion on chair ignited
	14:04	Varnish on chair arm flashed off
	14:10	Wooden arm of chair ignited
	14:15	Rollover occurred
	14:47	Flashover completed as carpet in doorway ignited
<b>6</b>	0:00	Ignition of paper tissue by electric match
	2:00	Entire vertical cushion and end of sofa involved. Drop-down of molten, flaming fabric observed
	2:20	Flames reached ceiling in corner
	2:22	Rollover occurred
	2:40	All of sofa involved. Fabric melting and curling.
	3:00	Flashover completed as carpet in doorway ignited
	0:00	Ignition of wax paper trailer
<b>7</b>	1:00	Flames reached doorway
	2:30	Ottoman and carpet ignited, flames spreading
	3:30	Ignition of all room contents below smoke layer observed
	3:40	Ignition of hot smoke layer (rollover) occurred.
	3:50	Flashover completed as carpet in doorway ignited
<b>8</b>	0:00	Gasoline ignited by open flame at doorway
	0:37	Chair ignited
	0:42	Dresser ignited
	0:45	Rollover occurred
	0:51	Flashover completed as all fuels visible from doorway ignited
<b>9</b>	0:00	Potato chips on bed ignited by direct flame
	3:00	Pillow ignited
	4:00	Side of night stand ignited by fire on bed
	5:55	Lamp Ignited
	6:35	Rollover occurred
	6:47	Chair in doorway ignited by radiant heat
<b>10</b>	7:02	Flashover completed as carpet in doorway ignited
	0:00	Ignition of gasoline by time delay device
	0:10	Flames visible height of compartment
<b>11</b>	0:17	Flashover completed as carpet in doorway ignited



*Figure 1: Test cubicles as built at San Jose CA, May 1996. Capt. Jeff Weber, San Jose Fire Dept. watches Monty McGill (State Fire Marshal, retired) pour the gasoline for Test #10. The same type of cubicles were built for the Moses Lake tests.*



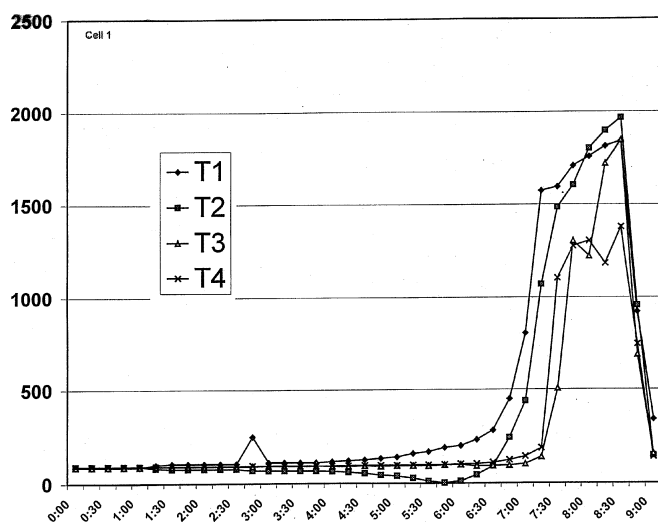


Figure 2: Temperature (°F) v. Time (min:sec) for Test 1. Vinyl-covered recliner ignited using a small (3 inch diameter) pool of isopropyl alcohol (ignited by electric match at  $t = 0:00$ . T1 and T2 were the upper layer (ceiling) thermocouples. T3 and T4 were floor-level thermocouples. (Apparent spike at 3:00 was the result of faulty manual data entry. Apparent decrease in T2 temperature is the result of faulty electrical connection to thermocouple, eventually overwhelmed by increasing temperatures.)

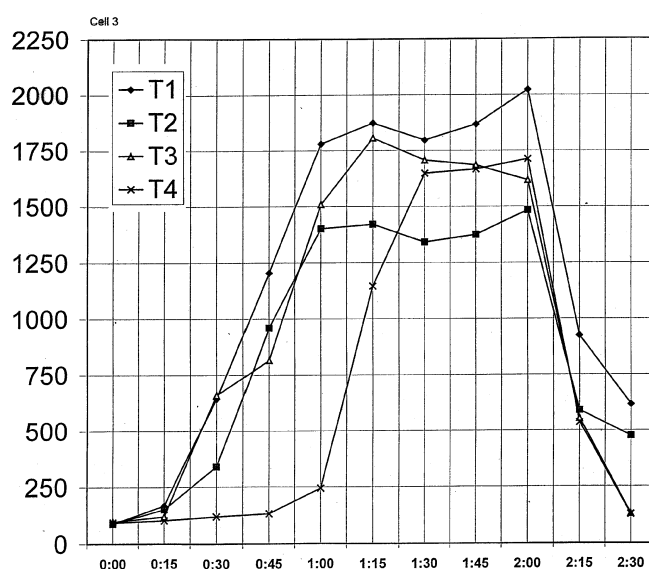


Figure 4: Temperature (°F) v. Time (min:sec) for Test 3. Paint thinner spread over trailer of clothing and corner of bed, ignited by electric match at  $t = 0:00$ . T1 and T2 were the upper layer (ceiling) thermocouples. T3 and T4 were floor-level thermocouples.

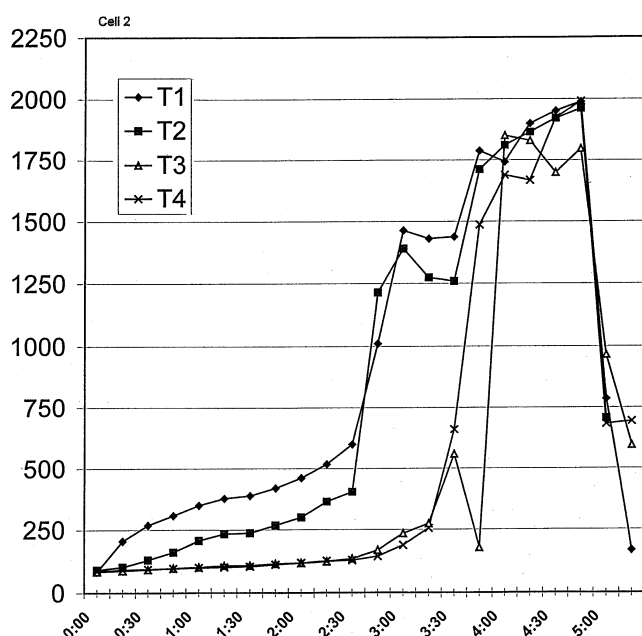


Figure 3: Temperature (°F) v. Time (min:sec) for Test 2. Isopropyl alcohol spread over clothing and chair and ignited by electric match at  $t = 0:00$ . T1 and T2 were the upper layer (ceiling) thermocouples. T3 and T4 were floor-level thermocouples.

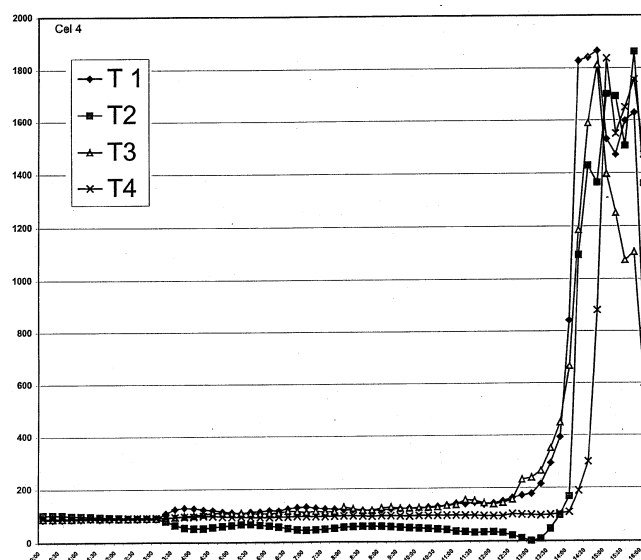


Figure 5: Temperature (°F) v. Time (min:sec) for Test 4. Paper and cardboard in wastebasket located under particle board desk by electric match at  $t = 0:00$ . T1 and T2 were the upper layer (ceiling) thermocouples. T3 and T4 were floor-level thermocouples. Apparent decreases in T2 temperature are the result of a faulty electrical connection to thermocouple, eventually overwhelmed by increasing temperatures.

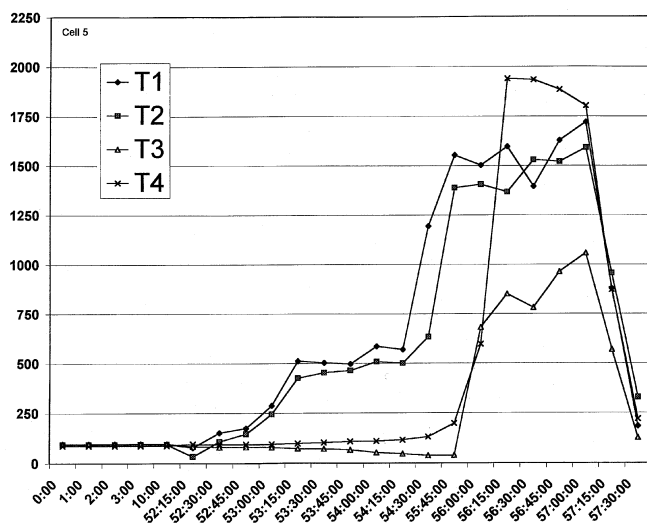


Figure 6: Temperature (°F) v. Time (min:sec) for Test 5. Smoldering cigarettes placed onto latex foam rubber seat cushion and into kapok backrest filling at  $t = 0$  to 1:00. T1 and T2 were the upper layer (ceiling) thermocouples. T3 and T4 were floor-level thermocouples. Apparent decrease in T2 temperature is the result of a faulty electrical connection to thermocouple, eventually overwhelmed by increasing temperatures.

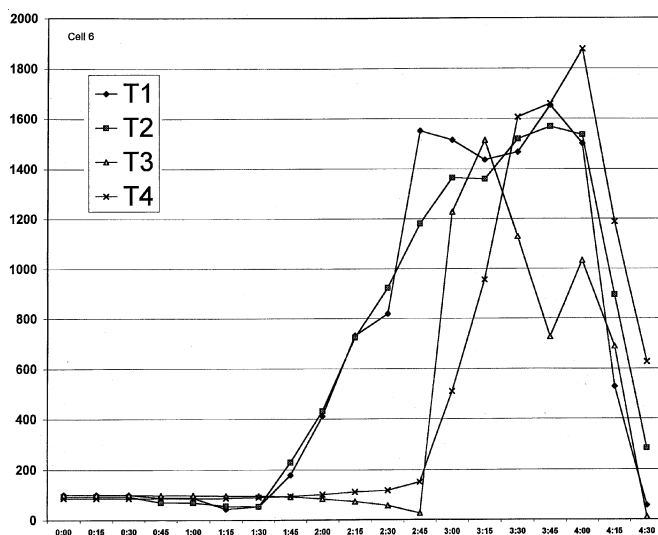


Figure 7: Temperature (°F) v. Time (min:sec) for Test 6. Backrest cushion (polyurethane foam cushion covered with synthetic fabric) ignited by electric match at  $t = 0:00$ . T1 and T2 were the upper layer (ceiling) thermocouples. T3 and T4 were floor-level thermocouples. Apparent decreases in T1, T2, and T3 temperatures are the result of faulty electrical connections to thermocouples, eventually overwhelmed by increasing temperatures.

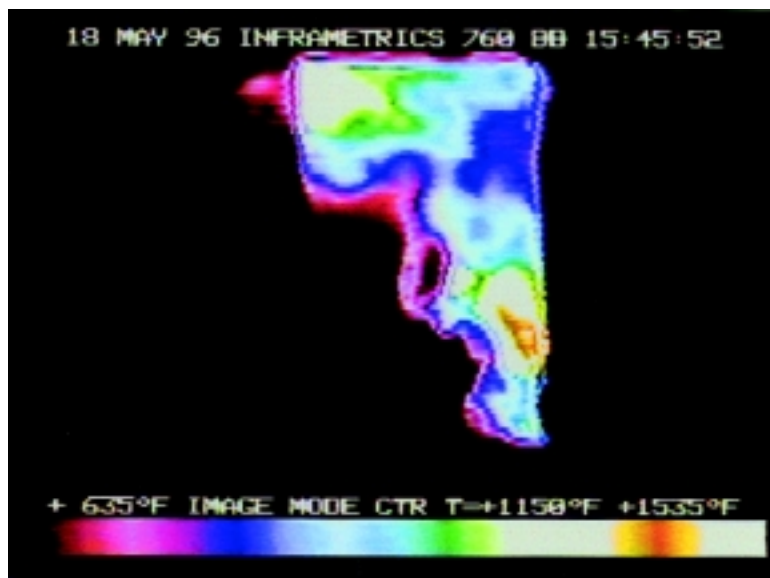


Figure 8: Image from InfraMetrics™ thermal imaging video of Test 9 captured approximately 6 minutes after ignition of bedding by direct flame. Colors can be compared to the calibration spectrum at the bottom of the frame. Thermal image of fire between bed and night stand is visible as a bright yellow image on lower right of the door opening. High temperatures near ceiling indicate layer is about to undergo rollover (ignition).

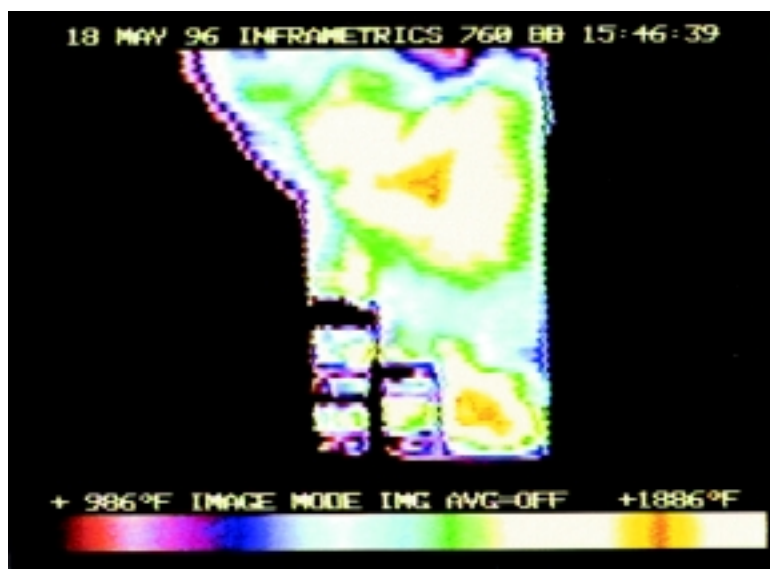


Figure 9: Image from InfraMetrics™ thermal imaging video of Test 9 captured 47 seconds after Figure 8. Colors can be compared to the calibration spectrum at the bottom of the frame. Flashover has just occurred in the compartment, and regions of high temperatures on the order of 1800°F can be seen both in the hot gas layer and near the floor where the carpet has ignited.

Figure 10: Image from InfraMetrics™ thermal imaging video of Test 9 captured 28 seconds later during post-flashover burning. Colors can be compared to the calibration spectrum at the bottom of the frame. While high temperatures are still visible in both upper and lower portions of the room, the locations have shifted as a result of the extensive turbulence.

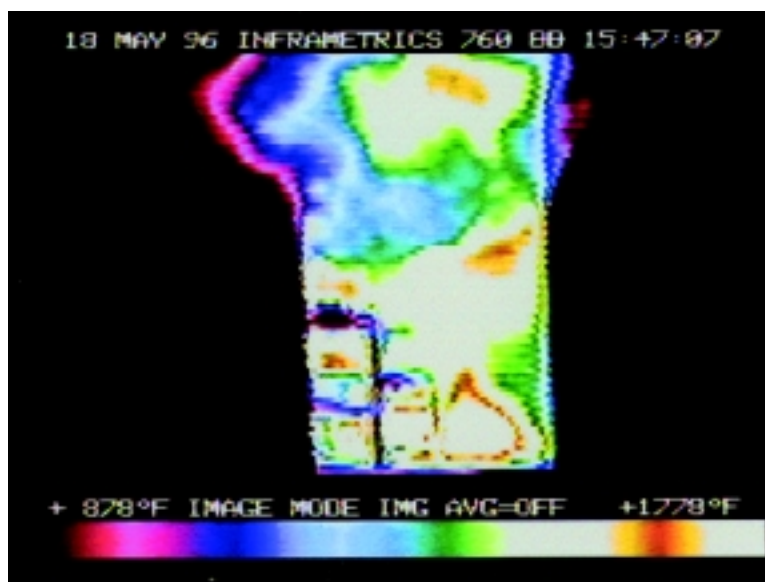


Figure 11: Image from InfraMetrics™ thermal imaging video of Test 10 captured three seconds after ignition of gasoline on floor of compartment. Colors can be compared to the calibration spectrum at the bottom of the frame. High temperatures are localized around the gasoline pool on the floor. Flashover occurred in this compartment at 0:17 (at 16:06.13 on monitor) as a result of the rapid ignition of the gasoline.

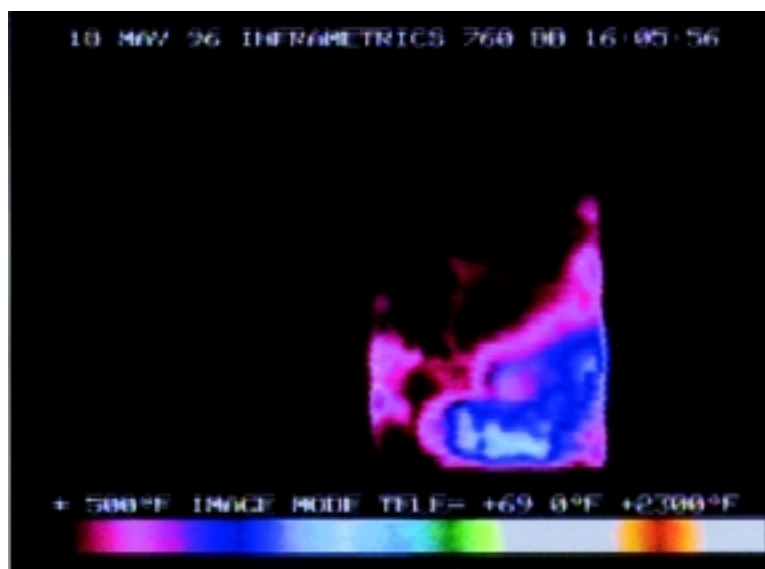
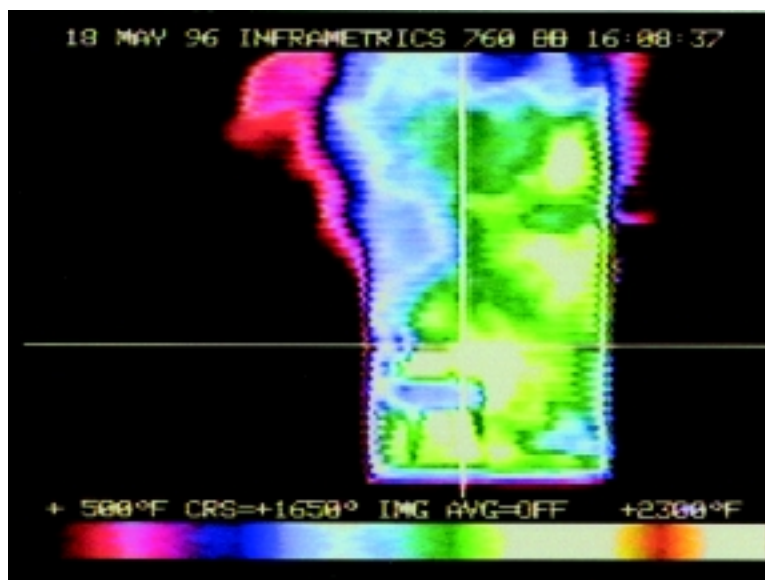


Figure 12: Image from InfraMetrics™ thermal imaging video of Test 10 captured at 2:23 during post-flashover burning. Colors can be compared to the calibration spectrum at the bottom of the frame. High temperatures can be seen throughout the compartment, no longer confined to the vicinity of the gasoline. Appearance is indistinguishable from post-flashover image of non-accelerated fire (Figure 9).



## Under New Management CAC Firearms Study Group

By Bruce Moran

The Northern California Firearms study group underwent new management in mid 2000. Study Group leadership changed hands when Robert Thompson, ATF Danville handed the baton to Bruce Moran, Sacramento County District Attorney's Office. Bruce volunteered to "pick up the ball" as Firearms Study Group Chairman with close support from Mike Giusto, DOJ-CCI and Terry Fickies, DOJ-Sacramento. Many thanks are owed to Robert Thompson for his years of service as previous chairman.

As new coordinators, we are optimistic that we will be able to attract firearm examiners at all levels of experience from both the Central Valley as well as the Bay Area into the group. Our theme will be to conduct meetings with an emphasis on practical topics that participants can learn from and take back to their laboratories for immediate use. We hope to emphasize the participation of our junior members so that they too will receive maximum benefit from our meetings.

In that spirit, two meetings were held in 2000. The first meeting took place at the Barnwood Restaurant in Ripon, CA on April 27. Tim Rieger of the California Department of Justice, Firearms Division, California Department of Justice Attor-

ney General's Office, presented the group with a review of new California gun control laws and provided each attendee with the new California Gun Laws reference guide.

Our second meeting was an all day workshop held at Moldcrafters Machine Shop in Lodi, CA. Mike Giusto, Department of Justice CCI, made arrangements for the group to participate in a machining tool workshop. The purpose of the workshop was for participants to obtain first hand knowledge of various machine tool processes by having an opportunity to use metal working machines to produce sample toolmarks that could be used for future reference in our casework. Participants were introduced to milling machines, lathes, surface grinders, drills, and an EDM machine commonly associated with the production of firearm and tool working surfaces.

Participants produced machine tooled reference samples to take back to their respective laboratories. Sequentially made toolmarks were made with certain machines for future study group evaluation. The experience proved valuable in building knowledge of machined tool surface recognition and evaluation to be used in the interpretation of toolmark surfaces when conducting casework and also when providing expert witness testimony.

During the lunch "hour" at the local Omega restaurant the following papers were given to complete the theme:

*The Evaluation of Limited Tool Surfaces Involving Magazine Marks and the Influence of Subclass Features in the Interpretation of Identification vs. Non-identification* by Bruce Moran, *The Evaluation of Materials Cut by Lasers* by Mike Giusto and *A Review of Robert Kennington's Evaluation of Consecutive Grinding Marks (AFTE 2000)* by John Murdock.

All in all, the day proved to be quite successful with a strong attendance from laboratories in Northern California including participants as far away as the Eureka-DOJ laboratory, numerous Bay Area representatives, and the Fresno-DOJ laboratory. This would not have been possible without the many hours of preparation and planning on the part of Mike Giusto. His efforts significantly benefited all of us. Terry Fickies also provided close assistance and volunteered to assist the rest of the participants by operating the fly cutter machine.

We are optimistic that the upcoming year 2001 will be an active one and that the exchange of information and knowledge will be far reaching and a strong network of participation of all levels of experience will be realized. Anyone interested in becoming active in the group are welcome. No contribution is too insignificant. If you have something interesting to share from your casework, have a new technique you use, or would like to practice a paper you will be presenting in the future, we are most interested in hearing from you. Remember, the bottom line is we want to learn from each other.

If you have any questions, would like to participate, or would like to place yourself on our mailing list, please contact:

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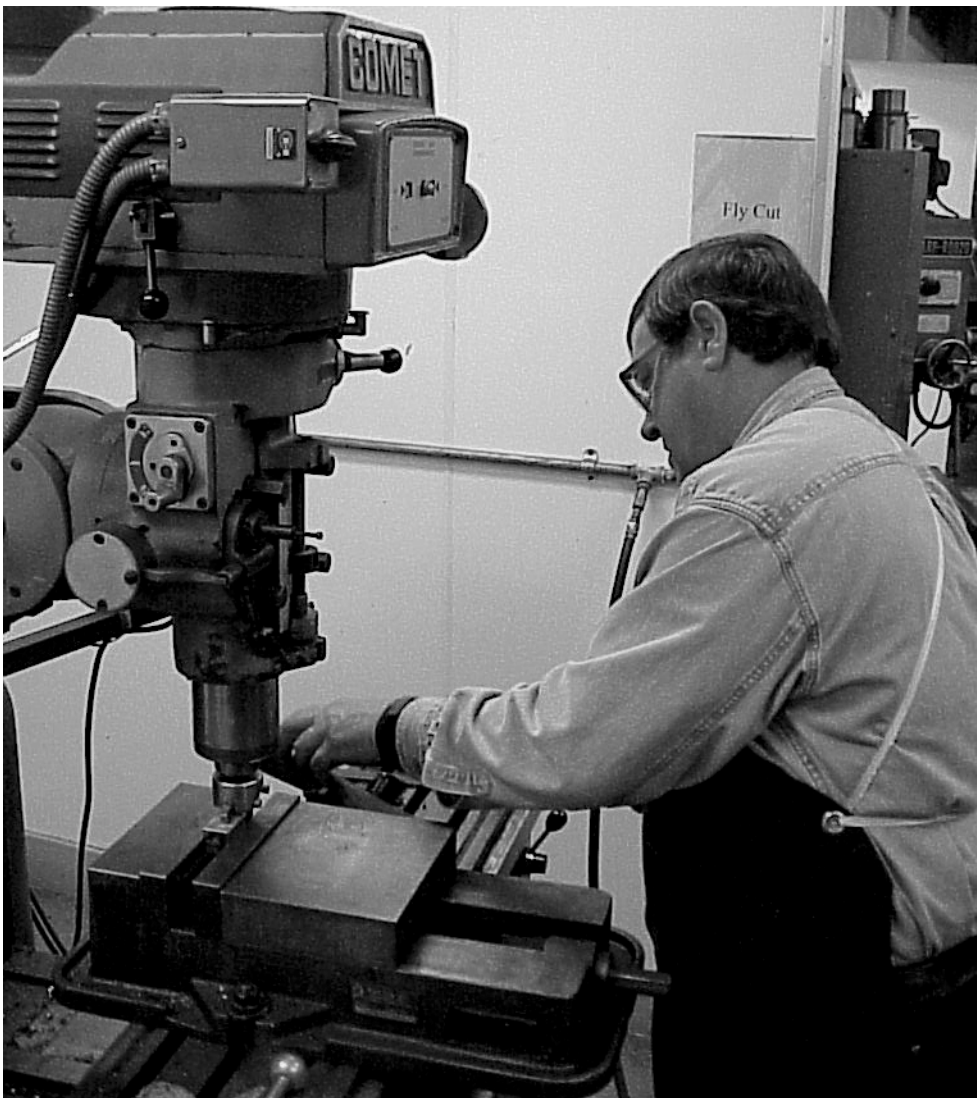


Chris Coleman risking the possibility of shorter fingers on the belt grinder.





*Mike Giusto (center) assists Dean DeYoung with the end mill.*



*Forensic Machinist Terry Fickies assisted the group in producing toolmarks with the fly cutter.*

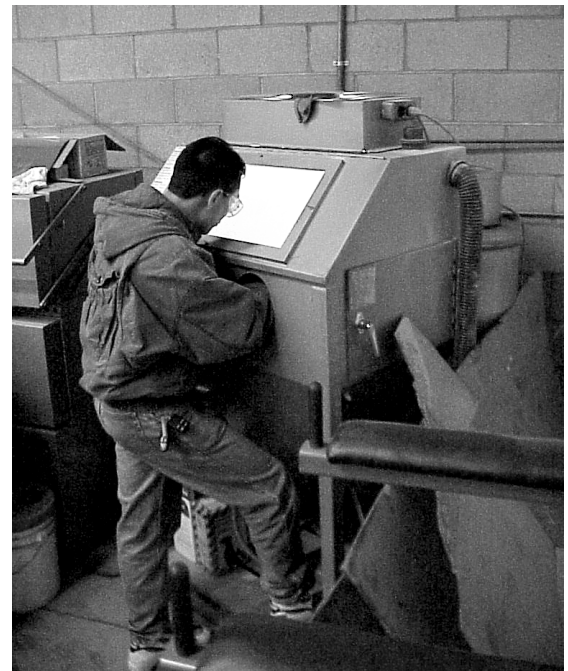




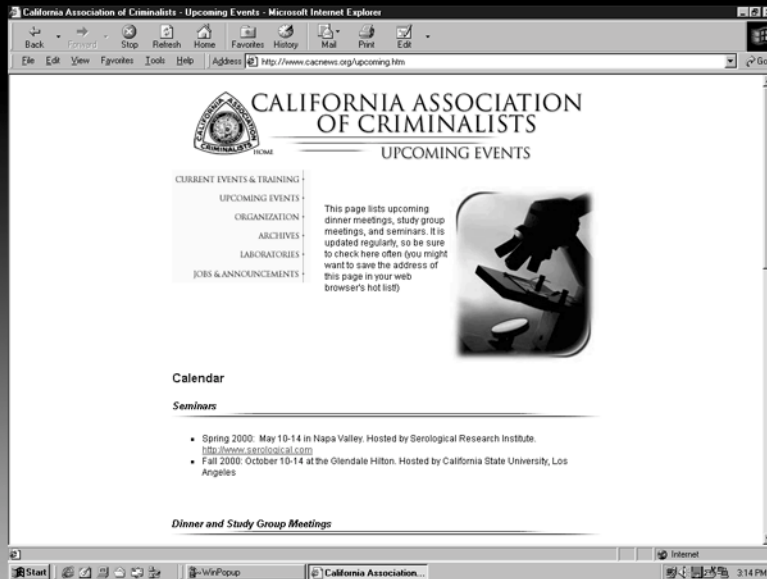
*Chris Coleman works the lathe while under close harassment of Eric Barloewen while Duane Quaschnick of Moldcrafters supervises.*

*(Below, left) Mike Giusto (Moldcrafters) operates the surface grinder as Chip Pollock, Gordon Deeg, and John Murdock observe.*

*(Below, right) Kenton Wong operates the sand blaster. (Actually, he's really trying to get one of those stuffed animals in the coffee break room).*



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# An Evaluation of Various Griess and Modified Griess Test Protocols

By: James Carroll, Los Angeles County Sheriff's Department, Los Angeles, California

**Key Words:** Modified Griess Test, Griess Test, GSR, Gunshot Residue, Distance Determination, Proximity Testing

## ABSTRACT

This article examines various protocols and test media used for the Griess test as well as the Modified Griess test and compares the results obtained from each. The Modified Griess protocol and test media as written by John Dillon and taught by the FBI was compared to the alternate protocols in the FBI GSR Manual as well as those used by other agencies in terms of ease of use, quality of results, and cost. Also, the ease of use and quality of results obtained with the Griess test was compared to that of the Modified Griess test. The observations made by the author are that the Griess test has distinct advantages over the Modified Griess test in terms of visibility and increased contrast of point reactions against the background. Certain protocols and test material also had distinct advantages over others. Those found to be superior include the use of desensitized photographic paper as taught by the FBI as well as a technique developed and used by Robert Shem.

## Introduction

While attending the BATF National Firearms Examiner Academy in the fall/winter of 1999 my classmates and I had the opportunity to spend a week with John Dillon covering the FBI Gunpowder and Gunshot Residue course. The first thing I noticed was that the Modified Griess Test protocol being taught was slightly different from my own laboratory's protocol. The FBI protocol calls for desensitized photographic paper to be treated with the alpha-naphthol/sulfanilic acid solution. The Los Angeles County Sheriff's Department (LASD) protocol calls for filter paper to be treated instead. Dillon's AFTE article (and the FBI manual, which contains this article) suggests the use of filter paper as a low-cost alternative, but his protocol for the use of filter paper is different from both my own agency's protocol and his treated photographic paper protocol.

In this paper I originally set out to evaluate the various Modified Griess test protocols to determine which, if any, had a distinct advantage over the others. After I began my research and thought I was near completion of the project, I found out that Robert Shem of the Alaska Department of Public Safety in Anchorage, Alaska, had been doing some research with the Griess test using Marshall's reagent. The Griess test had seen extensive use during the 1970s until it was discovered that Marshall's reagent, a chief chemical component of the test, was carcinogenic. At that time the FBI Laboratory developed the Modified Griess test, replacing Marshall's reagent with alpha-naphthol, a chemical not known to be carcinogenic<sup>1,3</sup>. Mr. Shem informed me that he could not find any documentation to support the claim that Marshall's reagent is carcinogenic. A review of the Material Safety Data Sheet confirmed this, indicating that

Marshall's reagent is not carcinogenic (See Appendix A).

## Theory

The Griess and Modified Griess tests are chemically specific chromophoric (color producing) tests for the presence of nitrite residues. These tests are an adaptation of the earlier Walker test, which utilizes a reagent known to be carcinogenic. The chemistry of the Griess and Modified Griess tests involves the reaction of nitrite residues with acetic acid to form nitrous acid, which reacts with sulfanilic acid to form a diazonium compound. This diazonium compound then reacts with either Marshall's reagent for the Griess test or alpha-naphthol for the Modified Griess test to form an azo dye, red/purple or orange, respectively.<sup>3</sup>

The application of the Griess and Modified Griess tests to the needs of the firearms examiner is somewhat unique. The Griess test is used in other chemistry disciplines as simply a spot test for the presence of nitrites.<sup>5</sup> For the purposes of distance determinations, however, the mere confirmation of the presence of nitrite residues is not enough. It is the pattern of these residues that is of interest here. Consequently, the application of these tests must be such that a pattern of nitrite residues is selectively visualized in such a manner that a side by side comparison of patterns can be easily performed.

## Materials Used

8x10 glossy black and white photographic paper - desensitized (Kodak), 8x10 matte black and white photographic paper - desensitized (Kodak), cheesecloth (VWR Scientific - cat. no. 21910-105), cotton twill jean (TwillX 1622, Berkshire Corporation, Great Barrington, MA), Whatman #1 filter paper (Whatman 1, 27cm, cat. no. 1001-270), Whatman #2 filter paper (Whatman 2, 24cm, cat. no. 1001-240), sulfanilic acid (J.T. Baker), alpha-naphthol (J.T. Baker), Marshall's Reagent (N-1-Naphthylethylenediamine dihydrochloride) - (J.T. Baker), methanol (J.T. Baker), acetic acid (J.T. Baker), de-ionized water (reverse osmosis filter system in LASD laboratory), household iron (Sunbeam) - set to "cotton" setting, miscellaneous laboratory glassware, stainless steel tray, aerosol sprayer (Sigma Chemical Corp., model A1147), Smith and Wesson model 586 revolver with 6" barrel, Federal model 38E 125 grain 38 special semi-jacketed hollow point ammunition, lot 20A-0121.

## Modified Griess Test Protocols

**Processing of previously desensitized photographic paper or filter paper as prescribed in the 1999 FBI GSR Manual<sup>1,3</sup>**

Note: The LASD protocol prescribes that filter paper be treated in this same manner.

1. Prepare a solution of 7.7 grains (0.5grams) of sulfanilic acid in 100 milliliters of distilled water.
2. Prepare a solution of 4.3 grains (0.28 grams) of alpha-naphthol in 100 milliliters of methanol.
3. Combine the equal volumes of the above solutions.
4. Pour the combined solutions into a non-reactive photo processing tray and briefly dip pre-cut sheets of the desensitized photographic paper into the tray. Simply submerge the sheets completely and remove them.
5. Set the sheets aside to dry on an uncontaminated surface.
6. Place the remaining solution in an uncontaminated storage container and seal.
7. Note: In lieu of desensitized photographic paper, ordinary laboratory filter paper may be processed in the same manner for use in the Modified Griess test. Economy may dictate

that this alternative be used. (See the suggested method in the specific test procedure which follows.)

8. Shelf life for this reagent is known through experience to be at least two months and probably a great deal longer.

#### **Preparation of nitrite test swabs as prescribed in the 1999 FBI GSR Manual <sup>1,3</sup>**

Note: The LASD protocol prescribes that nitrite test material be prepared in this same manner, with the substitution of small swatches of filter paper for cotton-tipped swabs.

1. Prepare a solution of 9.3 grains (0.6 grams) of sodium nitrite in 100 milliliters of distilled water.

2. Soak the cotton-tipped ends of a package of six inch swabs (typically, one hundred/package) in the solution.

3. Set the swabs aside to dry. Store in a sealed container.

#### **Preparation of a 15% acetic acid solution as prescribed in the 1999 FBI GSR Manual <sup>1,3</sup>**

Note: The LASD protocol prescribes that 15% acetic acid be prepared in this same manner.

1. Combine 150 milliliters of glacial acetic acid with 850 milliliters of distilled water. Remember to gently pour the acid into the water to preclude the potential spattering of undiluted acid.

2. Store in an appropriate uncontaminated sealed container.

#### **FBI Modified Griess test procedures <sup>1,3</sup>**

1. Test the four corners of the emulsion-coated side of the desensitized and chemically treated photographic paper for sensitivity to nitrite compounds. This is easily accomplished by saturating a nitrite test swab in a small amount of 15% acetic acid solution and dabbing the four corners. An orange color should appear at each corner, confirming such sensitivity before going further.

2. Place the evidence or known-distance test questioned side down on the emulsion-coated side of the treated photographic paper. Index seams, buttons, button holes, rips, pockets, suspected bullet holes, tears, cuts, etc., for possible future reference in court by marking with a lead pencil. DO NOT USE INK at this point because it may transfer back onto the tested item.

3. Soak a piece of nitrite-free cheesecloth in the 15% acetic acid solution (in a large beaker) and wring it out. Place the cheesecloth on the questioned item or known-distance test as the third layer of the "sandwich". Press the "sandwich" with a hot iron. On many irons the setting for "cotton" is appropriate. (Note that nitrite-contaminated cheesecloth will cause a generalized orange background coloration. Although undesirable, this is not a fatal flaw as long as individual point reactions are still visible against the background.)

4. Discard the cheesecloth and separate the questioned item or known-distance test firings from the photographic paper. Any orange indications on the paper are the result of a chromophoric reaction chemically specific for the presence of nitrite residues.

5. Retain any photographic paper showing positive results as a part of the raw data for inclusion in your notes. When dry, the photographic paper should be marked appropriately in ink with your symbol and case/file number.

#### **FBI Alternate Procedures for the Modified Griess test using filter paper <sup>1,3</sup>**

1. Treat the filter paper in the same solutions used for treating the photographic paper. Allow it to dry.

2. Place the filter paper on the questioned surface. Test for nitrite sensitivity using the test swabs.

3. Saturate a piece of nitrite-free cheesecloth in the 15% acetic acid solution and wring it out. Place the cheesecloth over the filter paper and apply a hot iron.

or:

4. Spray the filter paper with the 15% acetic acid solution until very damp. Cover with two or three additional layers of filter paper and iron until dry.

5. Separate the test media and check for positive results.

#### **LASD Procedure for the Modified Griess test using filter paper <sup>2</sup>**

1. Treat filter papers by dipping them into the combined solution (sulfanilic acid and alpha-naphthol, just as described above) and hang them to dry.

2. Test the chemically treated paper by touching a nitrite test paper moistened with 15% acetic acid solution to it. An orange color should confirm a positive reaction.

3. Place the evidence questioned side down on the chemically treated paper. Using a pencil, index seams, buttons, bullet holes, cuts, tears, etc.

4. Soak a piece of clean Whatman® filter paper in 15% acetic acid solution. Hang it up until the dripping stops, but it is still moist. Place the moist filter paper on the back of the questioned item as the third layer of the "sandwich". Cover the moistened filter paper with dry, clean paper towels and press with a hot iron for 60 seconds.

5. Discard the top layer of filter paper and paper towels and separate the questioned item from the chemically treated paper. Any orange indications on the paper are the result of a chromophoric reaction chemically specific for the presence of nitrite residues.

6. Photocopy the chemically treated paper and record the results in the case file.

## **Griess Test Protocols**

#### **Processing of previously desensitized photographic paper as prescribed in the 1981 FBI GSR Manual**

This protocol is the same as that used for the Modified Griess test with one exception. The 4.3 grains of alpha-naphthol in methanol are replaced by 7.7 grains of Marshall's reagent in methanol.

#### **Preparation of nitrite test swabs as prescribed in the 1981 FBI GSR Manual <sup>6</sup>**

This protocol is the same as that described above from the 1999 FBI GSR Manual.

#### **Preparation of a 15% acetic acid solution as prescribed in the 1981 FBI GSR Manual <sup>6</sup>**

This protocol is the same as that described above from the 1999 FBI GSR Manual.

#### **Preparation of a 5% hydrochloric acid solution as prescribed in the 1981 FBI GSR Manual <sup>6</sup>**

1. Combine 5 milliliters of concentrated hydrochloric acid (HCl) with 95 milliliters of distilled water. Remember to gently pour the acid into the water to preclude the potential spattering of undiluted acid.

### **FBI Griess test procedures<sup>6</sup>**

This protocol is the same as that described above from the 1999 FBI GSR Manual, with a few exceptions. First, the photographic paper is treated with Marshall's reagent instead of alpha-naphthol, as described above. Second, to enhance the color after completion of the test, the photographic paper is lightly sprayed with a 5% solution of hydrochloric acid after the test cloth or evidence item has been removed. A positive reaction is indicated by a deep red color, which turns to deep purple when sprayed with 5% hydrochloric acid.

#### **Robert Shem's "Simplified" Griess test protocol**

1. Prepare the Griess test stock solution as follows:  
5 grams sulfanilic acid dissolved in 1000ml distilled water  
5 grams Marshall's reagent dissolved in 1000ml methanol
2. Preheat a photo press or clothing iron to 225 degrees F.
3. Mix seven parts of the sulfanilic acid solution with seven parts of the Marshall's solution with 1 part glacial acetic acid in a photo tray. Tilt the tray back and forth to thoroughly mix the solutions.
4. Dip a piece of filter paper (preferably the thicker Whatman 2 filter paper) into the solution until completely soaked. Remove the filter paper and allow to dry until dripping stops (about 15 seconds).
5. Place the filter paper directly on top of the front side of the test material or evidence item to be tested. Sandwich this assembly between several layers of filter paper or copy machine paper and either place in a photo press or iron with a clothing iron for about 30 seconds (a photo press is highly recommended by Mr. Shem).
6. Separate the layers and document/photograph the results.

### **Procedure**

To simplify this comparison of Griess and Modified Griess Protocols, it was decided that a single firearm and a single type of ammunition would be used. A Smith and Wesson model 586, 38 Special revolver with a six inch barrel was selected along with Federal 38 Special, 125 grain semi-jacketed hollow point ammunition. Ammunition was disassembled and it was determined that it contained disc powder. Twill jean was selected as the test material because it is available in a consistent quality and is also widely accepted as a material that generally simulates various clothing materials.<sup>1</sup> The twill jean was mounted with push pins against a piece of corrugated cardboard cut from a box. Test shots were then fired at a muzzle-to-target distance of 12 inches. The shot twill jean was then gently placed between two pieces of clean white paper until ready for processing.

Black & white photographic paper was obtained from the LASD Photographic Laboratory. This paper was processed using an automated processor prior to being exposed to light to ensure that all light-sensitive material would be removed. Both glossy and matte finish paper were processed in this manner. The paper was then treated with a sulfanilic acid / alpha-naphthol solution or sulfanilic acid / Marshall's reagent solution as described above. Once dry, the paper was packaged in a manila envelope for storage prior to testing. Filter paper for the LASD Modified Griess test protocol was treated in this same manner but, within a short period of time, began to darken in color and had to be discarded. As a result of this phenomenon, filter paper had to be treated and dried just prior to testing.

The Griess and Modified Griess tests were performed twice using each of the protocols described above. In several

cases a protocol was altered after the two initial tests in an effort to improve the results.

### **Results and Discussion**

The first protocol tested was the standard FBI Modified Griess test protocol, which proved to work quite well. The photographic paper exhibited very distinct point reactions with a light orange background that did not interfere with the reading of the paper. Both matte and glossy paper were tested and both seemed to produce very similar results. One advantage to using photographic paper is that it can be treated in advance and kept on-hand for future testing. Also, because it does not seem to fade, it can be retained with the case notes as permanent documentation of the analyses performed. The cheesecloth proved easy to work with as well. It was simply placed in a small beaker containing the 15% acetic acid solution and wrung out by squeezing in a fist when needed. The cheesecloth seemed to hold the correct amount of acetic acid needed for Modified Griess testing.

The next protocol to be tested was the Modified Griess test protocol used by the Los Angeles County Sheriff's Department. The LASD protocol is very similar to the FBI protocol with only two changes. Treated filter paper is substituted for treated photographic paper and filter paper soaked in acetic acid is substituted for cheesecloth. Initially, this protocol produced fairly distinct point reactions that would certainly be very useful in proximity testing. They were slightly more diffuse than those on photographic paper, however, possibly because of the porosity of filter paper. Also, there was a stronger orange background color than with the photographic paper, but it did not reduce the visibility or distinctness of the point reactions. One of the major disadvantages of using this protocol is the fact that the filter paper cannot be treated long in advance. As mentioned above, paper that was treated would turn orange within about three hours, so it had to be treated and dried just prior to use. Additionally, once the test was performed, this paper had to be photographed or photocopied right away because the orange point reactions would soon begin to diffuse and fade and the background would become increasingly darker in color as time progressed. Also, the filter paper used to contain the acetic acid had to be moistened and then hung to dry until it stopped dripping. The wet filter paper was delicate and susceptible to tearing and, therefore, had to be handled carefully. Additionally, it was much more difficult to consistently control the amount of acetic acid in the filter paper than it was in the cheesecloth. To combat this problem, the tests were repeated using cheesecloth instead of filter paper to contain the acetic acid. While the cheesecloth proved much easier to use, it did not change the quality of the results.

The third protocol to be tested was the alternate FBI Modified Griess test protocol involving the spraying of acetic acid onto treated filter paper and then covering with dry filter paper and ironing. This method seemed to work just about as well as the LASD method. The point reactions were fairly distinct and certainly useful for proximity testing and the background color was not overly severe. The same limitations associated with using treated filter paper instead of photographic paper were present, as outlined above with the LASD protocol. Nonetheless, this protocol was easy to perform and produced satisfactory results.

The alternate FBI Modified Griess test protocol involving the sandwiching of treated filter paper between acetic acid-soaked cheesecloth and the evidence garment was explored



Table 1: Comparison of Griess and Modified Griess test protocols.

Test	Visualization Reagents	Visualization Media	Solvent	Solvent Media	Author's Ranking
FBI Modified Griess (standard)	Alpha-naphthol Sulfanilic acid	Desensitized photographic paper	15% acetic acid	Cheesecloth	3
FBI Modified Griess (alternate - acetic acid spray)	Alpha-naphthol Sulfanilic acid	Filter paper	15% acetic acid	Acetic acid sprayed onto visualization media	4
FBI Modified Griess (alternate - cheesecloth)	Alpha-naphthol Sulfanilic acid	Filter paper	15% acetic acid	Cheesecloth	Unacceptable
LASD Modified Griess	Alpha-naphthol Sulfanilic acid	Filter paper	15% acetic acid	Filter paper	4
FBI Griess (standard)	Marshall's reagent Sulfanilic acid	Desensitized photographic paper	15% acetic acid	Cheesecloth	1
Simplified Griess (Shem technique)	Marshall's reagent Sulfanilic acid	Filter paper	Glacial acetic acid	Same as visualization media	2*

\*In certain situations, as explained in the Results and Discussion section, the Simplified Griess test may be the best option.

next. This method produced results that were unacceptable. The background color was strong orange, obscuring any point reactions that may have otherwise been visible. Also, the weave-like pattern of the cheesecloth was visible on the filter paper, leaving lighter areas of orange under the open spaces of the cheesecloth weave. This pattern further obscured any point reactions by creating an inconsistent background. In an attempt to improve upon this method, filter paper soaked in acetic acid was substituted for cheesecloth. While this eliminated the weave-like pattern on the treated filter paper, it did not alleviate the strong orange background color which still obscured any point reactions.

The FBI Griess test protocol proved to work quite well, producing results that were clear and easy to interpret. Like the FBI Modified Griess test protocol involving the use of photographic paper, the point reactions were very clear and distinct. The deep purple color produced by overspraying with 5% hydrochloric acid was extremely easy to see and would also be easy to photograph. The background color was light and did not interfere with the interpretation of the results. As with the Modified Griess test, the photographic paper for the Griess test can be treated in advance and kept on hand, ready for use.

The Simplified Griess test protocol, developed by Robert Shem, proved easy to use and produced excellent results. What makes this protocol different from the others is that the acetic acid is carried by the same medium as the sulfanilic acid / Marshall's reagent. Even though the filter paper used is porous, the point reactions were very distinct, certainly much more so than those seen with the LASD Modified Griess protocol.

Also, after 24 hours sitting out, the filter paper was still easy to read and hadn't experienced much noticeable diffusion or fading of the point reactions. While this paper was not intended to explore Sodium Rhodizonate test protocols, Mr. Shem's technique is conducive to an easy follow-up with that test. The filter paper containing the Griess pattern can be over-sprayed with Sodium Rhodizonate test reagents to visualize any lead smoke or particles, producing results similar to a Bashinski transfer.

After testing these protocols it was determined that the standard FBI Griess protocol was the easiest to use and produced the best results. What made this protocol stand above the rest were the very distinct point reactions coupled with a deep purple color that was very easy to distinguish from the background. The standard FBI Modified Griess protocol produced point reactions that were just as distinct, but the orange color was much lighter and not as easily distinguishable as the purple. These two techniques have the added advantage that the photographic paper can be treated well in advance and retained after testing as a permanent record. The Simplified Griess protocol developed by Robert Shem proved to be worthy of serious consideration as well. While the point reactions produced were not quite as distinct as those on photographic paper, they were still very distinct and certainly quite useful. Also, because the Shem protocol is a "transfer" technique as opposed to a "steam-through" technique, it may be preferable when dealing with either thick or non-porous clothing. It also has application around seams, button holes, and pockets as it is not affected by varying thicknesses or layers of fabric. Also,

unlike the LASD protocol or other Modified Griess test protocols utilizing filter paper, the filter paper used in the Simplified Griess test can, for some reason, still be read for a few days after development. By that time it needs to be photographed, however. See Table 1 for a comparison of the protocols tested and the author's ranking.

An attempt was made to determine why the LASD laboratory had adopted its current protocol. The firearms section supervisor was consulted and it was discovered that the current protocol had been in place when he joined the section, almost ten years ago. The suspected reason for using filter paper was that it was thought to be a low cost alternative.<sup>1,3</sup> Vendors were contacted and the following pricing information was obtained (prices effective February 1, 2000):

Cheesecloth: \$23.57/60 pieces (VWR Scientific); each piece cut in half to yield 120 pieces - \$0.195/piece, Whatman Filter Paper: \$30.10/100 pieces (VWR Scientific) - \$0.30/piece, Generic Photographic Paper: \$31.95/100 sheets (Freestyle Sales Co., Hollywood, CA) - \$0.32/sheet, Alpha-Naphthol: \$78.22/100g (VWR Scientific), Marshall's Reagent: \$104.04/25g (VWR Scientific).

Taking these prices into consideration, it can be seen that filter paper is not a low-cost alternative to photographic paper if one has the facilities to process the photographic paper. Also, while Marshall's reagent is considerably more expensive than alpha-naphthol, it has been shown here to have distinct ad-

vantages and, in the author's opinion, is well worth the added cost. If used efficiently, 25g can be used to treat hundreds upon hundreds of sheets of photographic or filter paper.

## Future Studies

While it was my intention to provide a thorough and detailed comparison of several common techniques used for the detection of nitrite residues, a large number of variations to these techniques were not examined here. As I found myself more and more involved in this project I kept realizing additional variations that I would have liked to try but, due to time constraints and practicality issues, was not able to do so. I would encourage anyone who has the time to evaluate for him or herself the protocols I have presented here as well as any additional protocols. After all, the goal of our research is to improve the tools and techniques we have available to us.

## Acknowledgments

This paper would not have been possible without the support, guidance, and assistance I received from many people including Jack Dillon, George Stanley, and most of all, Robert Shem. Also a special thanks to the Los Angeles County Sheriff's Department for supporting this work.

## Appendix

```
SIGMA CHEMICAL -- N9125 N-1-NAPHTHYLETHYLENEDIAMINE DI HCL BULK
MATERIAL SAFETY DATA SHEET
NSN: 655000F054097
Manufacturer's CAGE: 21076
Part No. Indicator: A
Part Number/Trade Name: N9125 N-1-NAPHTHYLETHYLENEDIAMINE DI HCL BULK
=====
General Information
=====
Company's Name: SIGMA CHEMICAL COMPANY
Company's Street: 3050 SPRUCE ST
Company's P. O. Box: 14508
Company's City: SAINT LOUIS
Company's State: MO
Company's Country: US
Company's Zip Code: 63178-5000
Company's Emerg Ph #: 314-771-5765/800-325-3010
Company's Info Ph #: 314-771-5765/800-325-3010
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 19MAY97
Safety Data Review Date: 03JUL97
Preparer's Company: SIGMA CHEMICAL COMPANY
Preparer's St Or P. O. Box: 3050 SPRUCE ST
Preparer's City: SAINT LOUIS
Preparer's State: MO
Preparer's Zip Code: 63178-5000
MSDS Serial Number: CFGMB
=====
Ingredients/Identity Information
=====
Proprietary: NO
Ingredient: ETHYLENEDIAMINE, N-(1-NAPHTHYL)-, DIHYDROCHLORIDE (MARSHALL'S REAGENT)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: KV5330000
CAS Number: 1465-25-4
=====
Physical/Chemical Characteristics
=====
Appearance And Odor: OFF-WHITE POWDER
Melting Point: (SEE SUPP)
=====
Fire and Explosion Hazard Data
=====
Extinguishing Media: WATER SPRAY, CO2, DRY CHEMICAL POWDER/APPROPRIATE FOAM.
Special Fire Fighting Proc: WEAR SCBA & PROTECTIVE CLOTHING.
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.
=====
Reactivity Data
=====
Stability: YES
Cond To Avoid (Stability): LIGHT SENSITIVE, MOISTURE.
Materials To Avoid: ACIDS, ACID CHLORIDES, ACID ANHYDRIDES, OXIDIZING AGENTS.
```

```
Hazardous Decomp Products: THERMAL COMBUSTION: CO, CO2, NITROGEN OXIDES,
HYDROGEN CHLORIDE GAS, MAY DECOMPOSE ON EXPOSURE TO LIGHT.
Hazardous Poly Occur: NO
=====
Health Hazard Data
=====
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: MAY BE HARMFUL BY INHALATION, INGESTION/SKIN
ABSORPTION. CAUSES IRRITATION. INHALATION: IRRITATING TO MUCOUS MEMBRANE &
UPPER RESPIRATORY TRACT.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: IRRITATION.
Emergency/First Aid Proc: EYES: FLUSH W/COPIOUS AMOUNTS OF WATER FOR 15
MINS. SKIN: WASH W/SOAP & COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO
FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. INGESTION: WASH OUT MOUTH W/WATER IF
CONSCIOUS. OBTAIN MEDICAL ATTENTION IN ALL CASES.
=====
Precautions for Safe Handling and Use
=====
Steps If Matl Released/Spill: WEAR SCBA, RUBBER BOOTS & HEAVY RUBBER
GLOVES. SWEEP UP, PLACE IN A BAG & HOLD FOR WASTE DISPOSAL. VENTILATE AREA
& WASH SITE AFTER MATERIAL PICKUP IS COMPLETE.
Waste Disposal Method: DISSOLVE/MIX W/A COMBUSTIBLE SOLVENT & BURN IN A
CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER, IAW/FEDERAL,
STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL DRY PLACE. HYGROSCOPIC.
Other Precautions: AVOID CONTACT W/EYES, SKIN/CLOTHING. DON'T BREATHE
DUST.
=====
Control Measures
=====
Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: CHEMICAL RESISTANT
Eye Protection: SAFETY GOGGLES
Other Protective Equipment: PROTECTIVE CLOTHING, SAFETY SHOWER & EYE BATH.
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE
REUSE. WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: MELTING POINT: 381.2-388.4F.
=====
Transportation Data
=====
=====
Disposal Data
=====
=====
Label Data
=====
```

## ***Jobs, Meetings, Courses, cont'd***

July 17-20, 2001

### **Case Approach to Biological Evidence Examinations**

August 20-24, 2001

### **DNA Extraction and Quantification**

August 14-17, 2001

### **Latent Print Techniques**

August 27-31, 2001

### **Serial Number Restoration**

September 5-7, 2001

### **PCR-DNA: STR Analysis and Typing**

September 11-14, 2001

### **Methamphetamine: Synthesis and Analysis**

September 17-21, 2001

### **Latent Print Techniques**

September 24-28, 2001

### **Bloodstain Pattern Interpretation**

October 1-5, 2001

### **Case Approach to Biological Evidence Examination**

October 15-19, 2001

### **Footwear and Tire Impression Evidence (for non-examiners)**

October 24-26, 2001

### **Footwear and Tire Impression: Detection, Recovery and Examination**

October 29-November 2, 2001

### **Tire Track and Tire Impression Evidence Examination**

November 5-9, 2001

### **Latent Print Comparisons**

December 3-7, 2001

*The following items have not been verified for accuracy.*

## **Interpol Meeting in October**

The 13<sup>th</sup> INTERPOL Forensic Science Symposium will be held 16-19 October 2001 at INTERPOL Headquarters in Lyon, France.

The Forensic Services section of the Australian Federal Police was nominated by the Organising Committee as the Coordinating Laboratory for the category "Fire Cause and Fire Debris Analysis." (This category includes scene examination, sample collection, laboratory analyses, data interpretation, etc.)

If any laboratory has relevant information - such as unpublished research results or internal reports - that they would like included in the overview paper, then it can be sent to me either via e-mail ([chris.lennard@afp.gov.au](mailto:chris.lennard@afp.gov.au)), fax (+61 2 6287 0270), or to the following postal address: Dr Chris LENNARD, Forensic Services, Australian Federal Police, GPO Box 401, Canberra ACT 2601, Australia.

## **NFSTC DNA Technical Leader Sought**

Candidates must be able to demonstrate that they can provide leadership in the development and implementation of NFSTC's programs. Salary will depend on qualifications and experience, but it is expected to be in the range of \$50 to \$80K. The closing date for expressions of interest is **March 15, 2001**. Call (727-549-6067), write (NFSTC, PO Box 2710, Largo FL 33779) or email [wj@nfstc.org](mailto:wjt@nfstc.org) Dr William J Tilstone, Executive Director, NFSTC.

## **Crime Scene Technician**

City of Coral Gables, FL

\$31,369 42,038

Gathers, preserves and packages evidence at the scene of crimes. Performs forensic photography. Produces crime scene drawings conducts statistical analyses. Prepares comprehensive reports and testifies in court. Uses computer. laboratory equipment hand and power tools and ladders. Drives cars and trucks. Within 18 months of employment. must pass written test for crime scene technician and obtain International Association For Identification Certification Requires High School Diploma or equivalent and completion of specialized training programs related to Forensic Science and Criminal Investigations with a minimum of one year experience in crime scene processing, forensic work or related field. Must have a valid Florida driver's license, The City does not employ individuals who now use or have used tobacco products within the last twelve months. For additional Information and application procedure contact: Frank Shonberger, Supervisor, Crime Scene Unit ,Coral Gables Police Department, 2801 Salzedo St. Coral Gables FL 33134, Phone # 305-460-5435 e-mail:

[fshonberger@pd.citybeautiful.net](mailto:fshonberger@pd.citybeautiful.net)

## **ATF Examiner**

The Bureau of Alcohol, Tobacco and Firearms has openings for a Firearms/Toolmark examiner in all three laboratories (Rockville, MD, Atlanta, GA and Walnut Creek, CA) under Vacancy Announcement #DP0-00-067AJ. These positions are covered by the Pay Demonstration Project and the salary range is from \$23,304 to \$83,481 depending on experience and locality. For information please contact Althea Jacobs at (202) 927-8630 or check the ATF web site at [www.atf.treas.gov](http://www.atf.treas.gov).

## **Proficiency Samples Available**

The International Forensic Research Institute @ FIU in Miami, FL is pleased to announce the offering of Proficiency Test samples in trace evidence. (Ignitable Liquids, Glass, Fiber and Paint) These tests can be used to satisfy the external PT requirement of ASCLD-LAB. Please follow the link for more information and to access the order form. <http://w3.fiu.edu/ifri/pt/PTannounce.htm>

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\* This class is funded by the California Association of Criminalists (CAC), A. Reed and Virginia McLaughlin Endowment Fund and as such may be free of certain charges for all CAC members irrespective of affiliation. A substantial portion of the enrollment will be selected by the CAC, however all qualified CAC or non-CAC persons can apply.

# An Outsider's View From the Inside

Raymond J. Davis



I am the quintessential non-DNA expert working at the Department of Justice DNA Laboratory in Berkeley, California. I am a criminalist brought up in the generalist philosophy and I possess all the necessary credentials for not being a DNA expert. No molecular biology, no statistics, no genetics, no DNA workshops, no STR classes and I know only that DNA is the blue print of life and identical twins have the same DNA. I attended a CAC seminar once and sat through 5 or 6 DNA papers and when I went out for the morning break someone commented that I looked like a deer caught in the headlights. I often hear my colleagues discussing their work and I'm picking up a few pieces of information but most of it I find incomprehensible.

So what in the world am I doing working there? It's a question I get asked by friends when they find out I'm working there. The short answer is, I'm the Professional Development Trainer. One of my responsibilities is to insure that our DNA experts are also criminalists. That is, to show them the attributes possessed by the bench criminalist. In order to accomplish this I am literally bringing the criminal justice profession to the DNA lab in the form of forensic experts, police officers, attorney's, and judges. Over the past 14 months, we have had a variety of speakers discuss everything from questioned document examination to crime scene investigation, toxicology, latent fingerprint processing, Fire Cause Investigation, DNA from illegal whale catches to a shooting scene reconstruction. Approximately 16 speakers have given their time, talent and energy to bring a more worldly view to the staff at the DNA lab, and from the response I've seen, the staff has appreciated every person who has presented their area of expertise.

I have also been involved in a number of interesting assignments and my role is expanding as the needs of the laboratory expand. My purpose for writing this article is suggested in the title. I am the Outsider taking a look inside. Before I came to this laboratory, I saw it as a huge black hole where money and resources flowed into it and nothing came back out. Perhaps a perception you the reader have as well. Based upon my perception, I was a little reluctant to be a part of this enterprise. However, I was persuaded by the Assistant Bureau Chief, Lance Gima to work with him in developing programs to train his technical and clerical staff. We talked many times over several months to envision how this new training would unfold. I became convinced that this was something I wanted to do and it would also be challenging for me. So I signed on

as a contractor, got a desk and a computer and began thinking up ways to provide a wide range of training classes and career building opportunities. It's been both challenging and interesting work. The best thing to come from my decision to work here has been witnessing the mission of the laboratory in action and the people implementing the action.

Over the past 15 months I have had the opportunity to see the lab from the inside. It has changed my view and I'm delighted to share it with you now. I had no idea there were so many domains within the lab. Research (Method Development), DataBank Program (analyzing over 200,000 felony samples by June 30, 2001), Casework, Operations/Safety, Quality Control, and in July, MUPS (Missing and Unidentified Persons) and Post Conviction Testing. Lately, the laboratory has spent a fair amount of time interviewing for new staff positions and I've had the privilege of sitting on numerous interview panels. I'm impressed by the quality and enthusiasm of the candidates who would rather work at the Berkeley lab for peanuts when they have a choice to work at better paying Bay Area crime labs or work in the private sector. The DNA laboratory seems to attract a very dedicated type of person bent on working

**"I have had the opportunity to see the lab from the inside. It has changed my view"**

in the forensic DNA field. It seems as if we get new employees in every week. It's not unusual to come to work on any given day and find a new employee walking down the corridors here. Some of the criminalists working here measure their seniority in months rather than in years. The laboratory staff is currently at 85 and by this July will reach 137 technical and clerical personnel.

One of the highlights of working at the lab occurs when the staff is notified of a "cold hit." That is, when there is a match between a blood sample sent in from a client agency with samples from the laboratory's DNA database of felons. This information is formally presented at a laboratory wide staff meeting with a great deal of excitement and pride. Several people are asked to stand and speak about their particular role revealing that these cold hits are a laboratory wide collaborative effort. Even though I have no part in these cold hits, I feel proud to be a part of the great work going on at the laboratory.

The DNA laboratory is also charged with training its technical staff as well as criminalists from other laboratories. A number of DNA Academy and STRI/II courses have been ably presented by Dr. Cristian Orrego with help from other members of the technical staff. Dr. Orrego is also on the staff at San Francisco State University as well as the staff at the University of Santiago, in his native country of Chile. Classes in Courtroom Presentation of Evi-

dence, Technical Writing and Crime Scene Investigation are also presented there. A master calendar in the lobby reveals a host of activities that would keep an event scheduler busy. There are frequent technical meetings, training classes, and tours, interview panels and guest speakers vying for time and space at the laboratory.

The laboratory's internal communication system GroupWise keeps everyone posted on the latest events, information, meeting times and other activities that challenge the staff to stay on top of the DNA juggernaut. Although the laboratory has been in operation for over 10 years, the work is still cutting edge and new employees feel as if they're still getting in on the ground floor. It's an exciting time to be in the field of forensics, especially at the DNA laboratory.

I've met a lot of young people at the lab who were born after I began my career in forensic science. In fact, one criminalist when I told her my age commented that I was older than her father! Ouch. Despite this age gap, they have accepted me as one of their own. It's made me feel like a partner in an incredibly vital program. The atmosphere at the lab is purposely kept loose and for good reason. The tremendous tasks facing the staff could turn this place into a pressure cooker if it weren't for the way people keep things light. What's remarkable is that an incredible amount of work gets done here in spite of the constant pressure. These people know when to lighten up and they know when to work hard. This balancing act works here especially when most of them are working at so many different assignments. I like how they handle it all. Someone said to me that it's not always about the work but rather for whom you do the work with. This staff likes working together. And for people who visit the laboratory, they can tell that it's a very friendly place.

Whether you work for one of Department of Justice Regional Laboratories or another county or city crime laboratory, your colleagues at the DNA Laboratory are doing remarkable work here. Two shifts, morning and swing, keep the laboratory humming with activity, from 7:00 in the morning until 10:30 or 11:00 in the evening. And there's even a Saturday shift! The resources that have been directed toward the DNA Laboratory are well deserved in light of the huge responsibility placed upon them. I know that the work being done here will have a dramatic impact on how criminal investigations are conducted in the near future. History will confirm that the money spent here was money well spent.

In the fifteen months since I first arrived here, I am beginning to feel less like an outsider and more of an integral part of the DNA program. I have learned a great deal about the mission of the DNA Laboratory, about the work being conducted here and most importantly, about the dedicated people working here. In addition, I've noticed another change here. The insiders are becoming more like criminalists. Broadening their experience as well as their outlook on the profession of forensic science. Much of this change has come as a result of the extensive training that has taken place here in the form of continuing education, attendance at seminars, off site training meetings, attendance at workshops and at professional symposia.

I hope by this correspondence that you will have a much clearer view of the DNA Laboratory and its mission. And if you find yourself in the Bay Area, come by and visit us at the laboratory. We look forward to seeing you and we'll leave the light on for you.

---

## TECHNOLOGY

An Amish boy and his parents were visiting a huge mall in the big city. While the mother attended to her shopping they walked along the mall in absolute amazement. In fact, they were amazed by almost everything they saw, but especially by two shiny, silver walls that could move apart and back together again.

The boy asked his father, "What is this father?" The father never having seen an elevator before responded, "Son, I have never seen anything like this in my life. I really don't know what it is."

While the boy and his father were watching wide eyed, an old lady limping slightly with a cane, slowly walked up to the moving wall and pressed a button with an arrow on it.

Soon, the silver wall opened and the lady walked between them and into a small room. The wall closed behind her and the boy and his father watched as they saw small circles of numbers light up above the wall. They continued to watch when suddenly the circles of numbers lit up again and were now moving in the reverse direction. And then the wall opened up and a beautiful 24-year-old woman stepped out.

The father immediately turned to his son and said, "Quick son, go get your mother!"



# Spring 2001 CAC Seminar

## May 7 – 12, 2001

### *"Learning Opportunities for Forensic Scientists in the 21<sup>st</sup> Century"*

97<sup>th</sup> Semi-Annual Seminar, Granlibakken Resort and Conference Center at Lake Tahoe, Tahoe City, CA

**About the Location:** In Norwegian, Granlibakken means "a hill sheltered by fir trees." This resort and conference center combines breathtaking surroundings and rustic lodging to create a unique atmosphere of inspiration and relaxation that will certainly enhance the Spring 2001 CAC Seminar. The appeal of this location attracted ski enthusiasts dating back to the 1920's. The Olympic tryouts were held there in 1932 and Junior Olympics in 1952. University of California Alumni built the original main lodge in 1958. In 1989 and 1995, new conference facilities and an executive lodge were completed.

Daily conference center package rates include one night's lodging, full breakfast, lunch and dinner plus use of meeting and recreational facilities. Recreational opportunities (depending on season) include: river-rafting, lake cruises, golf, mountain biking, skiing, ice-skating, hiking, tennis, swimming, horseback riding, a par course, etc. [www.granlibakken.com](http://www.granlibakken.com) (800) 543-3221 (530) 583-4242 fax: (530) 583-7641

#### **Workshops:**

Microscopy of Rape Workshop	(3 Days: Monday – Wednesday, May 7 – 9th)
Adobe PhotoShop® Workshop	(2 Days: Monday – Tuesday, May 7 – 8th)
Fluorescein Workshop	(1 Day, Monday, May 7th)
GHB and Related Compounds Workshop	(6 Hours, Monday, May 7th)
Donner Party Archeology Workshop	(6 Hours, Tuesday, May 8 <sup>th</sup> )
Bloodborne Pathogens Workshop (Computer Based Training)	(4 Hours, Wednesday, May 9th)
DNA Workshop	(1 Day, Wednesday, May 9th)
The Invincible Witness- 10 Winning Strategies	(4 Hours, Wednesday, May 9th)
Interviewing & Promotional Skills	(4 Hours, Wednesday, May 9 <sup>th</sup> )
Windows 2000 Workshop	(1 Day, Wednesday, May 9 <sup>th</sup> )
Digital Evidence at Crime Scenes	(1 Day, Wednesday, May 9 <sup>th</sup> )

**Technical Presentations and Poster Session:** Abstracts for presentations and posters are currently being accepted. Topics already offered for potential inclusion into the technical program or poster session include:

**Panel Discussion:** • Guidelines for Dealing with Digital Equipment at Crime Scenes • The Evidential Portable Alcohol System (EPAS) • Analytical Profiling of Clandestinely Manufactured Methamphetamine • New Features Available through the CCI Virtual Library and Its Sherlock Search System • .38 vs. .357: Exams of Lead Bullet Parts • SEM vs. Light Microscopy • Elemental Analyses • An Overview of the National Center for Forensic Science • The Conceptual Tool for Making Casework Decisions • Effects of Dry-cleaning Solvents on Semen Deposits

**Additional Meeting Features:** Keynote Speakers to Address Meeting Theme • Banquet • ABC Examinations • Vendor Displays and Introductions • CAC Board Meeting • New Members' Orientation • CAC Business Meeting

Registration and forms and other information available at: <http://www.ns.net/cci>

Victor Reeve, Seminar Chair, California Criminalistics Institute, Room A-104; 4949 Broadway, Sacramento, CA 95820  
[www.ns.net/cci](http://www.ns.net/cci) (916) 227-3575 fax: (916) 454-543 email: [reevev@hdcdojnet.state.ca.us](mailto:reevev@hdcdojnet.state.ca.us)

# SEMINAR WORKSHOPS

## **Microscopy of Rape Workshop**

A 3-day course that covers the analysis of rape evidence with heavy emphasis on the use of the microscope. The student will be using Olympus BH2 Polarizing Microscopes. For more details, see CCI Course Catalog description for Course # M 203. Edwin Jones is presenting this workshop. Coordinator: Fred Tulleners.

## **Adobe PhotoShop® Workshop**

During this 2-day workshop students will learn basic operations and capabilities of Adobe PhotoShop™. They will learn to enhance digital (or digitized) photographs for comparisons, presentations, and exhibits. Several tools will be used for selecting parts of images, as well as moving, duplicating, and resizing images. They will also learn to use layers, and to apply layer effects and filters to create special effects. They will perform adjustments to contrast and color balance. And, they will learn to isolate image areas by creating and saving masks with specialized tools, commands, modes and layer elements. Coordinator: John Rush

## **Fluorescein Workshop**

This is a one-day workshop that covers latent blood visualization with fluorescein. The workshop is designed to be part lecture, part hands on and part discussion. Topics will include reagent preparation and application, substrate variation and fluorescence interpretation. This workshop will be presented by Charlene Marie and Dawn Sorensen. It is limited to 12 students. Coordinator: Jim Weigand

## **GHB and Related Compounds**

This workshop will take place in Sacramento at CCI's classroom and chemistry laboratory. Several analyses and syntheses of GHB and related compounds will be performed and evaluated. Interpretation and reporting of results, and evaluation of analogue similarity will also be considered. Presenters include R. Doyle, L. Walker, J. Hamiel, B. Lasater and K. Andrews. Coordinator: Jerry Massetti

## **Donner Party Archeology**

Professor Donald Hardesty, Univ. Nevada at Reno and Prof. J doe, CA State Univ. Chico will present archaeological principles and chemical analyses used to study the Donner Party. Michael Giusto, CCI will provide commentary on firearms found near the sites and associated with the Donner Party.

The workshop will begin at Granlibakken. After lunch, the workshop will reconvene at Donner Memorial State Park, about 15 miles away. Artifacts in the museum and at least one of the archaeological sites will be examined. Dr. Hardesty's text will be provided to all workshop participants. If everyone cannot be transported to the Donner Memorial by carpooling, public transportation may need to be hired (\$ 15 / person, estimated). Coordinator: Jerry Massetti

## **Bloodborne Pathogens (Computer Based Training)**

A multi-level CD computer based Cal-OSHA supported training packaged that not only retains the training record, but also documents the training performance of participants, us-

ing randomized quizzes placed strategically throughout the program. The purchase price not only provides recipients with CD training package, it also can be formatted specifically for your agency's particular needs. Coordinator: Tom Valentine

## **The Invincible Witness: Ten Winning Strategies**

Raymond, Davis, facilitator at CCI, will present a 4-hour presentation on 10 winning strategies employed by the successful and invincible expert witness. He has culled these strategies from students attending the Courtroom Presentation of Evidence Course at CCI over the past 10 years, as well as from his own personal experiences. This interactive presentation will cover some of the topics presented at the CCI course as well as new material never presented before.

## **Interviewing & Promotional Skills**

This 3 ½ -hour workshop is being presented by Raymond Davis, Professional Development Trainer at the DOJ, DNA Lab in Berkeley. This workshop has been presented at two previous CAC seminars, Monterey 1998 and Oakland 1999. This workshop will provide timely and informative interviewing techniques to the new employees seeking a position with a crime laboratory as well as for criminalists seeking advancement through promotional examinations.

## **Windows 2000 Workshop**

A one-day workshop on Windows 2000 Professional. This is or will be the operating software for most scientific instruments. Presenter to be determined. Coordinator: Mike Giusto

## **New World of Digital Evidence at Crime**

### **Scenes: How to Set Up a Computer Forensics Program**

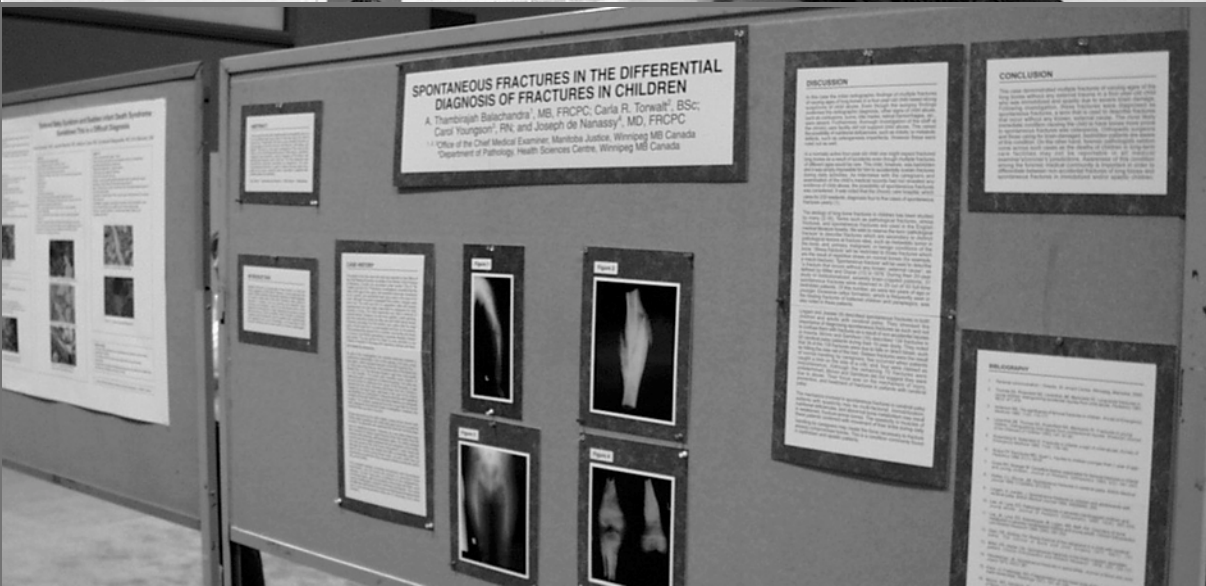
This is a daylong workshop beginning with an introduction to cybercrime and how the forensic science perspective relates to the new world of digital evidence. The establishment of a computer forensics program is examined from both a management and an examiner perspective. This includes discussions on equipment, personnel, training, policies and procedures, and costs. Some current resources available are discussed and the future of digital evidence is examined, including areas such as digital, audio and video.

## **DNA Workshop**

The DNA Workshop is shaping up to be an informative one-day meeting. So far we have promises from staff at Alameda Co. Sheriff's Lab, CA DOJ-Berkeley, CA DOJ-CCI, CA DOJ-Fresno, Emerald City Forensics, Inc., Sacramento Co. DA's Crime Lab, and Santa Clara Co. DA's Crime Laboratory for the following tentative list of presentations:

- *People v. John Doe*: Putting a Face to a Profile
- Aspermic Semen Sample Mixed with Other Body Fluids: Appearance of STR Profiles
- Effects of Dry Cleaning on Semen Deposits
- STR Typing: Appearance of Body Fluid Mixtures and Impact of Light
- Reviewing STR GeneScan Data with the Help of an Excel Spreadsheet
- Impact of Presumptive and Fingerprint Reagents on STR Typing Profiles
- Finding Body Fluid Stains: How Effective Are Forensic Light Sources?
- Validation of the AmpflSTR Cofiler Reagent Kit at the California Department of Justice Berkeley DNA Laboratory
- Effects of Locus, Sequence, and Primers on Stutter Production During PCR Amplification of STRs
- Case Examples in Evidence Processing
- The California DOJ Berkeley DNA Laboratory's Study on Low Template Quantity Amplifications and Low RFU Results. Coordinator: Terry Spear

# AAFS 2001 Seattle



# Training & Resources

## CAC Sponsored Classes

The California Association of Criminalists Training and Resources (T&R) Committee is committed to promoting and encouraging professionalism and excellence of our membership through training. We are the **only** criminalistics association that provides training **and** subsidizes most or all of the course costs for its members.

T&R coordinates and provides several professional training classes and courses throughout each year, many in conjunction with the California Criminalistics Institute (CCI). We provide beginning and advanced specialty courses, as well as non-technical professional subjects, to help you in your criminalistics career.

## Surveys

**Your input** helps us decide which classes we want to sponsor. How do we get that input? Through our T&R committee survey! I'm sure that all of you have seen one and may have even returned one, but most of these inserts are not being returned to us. Without your input, we have no idea what you (our membership) wants and needs as far as training classes.

If there are different classes that you would like to see offered, please give us your suggestions. Visit the CAC website for an expanded T&R section with a link to an online version of the survey (currently under construction). In the meanwhile, please contact a T&R committee member to get a copy of the survey.

## Resources

We have a video library offering a comprehensive selection of professional training topics (currently about 100 tapes covering more than 40 subject areas). These tapes are available for loan free of charge to CAC members only. Please contact Elizabeth Thompson with requests and/or a current list of titles.

Admittedly, some of our videos are out of date and/or may have been replaced by new and improved techniques. This is where you can help us further. If you have or are going to be taping any interesting speakers, meetings, or training that you think will benefit our membership, please pass along a copy to us for the library. We have videotaping equipment available for this purpose if you need it (one camera system in Northern CA and one in Southern CA).

## Benefits of CAC Sponsored Training

- CAC members get 1<sup>st</sup> priority in class selections for CAC sponsored courses
- CAC members do not pay a materials fee for CAC sponsored courses
- CAC members from out of state or private labs do not pay tuition to CAC sponsored courses at CCI
- Opportunity to attend classes outside of your discipline

## 2001 Course Schedule

*(Please fill out CAC application as well as CCI application)*

### CCI Footwear Impression Evidence

Instructor: William Bodziak  
March 26-30, 2001

### CCI Tire Impression Evidence

Instructor: William Bodziak  
April 2-6, 2001

### CCI Crime Scene Investigation II

Instructors: Joe Rynearson & Jim Weigand  
April 16-20, 2001

### CCI Basic Practical Microscopy

Instructor: B. Schnek  
May 21-25, 2001

### CCI Technical Writing

Instructor: Ann Neumann, MA, JD  
May 30-June 1, 2001

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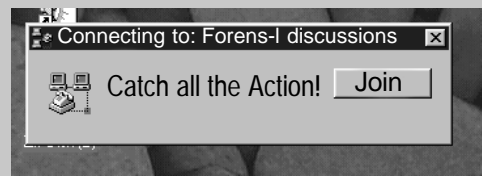


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Criminalists

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The world of forensic science is rapidly changing—stay in touch by subscribing to the "Forensic Listserver." Completely free, this message board is always buzzing with hot topics about certification, use of canine detection methods, DNA technical questions, crime scene processing methods and even requests from TV producers for broadcast ideas.

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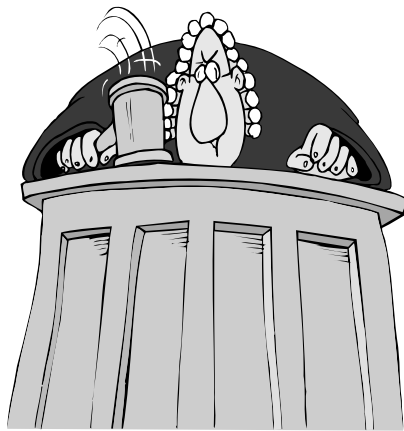
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## Interested in becoming a member?

- Receive the *Journal of the Forensic Science Society* and/or *Journal of Forensic Sciences*—
- Receive *The CAC News* —
- Lower, Member registration fees at CAC Seminars —
- Receive CAC Membership Roster / Seminar Abstracts —
- Receive Salary Survey of Government Labs —
- Membership in a prestigious Forensic Society —

To join, follow these simple steps: 1. Contact the CAC Membership Secretary, Elissa Mayo-Thompson (909)782-4170, to obtain an information packet and application. 2. Fill out and return the application to Elissa along with your first year's dues & appl. fee. 3. Two of your listed references will be contacted. 4. Applicants are screened to ensure that they meet the requirements. (Outlined in Article 11 of the CAC Membership Handbook). 5. Your application will be presented to the Board of Directors at their next quarterly meeting. If approved, your application will be voted on by the membership at the next Seminar.





## Courtroom Calamities

Prosecuting Attorney: "Since this foreign pubic hair was found on the back of the panties, could this sexual assault have occurred from the rear?"

Defense Attorney: "Objection your Honor this witness is not an expert in Doggie Style!"

-Anonymous

While Gary Cortner and I were waiting to testify, Gary had just bought a nice looking tie that matched my suit much better than the one I had on, so I borrowed it. After completing my testimony I asked Gary if he wanted his tie back before he had to take the stand. He was a bit hesitant to wear the same tie, so I told him if anyone asked to just tell them it is a government issue tie.

-Richard Kinney

During testimony, I told the attorney that I could not hear his question because someone was squeaking their chair. It was a bit embarrassing when we all realized it was the judge.

-Jerry Massetti

When the prosecution was asked to present their next witness, the criminalist did not step forward.

Fearing that an accident had occurred a massive search and rescue team was sent out. The criminalist was finally found asleep in their car in the courthouse parking lot.

-Anonymous

Defense Attorney: "You testified that this screw driver was the same in-

strument that made the scratches on the door."

Criminalist: "Yes sir."

Defense Attorney: "I would like to ask you, have you ever made a screw driver?"

Criminalist: "If you mean have I ever manufactured one, then no sir."

Defense Attorney: "Your honor, I wish to have the testimony of this witness stricken from the record. He has never made a screwdriver and is not competent to testify as to the identity of one."

Judge: "I will allow his testimony."

After testifying I encountered the Judge in the corridor and he said, "The next time someone asks you if you've made a screwdriver say sure, take an ounce of vodka, some orange juice and stir."

-Morris Grodsky

Attorney: "Good morning Mr. DePartee, how are you employed?"

Latent Print Analyst: "I'm doing pretty well thank you."

-David DePartee

## Engineering Terms

Ratio of an igloo's circumference to its diameter = Eskimo Pi

2000 pounds of Chinese soup = Won ton

1 millionth of a mouthwash = 1 microscope

Time between slipping on a peel and smacking the pavement = 1 bananosecond

Weight an evangelist carries with God = 1 billigram

Time it takes to sail 220 yards at 1 nautical mile per hour = Knot-furlong

365.25 days of drinking low-calorie beer because it's less filling = 1 lite year

16.5 feet in the Twilight Zone = 1 Rod Serling

Half of a large intestine = 1 semicolon

1000 aches = 1 kilohurtz

Basic unit of laryngitis = 1 hoarsepower

Shortest distance between two jokes = A straight line

453.6 graham crackers = 1 pound cake

1 million microphones = 1 megaphone

1 million bicycles = 2 megacycles

2000 mockingbirds = two

kilomockingbirds

10 cards = 1 decacards

1 kilogram of falling figs = 1 Fig Newton

1000 cubic centimeters of wet socks = 1 literhosen

1 millionth of a fish = 1 microfiche

1 trillion pins = 1 terrapin

10 rations = 1 decoration

100 rations = 1 C-ration

2 monograms = 1 diagram

8 nickels = 2 paradigms

3 statute miles of intravenous surgical tubing at Yale University Hospital = 1 I.V. League

Frank Cassidy

## Why Teachers turn Gray

These are reported to be actual test answers from various schools in the Huntsville, Alabama metropolitan area:

Q: Name the four seasons. A: Salt, pepper, mustard and vinegar.

Q: What guarantees may a mortgage company insist on? A: If you are buying a house, they will insist you are well endowed.

Q: What happens to a boy when he reaches puberty? A: He says good-bye to his boyhood and looks forward to his adultery.

Q: Name a major disease associated with cigarettes. A: Premature death.

Q: How are the main parts of the body categorized? A: The body is consisted into three parts - the brainium, the borax and the abdominal cavity. The brainium contains the brain, the borax contains the heart and lungs and the abdominal cavity contains the five bowels, A, E, I, O, and U.

Q: What is the fibula? A: A small lie.

Q: What does "varicose" mean? A: Nearby.

Q: Give the meaning of the term "Caesarian Section." A: The caesarian section is a district in Rome.

Q: What is a seizure? A: A Roman emperor.

Q: Use the word "judicious" in a sentence to show you understand its meaning. A: Hands that judicious can be soft as your face.

## Face Game Answers

(l-r top) Fred Cherrill (Chief of Fingerprints, Scotland Yard), Juan Vucetich (Argentina), Francis Galton, (l-r bottom) Edward Henry, William Herschel, Henry Faulds

