# The CACNews

News of the California Association of Criminalists • First Quarter 2008

FALL SEMINAR BERKELEY 2007

FIREARMS SAFETY WORKSHOP

# The President's Desk

## Another Year

I cannot believe that 2007 has gone by already. Growing up I remember wishing for the holidays to come and for my next birthday. Now I wish that the birthdays would slow down and the holidays mean the year has flown by.

I did not get the chance to thank the two laboratories that hosted seminars last year. In May we were in Orange County. Pennie Laferty and her hard working crew put on a wonderful seminar in Garden Grove. From the ride tickets for our meals to the wonderful selection of papers in the technical session the meeting was a theme park success.

In October we were in Berkeley hosted by the DOJ Richmond lab. Megahn Mannion-Gray and her energetic group presented us with a shakin' good time. The technical session was well balanced and Elvis was definitely shaking it. Thank you to both labs for seminars that were both enjoyable and informative.

For those of you that were not at the October meeting, this will be my last update on AB1079. I know you are all saying, "*finally*." Governor Schwarzenegger signed the AB1079 creating a Task Force that will look into the California Commission on the Fair Administration of Justice's recommendations. The CAC has a position on the Task Force. CAC President-Elect Jennifer Mihalovich said she would like the opportunity to represent our interests on the Task Force. Jennifer has served as the president of the American Board of Criminalistics, the regional director, north for our association and has worked in both private and public labs. These experiences give her an insight into the concerns of criminalists and crime laboratories in California.

I know 2008 is bound to bring even more interesting topics and changes. I look forward to the New Year and wish you all the best in 2008.

Julie

*For those of you who were not at the October meeting, this will be my last update on AB 1079. I know you are all saying, "finally."*

Julie Leon
*CAC President*

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Because of the computerized typesetting employed in *The CACNews*, submissions should be made in the form of MS-DOS compatible files on CD or by e-mail. Text files from word processors should be saved as ASCII files without formatting codes, e.g. bold, italic, etc. An accompanying hardcopy should be submitted along with the file. Graphics, sketches, photographs, etc. may also be placed into articles. Please contact the editorial secretary for details.

The deadlines for submissions are: December 1, March 1, June 1 and August 15.

**On the cover...**
*With apologies to Andy Warhol, a graphic representation of Mike Guisto's Firearms Safety Workshop, presented at the recent CAC Fall Seminar. More photos inside.*

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# CAC*Bits*

*CAC Immediate Past President John Simms explains fiber evidence in "Badge of Betrayal", a recent episode of Court TV's "Forensic Files."*

## New Life Members Named

Three new Life members have been announced by the CAC Board: Patricia Lough (San Diego PD Lab, ret.), Duane Dillon (Private Practice, Martinez, CA) and Morris Grodsky (San Mateo Co. SO, USAID, ICITAP, ret.).

In other awards news, James Stam will receive his Distinguished Member award at the Spring CAC Seminar in San Diego.

John DeHaan and Raymond Davis have been named as winners of the W. Jack Cadman Award.

Steve Lee received his award for the Most Outstanding Paper (Spring 2006) at the recent Berkeley meeting.

Congratulations to all the award recipients!

Nominations for awards may be made to the Awards committee: Alicia.LomasGross@doj.ca.gov or Mey.Tann@doj.ca.gov.

## Jennifer Mihalovich to Represent CAC

CAC President-Elect Jennifer Mihalovich has agreed to serve on the California Crime Lab Review Task Force. This task force was created by AB 1079 and recently signed into law. It will be made up of representatives from every area of the criminal justice system. (Please see "The President's Desk," CACNews 4th Q 2007).

## Pete Barnett Heads up New CAC Committee

Pete Barnett has agreed to serve as committe chair on the CAC's new "Criminal Justice/Task Force Committee." This committee will follow legislation and governmental actions of interest to criminalists, especially the California Commission on the Fair Adminstration of Justice.

Pete offers the following draft summary of his new committee's scope:

CAC Crime & Justice Committee
Statement of the Committee's scope of responsibility:

The By Laws of the California Association of Criminalists define a number of purposes to which the Association is committed. Among these are the following:

Purposes:

SECTION 6: Promote wide recognition of the practice of criminalistics as an important phase of jurisprudence

SECTION 12: Encourage the recognition of this Association and its purposes among other appropriate groups and societies.

SECTION 14: When appropriate, to review and act upon any pending legislation which appears to be related to the field of criminalistics

In furtherance of these stated purposes of the CAC, the Crime and Justice Committee of the CAC is established to monitor legislative, regulatory, and judicial developments on a local, state, federal, and international level which affect the practice of criminalistics; to inform CAC members of such developments in a timely fashion; to propose appropriate responses to any legislative, regulatory, or professional proposals which might affect the practice of criminalistics; to propose legislation, regulations, or professional practices that would enhance the practice of criminalistics; and to undertake other tasks in furtherance of the Purposes of the CAC as stated above.

Initial committee tasks:

1. Monitor the activities of the "Crime Laboratory Review Task Force" established under AB 1070, recently signed by the Governor.
2. Monitor the activities of the California Judicial Council Science and Technology Task force.
3. Report of the activities of the FAIR Committee.
4. Monitor activities of the California State legislature on matters of concern to criminalists
5. Monitor the activities of the Forensic Science Committee of the National Academy of Sciences.
6. Establish and maintain liaison with the California Association of Crime Laboratory Directors.
7. Monitor and report on legislative or regulatory activities affecting the practice of criminalistics in other states.
8. Report on appellate decisions affecting the practice of criminalistics

## Landis Topic at the 2008 IAFS

Following his article in the 4th quarter of the *CACNews*, Bob Blackledge reports that he and Bruce Goldberger plan to jointly present a breakfast seminar about the "Bad Science" in the Floyd Landis case. It will be at the triennial meeting of the International Association of Forensic Sciences, 21-26 July, 2008, in New Orleans. See www.iafs2008.com.

## FSS Joint Meeting Announced

The Forensic Science Society has announced a joint meeting with the European Academy of Forensic Science for their 50th annual meeting. The 2009 event will be held in Glasgow, Scotland.

## Spring CAC Seminar Planning Underway

May 5th -9, 2008

The California Association of Criminalists Semi-Annual Seminar

To be held at the Kona Kai Resort in San Diego, CA http://resortkonakai.com

CONTACT: Frank Healy (fhealy@pd.sandiego.gov) or Tanya DuLaney (tdulaney@pdsandiego.gov)

## McCrone Website Loaded with Info

McCrone Research Institute (McRI), the independent not-for-profit educational and research organization in Chicago, welcomes you to visit their new and improved website (*sample*, *right*).

Included with the new website design is the 2008 McCrone Research Institute course calendar and secure online registration for all microscopy and microanalysis courses.

Visit www.mcri.org to view the McRI 2008 Course Calendar.

## All Work and No Play

*Proving that John DeHaan* (below) *does more than lecture on fire scene reconstruction, here he is in Lakeside, CA with his Essex race car at a recent expo. John just returned from Wyboston, England after delivering the Stuart Kind Memorial lecture to the Forensic Science Society. He had recently been elevated to fellow of the FSS, perhaps the first American to be so named.*

*Photo by John Jerome, Fire Prevention Specialist, Rancho Santa Fe Fire Protection District. Used by permission.*

# The Editor's Desk

## Upstarts & Fuddy-duddies

**Remembering…**

As avid of a Giants fan that I am, that has only been since the late 80's. I still remember walking into my 7th grade science class slamming my books down onto the desk because my hometown hockey team, the Buffalo Sabres, had just lost in the Stanley Cup finals to the Philadelphia Flyers, four games to two. If you think I don't like the Dodgers, don't even get me started on the Flyers!

**Appreciating…**

In order to watch the Buffalo Sabres in California I get a sports package allowing me to watch all those games. In addition, I am able to watch some of the older games on an NHL network. I can really appreciate the work and energy of those earlier players along with their sheer guts—no helmets and for the goalies, sometimes no masks, let alone the cages they have now.

**Passing it down…**

My son has adopted the Buffalo Sabres as his team and hockey is the only sport he'll even watch. While he cannot appreciate the players of the early and mid-70's as I can, he can still appreciate the work, energy and guts because those characteristics still carry on.

**Putting it all together…**

As editor of the *CACNews* I have had the opportunity to do many things, one of which is gathering nicely written memorials of some of our colleagues who have passed on. This has gotten me to ponder lately about founders and not the Founders of *Star Trek Deep Space Nine* lore but our respected founders, those of the California Association of Criminalists.

**Those intangibles . . . can only be gained by letting down that gate of our fortress of independence and developing a greater interdependence with one another—young and more experienced working together to take the basic philosophies and premises of forensic science and bringing them into the future.**

It has also brought to mind an earlier comment I made about us having a responsibility for our future as much as we have for the present. [Editorial, *CACNews*, 2nd Quarter, 2006]

I'm reminded a bit of the various stages children and parents go through as the children grow and mature. In the first years, children are gobbling up everything their parents offer. Their parents are heroes to them. To even conceive that a parent does not know something well, that would just be heresy in the eyes of their children. It's kind of like that as we begin our careers too. We latch onto some experienced individuals and soak up everything they have to offer. They are our heroes and among the best at what they do.

As children move into the later stages of their development they are beginning to act on experiences they have gained, begin to think that they pretty much have an answer for anything and everything and their parents, well, they are just old fuddy-duddies stuck in their ways. Earlier they were too young to appreciate those ways and now they simply think they know better. This is reflected in our own careers as well. As we gain experience we start to assert ourselves, trying to achieve some independence and recognition as fully qualified, independent examiners. As we do that we tend to pull away and see the reflections of the more experienced examiners as simply moaning and groaning of people stuck in their ways.

From what I have heard from others, the magic age is 25. That's when the children grown into adults have a better appreciation for their parents and rather than continuing to build that fortress of independence, they let down the gate a bit and begin to strive for interdependence. The children begin to realize that maybe their parents actually do know something they don't and the parents, if they are smart, will realize that their children also have some insight that they do not. Once again, this can be reflected in our own careers. I am not certain at what "age" that happens or maybe it's a steady growth thing. Regardless, there comes to be that time when we develop an appreciation for those who had blazed the trail in front of us. At the same time those who have blazed that trail, if they are smart, will realize that these young

**Ron Nichols**
*CAC Editorial Secretary*

upstarts have something to offer that may actually improve upon what has begun.

Forensic science is dealing with increased responsibilities due to ASCLD/LAB and soon-to-come ISO accreditation along with increased court challenges, especially in the identification disciplines. As a result, I have heard many colleagues close to retiring comment how happy they are that they won't have to deal with this stuff anymore. That's really a shame because they are in the best position to help us into the future. Far too often everything we have invested ceases the moment those retirement papers are signed.

I have been privileged to meet and speak with many of the founders not only of the CAC but other organizations as well including the Association of Firearm and Toolmark Examiners (AFTE) who playfully refers to them as dinosaurs. I have gleaned much just from speaking with them because the philosophies they have developed simply as a result of experience are extremely valuable. Yet, the more reflective ones do not necessarily look sentimentally at the past without an appreciation for the future. They have helped me to appreciate those things the profession is losing that it can ill-afford to lose.

Their ability to pull units of information into one cohesive whole is something that I have probably appreciated the most. Call it old-school or whatever else you like but I think it is the fundamental purpose of forensic science. In the "good ole days" criminalists were responsible for a wide variety of examinations. It can be successfully argued this was inefficient and with the increased technology more single discipline-focused individuals is a necessity. At the same time, we are losing the ability to pull these bits of information together, leaving it for the detectives or the attorneys assigned to the case. We are losing an appreciation for the totality of evidence, focused only on what it means for our not-so-simple discipline. Sometimes it is not the definitive identification of a bullet to a particular gun that truly matters but the class of fibers present in the nose of the hollow point bullet that provides the critical information.

There are other things that I have come to appreciate as well but time and space simply do not allow for more expansion at this time. However, they all do have one common characteristic—they are those intangibles that simply cannot be gained by reading a book or sitting through a lecture. They can only be gained by letting down that gate of our fortress of independence and developing a greater interdependence with one another – young and more experienced working together to take the basic philosophies and premises of forensic science and bringing them into the future.

As you might be able to tell from the latest memorials and Founder's Lectures at the CAC meetings, the original founders are getting scarcer and scarcer. However, this does not mean that we are lost as sheep without a shepherd. The founders of this country have long since passed but their desire and quest for a God-fearing, democratic and free society lives to this day. Why? Because others have taken to heart those basic tenets and strive to keep that spirit alive. Our founders have been instrumental in our development as an organization and a profession. Yet, all will be lost if we do not adopt a founder mentality and take it into our future.

Close to retirement? Don't stop the race just as you are getting to the end. Strive to finish that race with passion and drive. The beginning of the race is where we position ourselves. The middle is where we work to be steady, improving our position bit by bit and not getting burned out too early. The last part is where we are to engage every last thruster we have and not to just finish the race but to drive across that finish line. At the same time do not be so focused on the past and how it appears to be dismissed by the present that we ignore the good in what is happening. There is a way to bring integration of the old and the new.

Are you anywhere but close to retirement? Be careful about that fortress. It is important to develop some independence but not at the cost of completely forsaking interdependence. Let's not dismiss philosophies because we view them as old and ancient. From what I have been able to tell, regarding God with awe and reverence, democracy and freedom still work in today's world. I suspect that much of what our founders have tried to share with us also will work in today's world, even with the perceived restrictions of ASCLD/LAB, ISO, and the court challenges.

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

Ron

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**Northern California Firearms Study Group**

# Survey of the Association of Firearm & Toolmark Examiners

# Concerning Quantitative Consecutive Matching Striae (CMS)

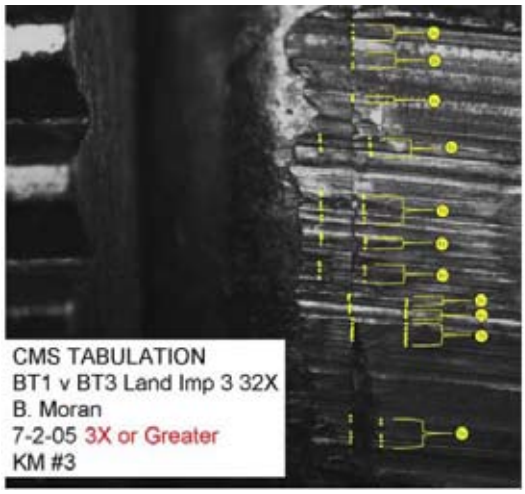
**Final Report**
**September 27, 2007**

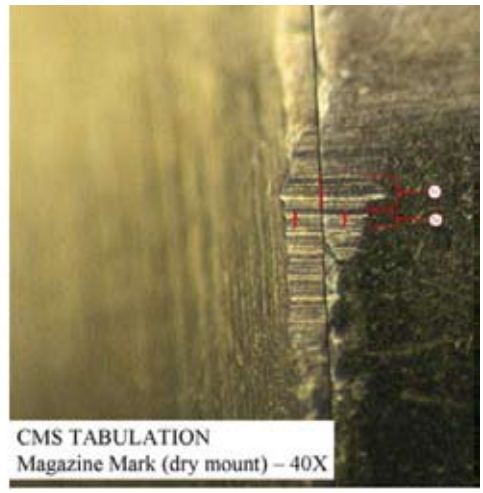
*JD FRANZ RESEARCH, INC.*
*Public Opinion and Marketing Research*
*Sacramento, CA*
*Jennifer D. Franz, Ph.D.*

## I. INTRODUCTION

The research findings presented in this report derive from a survey of members of the Association of Firearm and Toolmark Examiners (AFTE) that was commissioned by California Association of Criminalists (CAC) Northern California Firearms Study Group and conducted as a joint venture between CAC and JD Franz Research, Inc. of Sacramento. CAC's Northern California Firearms Study Group designed, distributed, and collected the questionnaires; JD Franz Research tabulated the data and prepared this report.

Initially, all of the approximately 800 AFTE members were invited by postcard to complete the survey on the AFTE Web site; they were also encouraged to distribute the survey to non-AFTE members who are qualified firearm or toolmark examiners. When the response to this invitation proved to be minimal, in part because of difficulties accessing the survey, the survey was re-distributed to all AFTE members by email.




The initial mailing took place on October 14, 2006; the follow-up email was sent on January 30, 2007.

As of the cutoff date for returns of April 1, 2007, 159 people had responded. Although one could compute a response rate for this number of returns based on the initial survey distribution, this rate could be misleading. The reason for this is that the total survey distribution is unknown; those invited to participate were also encouraged to include others they deemed qualified as firearm and toolmark examiners.

The primary purposes of the survey were to determine the extent to which AFTE members use and believe in the scientific validity of the Quantitative Consecutive Matching Striae (CMS) method of firearm and toolmark identification. Specific areas of inquiry were as follows: • Reading about the CMS method • Receipt of training in CMS • Familiarity with the theoretical aspects of the CMS method • Familiarity with the CMS method in practice • Knowledge about CMS and scientific validity • Awareness of evidence that should prevent CMS from being used • Use of pattern matching and CMS • Determining whether to use CMS • Reasons for using CMS • Guidance from SOP or procedure manuals • Court challenges and feedback on the use of CMS • Characteristics of responding examiners

Following this Introduction, the report is divided into two additional sections.

Section II presents and discusses the Findings, and Section III contains the research firm's Conclusions and Recommendations.

For reference, there are also three appendices. Appendix A contains a copy of the Questionnaire that was used in conducting the research, and Appendix B includes Detailed Data Tabulations for all of the survey questions. Finally, Appendix C presents transcriptions of responding examiners' Comments. *NOTE: The Appendices are available at www.cacnews.org.*

## II. FINDINGS

Findings from the survey are presented here in an order that seems logically to tell the story of the results. Readers who are interested in the precise phrasing of the inquiries are invited to consult the copy of the questionnaire that can be found in Appendix A.

*Reading About the CMS Method (Question 7)*

As shown in Table 1, the largest group of examiners have read and studied between one and four articles about CMS. A third of examiners (33 percent) have read five or fewer articles on the topic. Somewhat more than a third, on the other hand (35 percent), have read ten or more such articles. The mean number of articles read (excluding examiners who did not give a numeric response) is 8.46.

*Receipt of Training in CMS (Questions 12 and 13)*

Figure 1 demonstrates that somewhat over two-thirds of examiners have received training in CMS. Of these, as depicted in Table 2, the largest groups have received training from the California Criminalistics Institute and the AFTE.

Table 1

NUMBERS OF ARTICLES ABOUT CMS THAT EXAMINERS HAVE READ

| | Frequency | Percent |
|---|---|---|
| 1 To 4 | 36 | 22.8 |
| 5 | 16 | 10.1 |
| 6 To 9 | 22 | 13.9 |
| 10 | 31 | 19.6 |
| More Than 10 | 25 | 15.8 |
| Several/Don't Track/All Of Them | 26 | 16.5 |
| Those Provided During Class Only | 1 | .6 |
| Don't Know | 1 | .6 |

Figure 1

Table 2

**TYPES OF CMS TRAINING EXAMINERS HAVE RECEIVED**

| | Frequency | Percent |
|---|---|---|
| California Criminalistics Institute Criteria For Toolmark Identification Course | 51 | 46.4 |
| AFTE Training Seminar CMS Workshops | 39 | 35.5 |
| Class Presentation At Another Location | 21 | 19.1 |
| NFEA (ATF National Firearm Examiners Academy) | 17 | 15.5 |
| Other | 25 | 22.7 |

The numbers of hours of training these examiners have received from NFEA, in class presentations, and from other sources are portrayed in Tables 3, 4, and 5.

Those who have received NFEA training (n=17) tend to have had less than ten hours of training (59 percent). Recipients of class presentations (n=20) are most likely to have had eight or more training hours (65 percent). With respect to those who have received other hours of training (n=14), no pattern emerges.

Table 3

**HOURS OF NFEA CMS TRAINING EXAMINERS HAVE RECEIVED**

| | Frequency | Percent |
|---|---|---|
| 4 | 3 | 17.6 |
| 6 | 2 | 11.8 |
| 8 | 5 | 29.4 |
| 10 | 1 | 5.9 |
| 16 | 1 | 5.9 |
| 20 | 1 | 5.9 |
| 24 | 1 | 5.9 |
| 40 | 2 | 11.8 |
| Don't Know | 1 | 5.9 |

Table 4

**CLASS HOURS OF CMS TRAINING EXAMINERS HAVE RECEIVED**

| | Frequency | Percent |
|---|---|---|
| 2 | 1 | 5.0 |
| 3 | 1 | 5.0 |
| 4 | 1 | 5.0 |
| 5 | 1 | 5.0 |
| 6 | 3 | 15.0 |
| 8 | 4 | 20.0 |
| 10 | 1 | 5.0 |
| 16 | 2 | 10.0 |
| 40 | 5 | 25.0 |
| 80 | 1 | 5.0 |

Table 5

**OTHER HOURS OF CMS TRAINING EXAMINERS HAVE RECEIVED**

| | Frequency | Percent |
|---|---|---|
| 1 | 1 | 6.7 |
| 2 | 1 | 6.7 |
| 4 | 1 | 6.7 |
| 5 | 1 | 6.7 |
| 6 | 1 | 6.7 |
| 15 | 1 | 6.7 |
| 16 | 3 | 20.0 |
| 24 | 1 | 6.7 |
| 32 | 1 | 6.7 |
| 40 | 1 | 6.7 |
| 50 | 1 | 6.7 |
| Don't Know | 1 | 6.7 |

*Familiarity With the Theoretical Aspects of the CMS Method (Question 5)*

Table 6 portrays examiners' familiarity with the theoretical aspects of the CMS method on a ten-point scale where one equals not familiar and ten equals very familiar. As this graphic indicates, the largest group of examiners view themselves as being very familiar with the theory underlying the method; responses of between 8 and 10 total the majority (61 percent). The mean level of theoretical familiarity with the CMS method is 7.80.

Table 6

**FAMILIARITY WITH THE THEORETICAL ASPECTS OF THE CONSECUTIVE MATCHING STRIAE (CMS) METHOD**

| | Frequency | Percent |
|---|---|---|
| Not Familiar | - | - |
| 2 | 1 | .6 |
| 3 | 3 | 1.9 |
| 4 | 3 | 1.9 |
| 5 | 15 | 9.6 |
| 6 | 12 | 7.6 |
| 7 | 28 | 17.8 |
| 8 | 36 | 22.9 |
| 9 | 19 | 12.1 |
| Very Familiar | 40 | 25.5 |

*Familiarity With the CMS Method in Practice (Question 6)*

Table 7 displays examiners' familiarity with the CMS method in practice on the same scale. As this chart illustrates, the most prevalent answer is again "very familiar." In this case, however, responses of between 8 and 10 constitute the minority (42 percent). The mean level of familiarity with the CMS method in practice is 6.37.

Table 7

**FAMILIARITY WITH THE CMS METHOD IN PRACTICE**

| | Frequency | Percent |
|---|---|---|
| Not Familiar | 13 | 8.2 |
| 2 | 13 | 8.2 |
| 3 | 4 | 2.5 |
| 4 | 9 | 5.7 |
| 5 | 25 | 15.7 |
| 6 | 10 | 6.3 |
| 7 | 17 | 10.7 |
| 8 | 22 | 13.8 |
| 9 | 11 | 6.9 |
| Very Familiar | 34 | 21.4 |
| Not Applicable | 1 | .6 |

*Knowledge About CMS and Scientific Validity (Questions 8, 9, and 15)*

Figure 2 demonstrates that two-thirds of examiners feel they have sufficient knowledge about the use of CMS to know whether it has been scientifically validated. In addition, as depicted in Table 8, close to a third believe the method has generally been validated on a ten-point scale where one equals falsified and ten equals validated. Ratings of 8, 9, and 10 on this scale total the majority (60 percent).

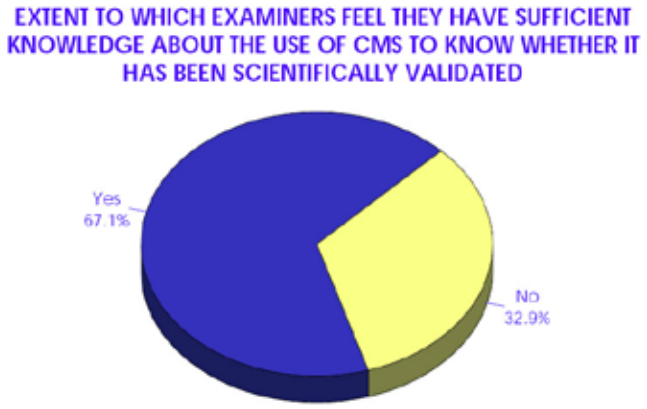



Figure 2

Figure 3 demonstrates that close to two-thirds of examiners accept CMS as being scientifically valid. Somewhat fewer than one in five, on the other hand, reject the method's validity. The remainder are uncertain.

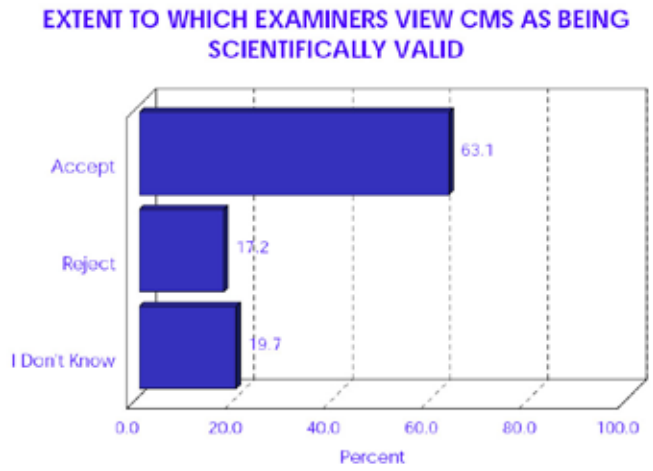



Figure 3

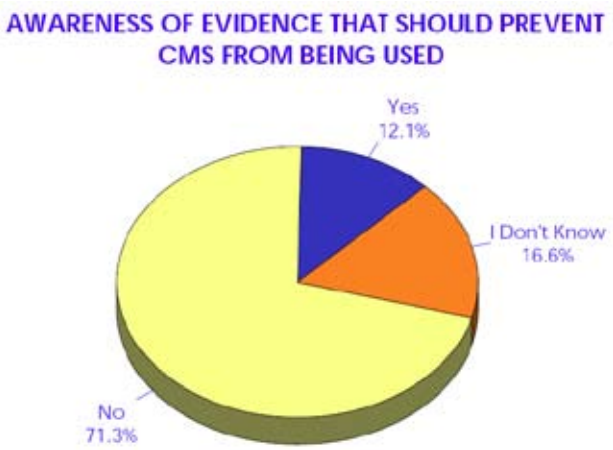



Figure 4

Responses concerning the scientific validity of CMS were cross-tabulated by familiarity with the method, both in theory and in practice, years of experience, numbers of articles read and studied, level of knowledge about the use of CMS, receipt of training about CMS, and whether CMS is listed in the examiner's SOP or procedure manual. Of these, familiarity with the method, articles read, level of knowledge, receipt of training, and listing in manuals all yielded statistically significant results ($p<.05$). These results are as follows:

- Those who are more familiar with the CMS method, both in theory and in practice, are more likely to accept it as being scientifically valid.
- In general, the more articles about CMS an examiner has read and studied, the more likely that person is to accept the method as being scientifically valid.
- Those who feel they have sufficient knowledge about the use of the method to judge whether or not it is scientifically valid are substantially more likely than those who feel their knowledge is insufficient to accept it as being valid.
- Those who have received training in the use of the CMS method are much more likely than those who have not been trained to accept the method as being scientifically valid.
- Those whose SOP or procedure manuals list CMS as a technique that is used and approved for examinations are dramatically more likely than those whose manuals have no such listing to accept the method as being scientifically valid. These data should be interpreted with some caution, however, as the number with such listings is quite small.

*Awareness of Evidence That Should Prevent CMS From Being Used (Question 14)*

Figure 4 shows that close to three-quarters of examiners are not aware of any "compelling evidence" that should prevent CMS from being used in casework. Only about one in ten state that they are aware of such evidence. The remainder do not know.

*Use of Pattern Matching and CMS (Questions 10, 11, 16, and 21)*

Table 9 indicates that well over nine in ten examiners use pattern matching, while close to half use CMS as an extension of pattern matching. The majority of examiners (51 percent) have used pattern matching for ten or more years, as shown in Table 10. On the other hand, half of examiners have used CMS for less than five years, as in Table 11 indicates.

Table 9

**Methods Examiners Use**

| | Frequency | Percent |
|---|---|---|
| Pattern Matching | 152 | 96.8 |
| CMS (As An Extension Of Pattern Matching) | 70 | 44.6 |

Table 10

**NUMBERS OF YEARS EXAMINERS HAVE USED PATTERN MATCHING**

| | Frequency | Percent |
|---|---|---|
| Less Than 5 Years | 28 | 18.7 |
| 5 To 9 Years | 46 | 30.7 |
| 10 To 14 Years | 24 | 16.0 |
| 15 To 24 Years | 28 | 18.7 |
| 25 Years Or More | 24 | 16.0 |

Table 11

**NUMBERS OF YEARS EXAMINERS HAVE USED CMS**

| | Frequency | Percent |
|---|---|---|
| Less Than 5 Years | 35 | 50.0 |
| 5 To 9 Years | 20 | 28.6 |
| 10 To 14 Years | 4 | 5.7 |
| 15 To 24 Years | 6 | 8.6 |
| 25 Years Or More | 5 | 7.1 |

Use of the CMS method is related to the receipt of training in the technique and to whether or not the method is listed as used and approved for examinations in SOP or procedure manuals, as demonstrated by cross-tabulational analysis.

Specifically:

• Those who have been trained in CMS are substantially more likely to use the method than those who have not been trained.

• Those whose manuals list CMS as used and approved for examinations are decidedly more likely to use the method than those whose manuals have no such listing. Again, however, these results should be interpreted with caution due to the small number of manuals that have such a listing.

As illustrated in Figure 5, the majority of examiners never use CMS in striated toolmark identification casework. One in five, on the other hand, always do. The remainder use it in select cases. Overall, then more than two out of five (43 percent) use CMS in striated toolmark identification.

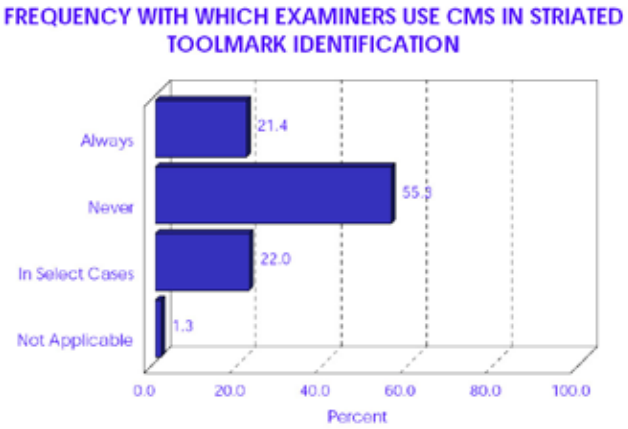



Figure 5

Table 12 demonstrates that the majority of examiners draw firearm and toolmark identification conclusions using pattern matching only. Two-fifths, however, draw conclusions using a combination of pattern matching and CMS.

Table 12

HOW EXAMINERS DRAW FIREARM AND TOOLMARK IDENTIFICATION CONCLUSIONS

| | Frequency | Percent |
|---|---|---|
| CMS Only | 3 | 1.9 |
| Pattern Matching Only | 92 | 58.2 |
| Pattern Matching And CMS Combined | 63 | 39.9 |

Use of CMS in specific situations is portrayed in Figure 6. Bullets are most likely to be examined using CMS; almost half of examiners use the technique in that situation. This is followed relatively closely by the use of CMS with cartridge cases and with non-firearm toolmarks.

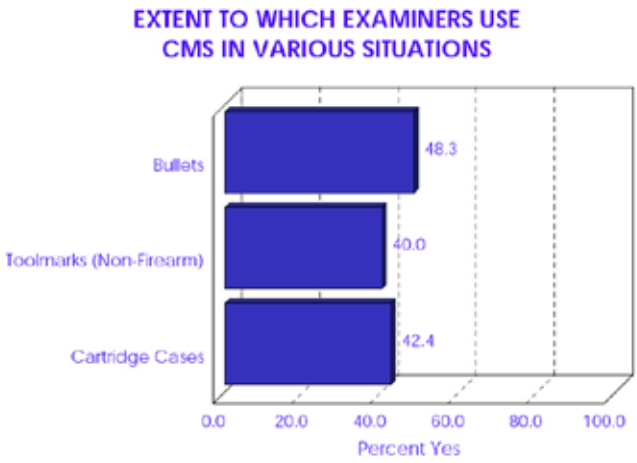



Figure 6

*Determining Whether to Use CMS (Question 17)*

The criteria examiners use to determine whether to use CMS are portrayed in Table 13. The most prevalent criterion is to document casework. This is closely followed by the difficulty of the identification and by examiner discretion.

Table 13

CRITERIA EXAMINERS USE TO DETERMINE WHETHER TO USE CMS

| | Frequency | Percent |
|---|---|---|
| Difficulty Of The Identification, Where Limited Striae Are Available For Comparison | 26 | 41.9 |
| To Document Casework | 29 | 46.8 |
| At Examiner Discretion | 25 | 40.3 |
| Not Applicable | 2 | 3.2 |

*Reasons for Using CMS (Question 20)*

Reasons that examiners use CMS are depicted in Table 14. Chief among these is examiner preference.

Table 14

WHY EXAMINERS USE CMS

| | Frequency | Percent |
|---|---|---|
| Required By Lab Protocol | 5 | 5.4 |
| Examiner Preference | 50 | 53.8 |
| Other | 32 | 34.4 |
| Not Applicable | 17 | 18.3 |

*Guidance From SOP or Procedure Manuals (Questions 18 and 19)*

As shown in Figure 7, by far the majority of examiners' organizations do not list CMS in their SOP or procedure manuals as a technique used and approved for examinations. Pattern matching, on the other hand, is listed as used and approved in the majority of organizations' manuals, as Figure 8 illustrates.

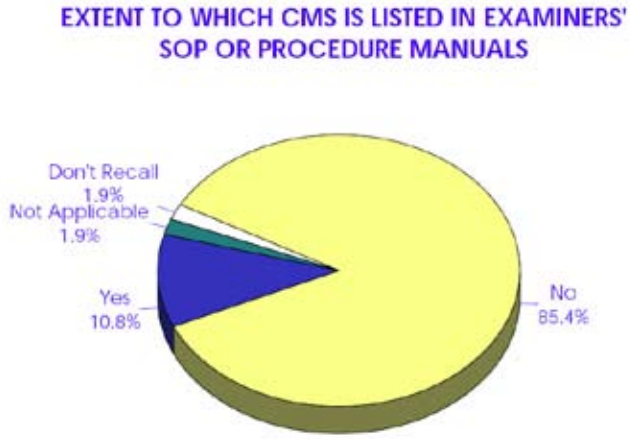



Figure 7

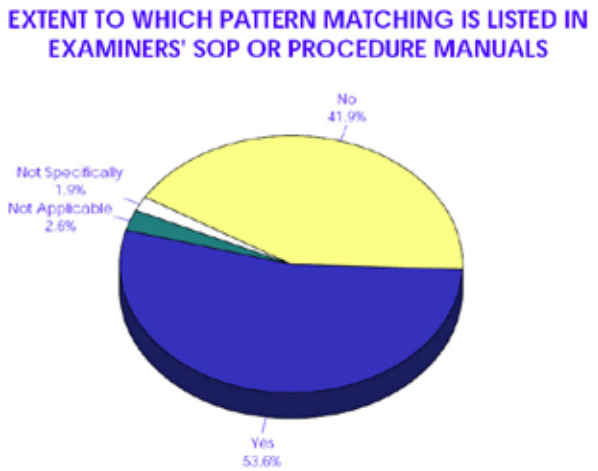



Figure 8

*Court Challenges and Feedback on the Use of CMS (Questions 22, 23, and 24)*

As Table 15 demonstrates, a strong majority of examiners have never been challenged on CMS in court. In addition, as Table 16 illustrates, an even stronger majority have never been challenged in court for not having used CMS.

Table 15

NUMBERS OF TIMES EXAMINERS HAVE BEEN CHALLENGED IN COURT ON CMS

| | Frequency | Percent |
|---|---|---|
| Zero | 119 | 77.3 |
| 1 | 8 | 5.2 |
| 2 | 4 | 2.6 |
| 3 | 2 | 1.3 |
| 10 | 1 | .6 |
| Not Applicable | 20 | 13.0 |

Table 16

NUMBERS OF TIMES EXAMINERS HAVE BEEN CHALLENGED IN COURT FOR NOT USING CMS

| | Frequency | Percent |
|---|---|---|
| Zero | 129 | 84.3 |
| 1 | 6 | 3.9 |
| 2 | 3 | 2.0 |
| 3 | 1 | .7 |
| 5 | 1 | .7 |
| 8 | 1 | .7 |
| Not Applicable | 10 | 6.5 |
| Many Times | 2 | 1.3 |

Table 17 shows that 15 examiners have received feedback from the court on their use of CMS. In the majority of these instances (60 percent), the feedback was positive; in almost all of the remaining cases (27 percent), the feedback was neutral.

Table 17

NATURE OF FEEDBACK ABOUT THE USE OF CMS

| | Frequency | Percent |
|---|---|---|
| Positive | 9 | 8.5 |
| Negative | 1 | .9 |
| Neutral | 4 | 3.8 |
| No Different | 1 | .9 |
| Not Applicable/Never Received Feedback | 91 | 85.8 |

*Characteristics of Responding Examiners (Questions 1, 2, and 3)*

Figure 9 demonstrates that almost all of the responding examiners have been accepted as experts in firearm and toolmark identification by a court of law. In addition, as Table 18 indicates, the majority (55 percent) have been practicing firearm and toolmark identification for ten years or more.

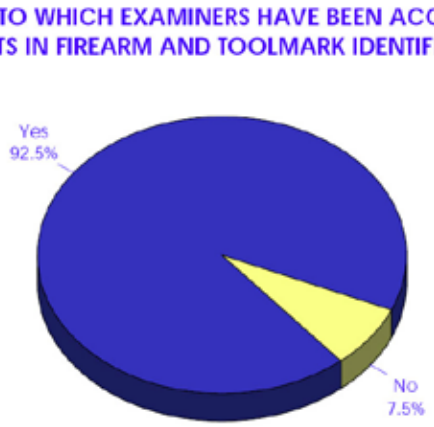



Figure 9

Table 18

**YEARS OF EXPERIENCE IN FIREARM AND TOOLMARK IDENTIFICATION CASEWORK**

| | Frequency | Percent |
|---|---|---|
| Less Than 5 Years | 28 | 17.6 |
| 5 To 9 Years | 44 | 27.7 |
| 10 To 14 Years | 26 | 16.4 |
| 15 To 24 Years | 32 | 20.1 |
| 25 Years Or More | 29 | 18.2 |

Most of those responding (76 percent) work in laboratories with five or fewer examiners who perform microscopic comparison casework. The most frequent laboratory sizes are three, two, or one examiners, shown in Table 19.

Table 19

**NUMBER OF EXAMINERS WHO PERFORM MICROSCOPIC COMPARISON CASEWORK IN EXAMINERS' LABORATORIES**

| | Frequency | Percent |
|---|---|---|
| 1 | 21 | 13.4 |
| 2 | 34 | 21.6 |
| 3 | 41 | 26.1 |
| 4 | 11 | 7.0 |
| 5 | 13 | 8.3 |
| 6 | 11 | 7.0 |
| 7 | 3 | 1.9 |
| 8 | 3 | 1.9 |
| 9 | 8 | 5.1 |
| 10 Or More | 9 | 5.7 |
| Not Applicable | 1 | .6 |
| Don't Know/Retired | 2 | 1.3 |

Table 20

**LOCATION OF LABORATORY**
**All Respondents**

| | Frequency | Percent |
|---|---|---|
| Outside United States | 19 | 11.9 |
| Alabama | 3 | 1.9 |
| Arizona | 7 | 4.4 |
| California | 47 | 29.6 |
| Colorado | 1 | .6 |
| Connecticut | 1 | .6 |
| Florida | 5 | 3.1 |
| Georgia | 3 | 1.9 |
| Guam | 1 | .6 |
| Hawaii | 2 | 1.3 |
| Illinois | 10 | 6.3 |
| Indiana | 1 | .6 |
| Kansas | 1 | .6 |
| Louisiana | 1 | .6 |
| Maine | 1 | .6 |
| Maryland | 5 | 3.1 |
| Massachusetts | 3 | 1.9 |
| Michigan | 3 | 1.9 |
| Minnesota | 1 | .6 |
| Missouri | 1 | .6 |
| Montana | 2 | 1.3 |
| Nevada | 1 | .6 |
| New Hampshire | 1 | .6 |
| New Jersey | 1 | .6 |
| New Mexico | 5 | 3.1 |
| New York | 3 | 1.9 |
| Ohio | 2 | 1.3 |
| Oklahoma | 2 | 1.3 |
| Oregon | 2 | 1.3 |
| Pennsylvania | 2 | 1.3 |
| Rhode Island | 1 | .6 |
| South Carolina | 1 | .6 |
| South Dakota | 2 | 1.3 |
| Tennessee | 1 | .6 |
| Texas | 4 | 2.5 |
| Virginia | 11 | 6.9 |
| Washington | 2 | 1.3 |

*Laboratory Locations (Question 4)*

Tables 20 through 25 show the laboratory locations for various categories of respondents. Among all respondents, the largest group are in California. This is also true for those who accept CMS as valid, those who use pattern matching only, those who use a combination of pattern matching and CMS, and those who use CMS only (although this number is too small to be meaningful). Among those who do not accept CMS as valid, the largest group are in Virginia.

Table 21

**LOCATION OF LABORATORY AMONG RESPONDENTS WHO ACCEPT CMS AS VALID**

| | Frequency | Percent |
|---|---|---|
| Australia | 10 | 6.3 |
| Canada | 3 | 1.9 |
| England | 1 | .6 |
| Hong Kong | 1 | .6 |
| Japan | 1 | .6 |
| Netherlands | 1 | .6 |
| New Zealand | 2 | 1.3 |
| Alabama | 3 | 1.9 |
| Arizona | 7 | 4.4 |
| California | 47 | 29.6 |
| Colorado | 1 | .6 |
| Connecticut | 1 | .6 |
| Florida | 5 | 3.1 |
| Georgia | 3 | 1.9 |
| Guam | 1 | .6 |
| Hawaii | 2 | 1.3 |
| Illinois | 10 | 6.3 |
| Indiana | 1 | .6 |
| Kansas | 1 | .6 |
| Louisiana | 1 | .6 |
| Maine | 1 | .6 |
| Maryland | 5 | 3.1 |
| Massachusetts | 3 | 1.9 |
| Michigan | 3 | 1.9 |
| Minnesota | 1 | .6 |
| Missouri | 1 | .6 |
| Montana | 2 | 1.3 |
| Nevada | 1 | .6 |
| New Hampshire | 1 | .6 |
| New Jersey | 1 | .6 |
| New Mexico | 5 | 3.1 |
| New York | 3 | 1.9 |
| Ohio | 2 | 1.3 |
| Oklahoma | 2 | 1.3 |
| Oregon | 2 | 1.3 |
| Pennsylvania | 2 | 1.3 |
| Rhode Island | 1 | .6 |
| South Carolina | 1 | .6 |
| South Dakota | 2 | 1.3 |
| Tennessee | 1 | .6 |
| Texas | 4 | 2.5 |
| Virginia | 11 | 6.9 |
| Washington | 2 | 1.3 |

Table 22

**LOCATION OF LABORATORY AMONG RESPONDENTS WHO DO NOT ACCEPT CMS AS VALID**

| | Frequency | Percent |
|---|---|---|
| Netherlands | 1 | 3.7 |
| Alabama | 2 | 7.4 |
| Arizona | 2 | 7.4 |
| California | 1 | 3.7 |
| Illinois | 4 | 14.8 |
| Indiana | 1 | 3.7 |
| Montana | 2 | 7.4 |
| New Hampshire | 1 | 3.7 |
| New Mexico | 1 | 3.7 |
| New York | 1 | 3.7 |
| South Dakota | 1 | 3.7 |
| Texas | 1 | 3.7 |
| Virginia | 8 | 29.6 |
| Washington | 1 | 3.7 |

Table 23

LOCATION OF LABORATORY AMONG RESPONDENTS WHO USE PATTERN MATCHING ONLY

| | Frequency | Percent |
|---|---|---|
| Australia | 1 | 1.1 |
| Canada | 2 | 2.3 |
| England | 1 | 1.1 |
| Netherlands | 1 | 1.1 |
| Alabama | 2 | 2.3 |
| Arizona | 6 | 6.9 |
| California | 11 | 12.6 |
| Florida | 4 | 4.6 |
| Georgia | 2 | 2.3 |
| Hawaii | 2 | 2.3 |
| Illinois | 10 | 11.5 |
| Indiana | 1 | 1.1 |
| Kansas | 1 | 1.1 |
| Louisiana | 1 | 1.1 |
| Maine | 1 | 1.1 |
| Maryland | 3 | 3.4 |
| Massachusetts | 1 | 1.1 |
| Michigan | 1 | 1.1 |
| Minnesota | 1 | 1.1 |
| Missouri | 1 | 1.1 |
| Montana | 2 | 2.3 |
| Nevada | 1 | 1.1 |
| New Hampshire | 1 | 1.1 |
| New Jersey | 1 | 1.1 |
| New Mexico | 4 | 4.6 |
| New York | 2 | 2.3 |
| Ohio | 1 | 1.1 |
| Oklahoma | 1 | 1.1 |
| Pennsylvania | 2 | 2.3 |
| Rhode Island | 1 | 1.1 |
| South Carolina | 1 | 1.1 |
| South Dakota | 1 | 1.1 |
| Tennessee | 1 | 1.1 |
| Texas | 4 | 4.6 |
| Virginia | 11 | 12.6 |

## Comments

Throughout the questionnaires, responding examiners made a number of marginal comments about the questions, their answers, and the CMS method in general. For reference, these comments have been transcribed verbatim and are presented in Appendix C.

Many of the comments are factual in nature, such as sources of training, and may be of minimal interest. There are also, however, a number of comments related to the validity of the CMS method. The preponderance of these comments are skeptical, critical, or outright oppositional, particularly before the direct question asking why examiners use CMS arises.

This is not to say, however, that the preponderance of the sentiments expressed in the survey are negative. Rather, it appears that those who have concerns were more likely to express these concerns in marginal notations. The objective data seem to be considerably more balanced in nature.

Table 24

LOCATION OF LABORATORY AMONG RESPONDENTS WHO USE A COMBINATION OF PATTERN MATCHING AND CMS

| | Frequency | Percent |
|---|---|---|
| Australia | 8 | 12.3 |
| Canada | 1 | 1.5 |
| Hong Kong | 1 | 1.5 |
| Japan | 1 | 1.5 |
| New Zealand | 2 | 3.1 |
| Alabama | 1 | 1.5 |
| Arizona | 1 | 1.5 |
| California | 32 | 49.2 |
| Colorado | 1 | 1.5 |
| Florida | 1 | 1.5 |
| Guam | 1 | 1.5 |
| Maryland | 2 | 3.1 |
| Massachusetts | 2 | 3.1 |
| Michigan | 2 | 3.1 |
| New Mexico | 1 | 1.5 |
| New York | 1 | 1.5 |
| Ohio | 1 | 1.5 |
| Oklahoma | 1 | 1.5 |
| Oregon | 2 | 3.1 |
| South Dakota | 1 | 1.5 |
| Washington | 2 | 3.1 |

Table 25

LOCATION OF LABORATORY AMONG RESPONDENTS WHO USE CMS ONLY

| | Frequency | Percent |
|---|---|---|
| Australia | 1 | 20.0 |
| California | 3 | 60.0 |
| Georgia | 1 | 20.0 |

## III. CONCLUSIONS AND RECOMMENDATIONS

From the results of this research, it would appear that the Quantitative Consecutive Matching Striae (CMS) method of firearm and toolmark identification remains controversial among professional examiners. Both the objective data and marginal commentary indicate that there is a solid minority of examiners who reject the technique as scientifically valid.

At the same time, however, the majority of examiners accept the method as being valid. In addition, somewhere around two in five use the technique as an extension of pattern matching in their own work. Relatively few are aware of any compelling evidence that should actually prevent CMS from being used in casework.

Perhaps even more important, court challenges to the use of CMS have reportedly been rare. Feedback from the courts has also been predominantly positive.

In terms of the future of CMS, analysis of the survey data suggests that there is a relationship between familiarity with the technique and its acceptance as scientifically valid. It therefore seems reasonable to conclude that as more examiners read about the technique and receive training in it, its use will increase.

Reinforcing this contention is the fact that among those who do not actually view the method as being valid, the largest group do not know whether they should accept or reject it. Presumably, as knowledge and understanding continue to spread, acceptance will grow as well.

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# Keith & Norah's Top Ten: Areas in Which Forensic Science Could Improve

*"The art of progress is to preserve order amid change, and to preserve change amid order."*
*—Alfred North Whitehead*

### 10. Partner with academia

Working forensic scientists should not only welcome, but seek out, interaction with academic scientists. Town-gown relationships would be ideal to foster the sorely-needed research in many areas that caseworkers simply don't have the time to pursue.

### 9. Require a scientific basis for comparison disciplines

Comparison disciplines (all print and impression evidence including, but not limited to: dermal ridge prints, shoe prints, tool marks, firearms, handwriting) should actively seek to underpin opinions with stated, objective criteria based on scientific experimentation. The writing is on the wall.

### 8. Acknowledge and work to limit contextual bias

The forensic community should acknowledge that contextual bias exists, and institute an appropriate information-flow to limit its effect on casework interpretation.

### 7. Documentation of examinations and analyses

All examinations and analyses should be clearly, completely, and contemporaneously documented. An SOP is a procedure to be followed, not a substitute for documentation of an individual analysis. Especially in forensic work, where no two samples are the same, and usually no opportunity exists for a true independent analysis of the physical evidence, detailed documentation is critical.

### 6. Embrace independent review

Primary analysts should not resist or fear independent review. Reproducibility is a hallmark of science. Because the nature of physical evidence and our legal system limits true duplicate analysis of most samples, external independent review is the next best check and balance on the system. If you have made a mistake, don't you want to know?

### 5. Provide transparency

Secrecy and gamesmanship are inappropriate to the work of the forensic scientist. All laboratory notes, data, results, procedures, logs, and records should be open to controlled and appropriate scrutiny.

### 4. Don't hide behind policy

While policy is clearly necessary to the smooth operation of a laboratory, it should not be so rigid that it becomes a shield rather than a crutch. Analysts should be able to substantiate their own work, and administration should support the analysts in this endeavor.

### 3. Explicate capabilities, limitations, and assumptions

Conclusions, whether provided in a written report, or proffered during testimony, should be accompanied by the relevant capabilities and limitations of both the test system and the physical evidence. Assumptions used in reaching the conclusions should be explicated.

### 2. Strive for clear communication

Whether in reports, testimony, or in communicating with colleagues and clients, always strive to use clear language that effectively communicates the true import of a conclusion. Avoid weasel words, phrases, and obfuscation. Use straight English when possible, and define scientific terms when necessary.

*And the number one thing Keith and Norah would like to see in forensic science…*

### 1. Pose alternate hypotheses! Ask the right question!

Forensic scientists should aggressively pose alternate hypotheses. Hypothesis testing and comparison is the very core of science. The forensic scientist should actively assist the client to ask the right question(s) in the context of the case. The most brilliant answer to the wrong question will be irrelevant!

# What's Shakin'
## in Forensic Science

was the theme, and a whole lotta shakin' was going on at the banquet! King Creole, aka Elvis, aka Rick T. was center stage for a high-energy trip down memory lane.

**With 103 registrants and a plethora of vendors, the Fall 2007 CAC seminar was underway at the Berkeley Marina Doubletree. In addition to the seminar resentation, thirty applications were received for provisional membership—a sure sign of a thriving organization.**

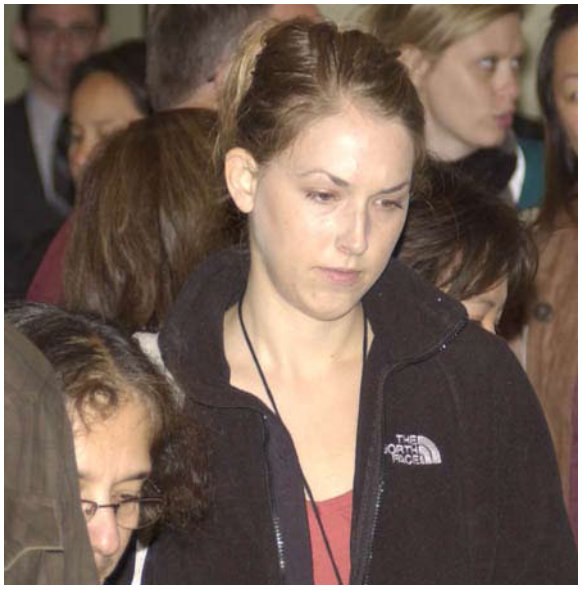
DNA Workshop

Firearms Safety Workshop

Photography Workshop

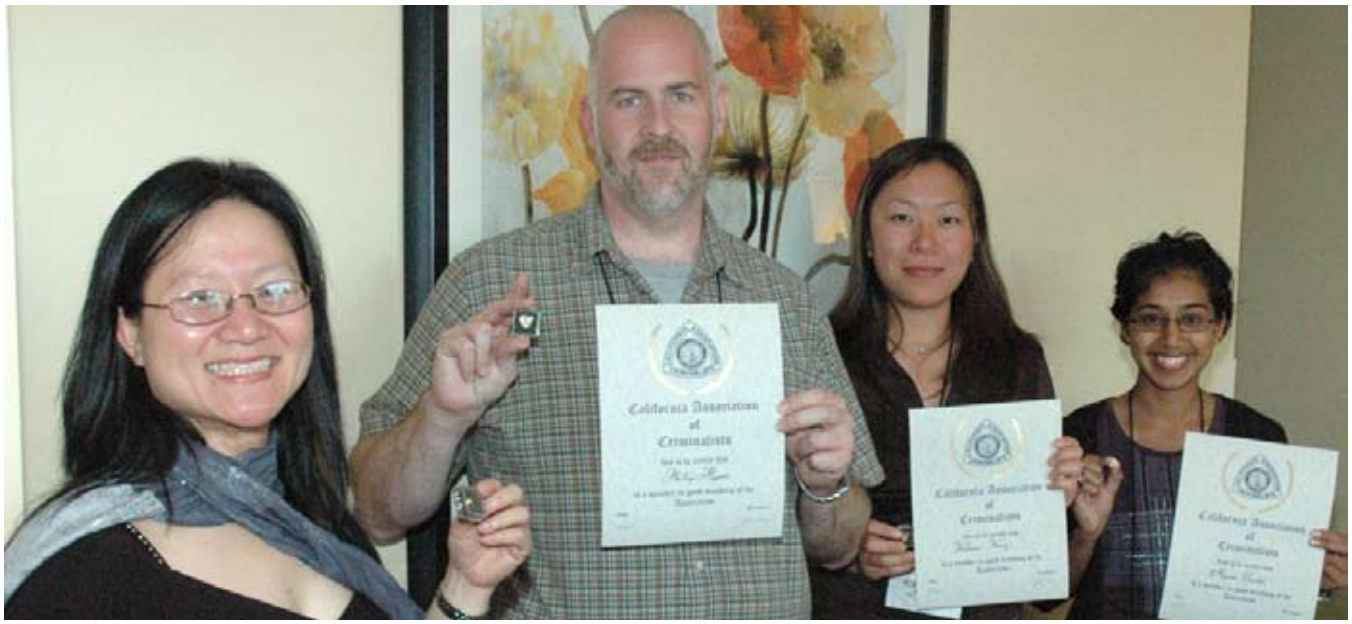
*(Top) the seminar planners meet to get ready for the week's events. Following the board of director's meeting (above) The Fall 2007 CAC seminar opened with three workshops: DNA discussion, hands-on training in forensic photography and the safe handling of firearms evidence.*

Many thanks to:
M. Lee Goff, PhD
Chaminade
University
Honolulu, Hawaii



THE POWER
00-DNA-TES

*Photography on this page and facing page provided by Jose Gonzales.*


California Association
of
Crematists

# Fall 2007
# CAC Seminar
# Abstracts

## Are We Analysts or Investigators?—Shaking Up the System

*Peter D. Barnett and George Sensabaugh*

This presentation is designed to challenge criminalists to think about the nature of their profession. Are criminalists evidence analysts or scientific investigators? Do criminalists respond to machines in their laboratories based on analysis requests from investigators and lawyers, or do they respond to incidents to determine if, and how, physical evidence can be used to understand what happened in that incident? What do we need to do in order to replace, or at lest supplement, eyewitness testimony with a scientific investigation of the physical evidence? First, we must develop and appreciate the basic principles of criminalistics that describe how physical evidence is produced and why it is useful. Some basic principles have already been enumerated: Transfer(Locard), Individuality(Kirk), and Divisible Matter(Inman and Rudin) There may be more. Then criminalists must become proficient at developing and refining the operations that are used to give voice to the "mute" physical evidence. These "unit operations", as defined in the oft-repeated "definition" of criminalistics are recognition, preservation, identification, individualization, and reconstruction. Next, the results of the scientific investigation must be presented in a way that is scientifically rigorous, legally relevant, and understandable to the decision makers throughout the criminal justice process. Traditional scientific processes of peer review, hypothesis testing, and replication can satisfy this requirement. And finally, criminalists must convince the other players in, and observers of, the criminal justice process that this approach is valid and is of value in the investigation and adjudication of events that are the subject of legal inquiries. This may be the most difficult challenge in shaking up the system, but it is the essence of the responsibility of a professional. Transparency, comity, accessibility, and responsibility all can serve to enhance the acceptance of a process of scientific investigation as an integral part of the justice system.

## Bones, Bones, Bones

*Lorna Pierce, PhD*
*Santa Clara County Medical Examiner-Coroner*

The role of the forensic anthropologist is to examine the skeletal material found in the county, and, if it is human, provide a biological profile and taphonomic assessment in order to identify the individual. In California, Native American remains are frequently found and a different protocol is followed. Several cases that have come across my desk in the last twenty years will be discussed.

## Genetic Genealogy

*Katherine Borges*
*Society of Genetic Genealogy*

A non-technical talk on Genetic genealogy in California.

## Sperm Counting and Its Use in Evaluating Postcoital Interval

*Edwin L. Jones, Jr.*
*Ventura County Sheriff's Department Forensic Sciences Lab*

In fertility studies, sperm counting was used to assess the sperm density of semen. The exposure to semen in the female reproductive tract was evaluated by counting sperm. In the Microscopy of Rape Evidence classroom, sperm counting was used as a quality assurance tool to test the students' ability to find and accurately identify sperm. Sperm counting was also used to evaluate the efficiency of various extraction techniques for sperm from different substrates. Counting sperm on a stained slide with no coverslip or mounting media consistently showed about 20% less sperm than counting the same sample with mounting media and coverslip. Counting sperm on the same slide with 400 and 600 times magnification showed consistently more sperm at 600X. Sperm counting was found to be of assistance in evaluating the postcoital interval (PCI) also known as time since intercourse (TSI) of samples from rape-murder cases. The techniques of sperm counting will be presented so that you can use the data with the published literature in the area of PCI. The extensive literature in the field of PCI will be discussed in relation to the types of sampling methods (swabs, smears on microscope slides and vaginal washings). One paper from this literature stands out as being useful for assessing PCI because the female volunteers were active after sex and it used 12 or more sperm to define the "4+" rating of sperm (1). The author will present a method for obtaining better data from the samples normally encountered in sexual assault investigations. This method involves counting the number of sperm and the number of nucleated squamous epithelial cells in each field of view.

1. Garlo AM. Phoshoglucomutase and esterase D activity in post-coital vaginal swabs. *J Forensic Sci Soc* 25:301-11.

## Microbial Community DNA Profiling: Sample Similarity and Geographic Proximity in a Large Database

*George Sensabaugh*
*School of Public Health, University of California - Berkeley*
*Gabriel Llinas*
*Forensic Science Program, University of California - Davis*

The forensic utility of microbial community DNA profiling as a tool for the analysis of soil evidence depends on its capacity to correctly link soil samples that may have originated from a common source and its capacity to differentiate samples that originate from unrelated sites. We have investigated the relationship of profile similarity to geographical proximity in a database of 1348 community DNA profiles of ascomycete fungi derived from samples collected according to a spatially structured sampling grid at 24 distinct sites from an arid region of New South Wales, Australia [Green, et al.,

Nature 432: 747, 2004]. Distances between samples ranged from 1 m to over 100 km. Profiles were compared using three statistical approaches: (a) pairwise sample similarity measures using the Sorensen and Morisita-Horn indices, (b) hierarchical cluster analysis using Pearson correlation statistics, and (c) principal components analysis.

We have found that none of the statistical approaches reliably differentiated geographically proximal (1 m sq. plots) from geographically unrelated sites (d > 250 m). Samples from unrelated sites were found to have highly similar profiles, indicating a substantial risk of false positive source attribution. Conversely, some samples from geographically proximal sites had quite dissimilar profiles, indicating that profile dissimilarity was not a reliable indicator of source exclusion.

These findings indicate that more foundational research is needed before microbial community DNA profiling is embraced or rejected as a tool for forensic soil analysis. Several directions for future research are suggested. First, the sample profiles characterized here were "species poor" with relatively few OTUs per profile. Species richness may need to exceed some minimum threshold to achieve forensically reliable profiles. Second, it is possible that the ascomycete fungi were a poor species group on which to base geographic similarity comparisons. Differences in sample discrimination potential for different microbial species groups deserve investigation. Third, the lack of consistency between the results provided by the different statistical approaches, though likely a consequence of the limited species diversity in the profiles, calls into question the choice among different methods of statistical analysis to be used for profile comparisons.

We thank the CAC and the A. Reed and Virginia McLaughlin Endowment for providing funds to support this pilot project.

## An Unusual Projectile: Shear Genius or Shear Stupidity?

*Gregory Laskowski*
*Kern County District Attorney's Office*

In April of 2007 a gentleman was mowing his front lawn in the town of McFarland, when a car drove up and two shots were believed to have been from the vehicle. The victim sustained a penetrating wound to his chest, and was transported to a nearby hospital. While at the hospital emergency room, an unusual object was removed from the chest wound.

At the scene of the shooting strange debris littered the front yard of the victim's residence. Two apparent bullet holes were observed to house, one into the stucco facing of the garage, and the other perforating the window of garage door This second shot then traversed the garage, perforated an interior wall, struck a ceiling lamp, rebounded off a cabinet door resulting in a bullet coming to rest in the washing machine.

This paper will describe the attempt to identify the projectile that struck the victim, who by-the-way survived his wound, the identification of the weapon that fired the bullet, and the suspicious debris littering the front lawn. A video re-enactment of the reconstructed device will accompany this presentation.

## Physical Matching as a Duty of a Firearms and Toolmark Examiner

*Jaco Swanepoel*
*Forensic Analytical*

Edmond Locard's Exchange Principal is one of the cornerstones of forensic investigations and states that when two objects come in contact with each other they exchange trace materials, markings and possibly other significant evidence. Two objects or surfaces that have been in contact with each other for any period of time should (under most circumstances) leave their respective markings or traces upon one another. Through careful examination and comparison such markings and traces can be detected possibly leading to the conclusion that the two objects or surfaces were in fact joined or in contact with each other. This case examination profiles a rare and unique dual-impression and examiners are looking at markings that were cross transferred from one surface to another. It is also important to examine the transferred markings in relation to their size, shape, position and orientation, as well as their individual significance. The markings are found on the bottom of a hydraulic pump and on the base plate that connects the hydraulic pump to the Grader it was stolen from. The Detective Service wanted the South African Police Services Forensic Science Laboratory to determine if the base plate and the hydraulic pump were connected to each other at one point or another.

## DNA in Wildlife Forensic Science in California: A Status Report

*Jeff A Rodzen, James D. Banks, Erin P. Meredith*
*California Dept of Fish and Game, Wildlife Forensics Lab*

The Wildlife Forensics Laboratory has assisted in species identification and processing of evidentiary samples from a large number of wildlife species in California. The use of STRs is playing a very important role in wildlife forensic science. Unlike human criminalistics, the WFL analyzes many different species, each of which must have its own unique and species-specific set of STRs and corresponding database of multilocus profiles. We provide an overview of our research to date on population and forensic genetics of deer, elk, and mountain lions and overcoming a Kelly-Frye challenge. New research projects will also be reviewed and include the development of STRs for bear, red and black abalone, and the polyploid white sturgeon.

## The San Diego DNA Project

*Judge George "Woody" Clark*

The San Diego County District Attorney's Office "DNA Project" was begun in June 2000 to proactively examine the cases of defendants who were prosecuted by the San Diego District Attorney's Office in 1992 or earlier. 1992 was selected based on the fact DNA testing was commonly available and routinely applied in criminal cases in San Diego after that time. The review focused on whether, in each case, biologi-

cal evidence still existed, whether the defendant consistently maintained his or her innocence based upon mistaken or wrongful identification, and whether current DNA technology could provide exonerating evidence. The project included review of more than 600 cases. The program received national attention for its innovation, was recognized by Time Magazine, and honored by the Harvard University John F. Kennedy School of Government. This presentation will review the procedures employed in the project, describe its implementation, and detail the results of the process.

## Opportunities and Limitations of Forensic Entomology

*Robert B. Kimsey, Ph.D.*

Entomology suffers much from the portrayal of forensic entomologists and the work they do in the public media, particularly in Television programs like CSI. Although the other forensic sciences suffer in much the same way, the difficulties caused entomology couple with the relative newness of this rapidly developing science to redouble misconceptions of what this field has to offer. Herein (1) I review technical stumbling blocks in forensic entomology and (2) the inherent limitations of the field, then describe the (3) major research efforts forensic entomologists currently struggle with, and (4) describe the progress and future of this potentially lucrative field. Although the "going will be rough" I argue that forensic entomology has a very bright future.

## Evaluation of Zeolite and DNA-SampleMatrix(r) and for Collection and Storage of DNA

*Brie Silva, Kimberly Clabaugh, Kingsley Odigie and Steven B. Lee: Forensic Science, Justice Studies Department, San Jose State University*

Collection and storage of DNA samples is of paramount importance in forensic DNA, epidemiological, clinical and virtually any molecular genetic laboratory. In forensic laboratories there is always the possibility that cases may be reopened and any stored biological evidence or extracted DNA sample may need to be re-tested. This is especially important when the amount of sample is limited. Proper storage of samples containing small amounts of DNA is important for maintaining sample integrity over time.

The objectives of this paper are: 1) To determine the efficacy of recovery of DNA from whole blood bound in the Zeolite in QuikClot(r) following storage at room temperature and -20°C freezer for periods of 1 week to 4 years and; 2) To evaluate a new substance, DNA-SampleMatrix(r) for long-term storage of DNA samples at room temperature and -20°C freezer over 6 months.

QuikClot(r) is a hemostatic agent, made of zeolite, a silicate made from equal parts silicon tetroxide (SiO4) and aluminum tetroxide (AlO4). Zeolite in the QuikClot(r) absorbs liquid in the blood, resulting in hemostasis and is therefore used in bandages to rapidly stop bleeding. 25ul aliquots of Bovine blood were placed on replicates of QC and then stored at room temperature or -20°C. 3 replicate samples from each temperature were extracted periodically over 1 year. Samples have been prepared to continue time points out to 4 years. Quantification was performed using standard agarose gel electrophoresis. Results on samples stored up to 3 months were stable at room temperature however DNA recovered from QC saturated with Bovine blood after 13 months of storage at room temperature yielded low amounts of degraded DNA. Results from replicates of 25ul blood aliquots out to 1 year will also be presented.

Biomatrica, Inc. has developed a technology that allows for the stable, dry storage of biological materials at ambient temperatures. The quality and quantity of control DNA (K562) recovered from room temperature and -20°C dry storage in DNA-SampleMatrix(r) versus standard microfuge tubes at various time intervals is being assessed. Preliminary results indicate that the integrity is maintained in DNA-SampleMatrix(r) over 3 months versus those stored in standard microfuge tubes. Samples stored in DNA-SampleMatrix(r) were amplified using Profiler Plus. No detectable inhibition to PCR amplification was observed. Results from replicates out to 6 months as well as results from degraded DNA samples will also be presented.

## The Zodiac Killer

*Mike Taylor*
*Reporter, San Francisco Chronicle*

In the 33 years since the killings, the San Francisco Police Department has amassed enough evidence and leads to fill an entire filing cabinet. Today, fewer than half of the envelopes sent by the killer remain, the rest having disappeared during three decades of handling by hundreds of local, state and federal investigators. The department's DNA testing unit is testing the envelopes using a DNA technique known as polymerase chain reaction, or PCR, which can develop a genetic profile from as few as 50 human cells. A genetic profile would allow investigators to search for a match among the hundreds of thousands of genetic profiles of known criminals in national databases - as well as among the possible suspects listed in the department's Zodiac files. The lab has found a partial DNA "fingerprint" on one of the envelopes, but not enough for definitive matching. However, a Primetime investigation prompted the discovery of three envelopes that offer new hope. The envelopes were thought to have been lost, but an anonymous Primetime source - a long-retired investigator - found them, in mint condition, during a search of his personal files and turned them over to the San Francisco police. "The potential is exciting," said Dr. Cydne Holt, supervisor of the San Francisco Police Department's DNA lab. "If there are cells on those envelopes, we will get the DNA from them and get an answer. ... The prospect of being able to contribute to the story is exciting."

## No Body Investigation and Homicide Prosecution: The *Christie Wilson* Case

*Garen Horst, DDA*
*Placer County District Attorney's Office*

The successful investigation and prosecution of a murder case where no body was recovered is presented. Actual exhibits from the jury trial will be shown, along with a narrative of the forensic evidence collection, processing and interpretation that proved so useful in this case. —*Ed.*

## The Recovery, Characterization and Assessment of Contact DNA Collected From Firearms Using a qPCR Triplex Method and STR Analysis

*Pamela Hofsass*
*UC Davis Forensic Science Master's Program*

Contact DNA describes a transfer of cellular material onto the surface of any item handled by a person. The objective of this study is to determine how much DNA can be expected to be found on trigger, slide and grip swabs taken from firearms under ideal conditions using standard casework methodology. Additionally, does the DNA profile detected reflect the profile of the last person who handled this firearm?

Forty-four recruits from the SFPD Police Academy provided their handled firearms for sampling after a required shoot at the Police Range. These firearms (all model P226 SigSauer 40 cal handguns) were immediately sampled after the last round of fire using sterile cotton-tipped swabs. Two sets of samples were collected; Set 1 from 22 recruits provided grips and trigger areas samples. Set 2 from 22 recruits provided grips, trigger and slide area samples. All samples were extracted using a standard organic phenol extraction method at the DOJ Jan Bashinski DNA Lab in Pt Richmond, CA. All extracts were analyzed using a DOJ-based RT qPCR Triplex method followed by Profiler Plus AmpFlSTR(tm) amplification and typing system. DNA was successfully recovered from all three areas targeted for sampling; grips, trigger and slide. Genetic analysis data was described in qualitative terms of profile recovered (e.g. - Full, Major/Minor, Mixture, Partial and No Profile). Data will be presented in terms of correlation between sampling sites, qPCR results versus ng DNA recovered as well as Profile obtained versus qPCR THO1/CSF Ratio. In addition, collection techniques and suggestions for potential future studies will be discussed.

## Hurricane Katrina Forensic DNA Co-Op

*Amanda Sozer, Ph.D.*

The presentation will provide the audience information on the Hurricane Katrina mass fatality DNA identifications and the forensic cooperative that was deployed. Recommendations for implementing a large-scale DNA identification project in response to future mass fatalities will also be presented.

In August 2005, Hurricane Katrina devastated an area of the Unites States equaling the size of Great Britain. Over 1300 individuals lost their lives, many as a result of the flooding which occurred when the New Orleans' levies broke. The victims were identified by forensic methods. DNA played a major role in the identification of victims and was used exclusively in many cases where fingerprints and dental records were unavailable.

The DNA identification effort was challenging because many of Katrina's missing victims lost their identifying personal reference items in the disaster. Personal reference items such as toothbrushes, clothing, and hairbrushes which could contain the victim's DNA were destroyed by the flooding. In addition, biological family members whose DNA could be used to make kinship identifications were evacuated to locations throughout the country and relocated multiple times following the storm. Locating and contacting family members was difficult and made the collection of the family reference samples difficult. Inconsistencies between reported and actual genetic relationships added to the complexity of the project. Genetic pedigrees were constructed for each reported missing and complex kinship analysis was performed to identify the victims in the majority of cases. Forensic DNA Analysts from Crime Laboratories across the United States participated in a Forensic DNA Co-Op to assist in the DNA identification effort. In addition, Genetic Counselors from 80 institutions volunteered to work with the families. By using lessons learned from previous mass fatality DNA responses, once funding was obtained, DNA identifications were made accurately and rapidly.

It is important to incorporate the lessons learned from the Hurricane Katrina DNA identification effort into future mass fatality response plans. Recommendations will be made for a possible future forensic cooperative.

## Forensic Odontology (Dentistry)

*James D. Wood, D.D.S.*
*Cloverdale, CA*

Forensic Odontology can be a valuable tool for the Criminalist. Forensic Dentistry has been used for human identification for many years and is well accepted for accuracy, time, and cost to law enforcement agencies. In addition, forensic odontology can be used for the analysis of bitemarks - human and animal. This presentation will provide an overview of current forensic dental techniques and their application.

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# Evaluation of Microbial Community Profiling for the Forensic Characterization of Soil Evidence: A Pilot Study

*Gabriel Llinas[1] and George Sensabaugh[2]*

Soil is a ubiquitous source of transferable physical evidence and has proven useful in a variety of forensic contexts. Traditionally, the analysis of soil evidence has focused on the physical and chemical properties of the soil itself. A variety of approaches have been used, including color comparisons, characterization of soil particulates by sieving or on density gradients, mineralogical classification, elemental composition, palynology, and stable isotope ratios; many of these approaches were reviewed in a Forensic Soil Examination Workshop at the October 2006 CAC Seminar.

A potentially promising new approach to forensic soil evidence analysis follows from observations by soil scientists over the past decade demonstrating that the bacterial and fungal species inhabiting the soil microbial community vary qualitatively and quantitatively from site to site [1]. The characterization of microbial communities in soil entails DNA profiling technologies already available in forensic laboratories and the potential of using these methods for the forensic characterization of soil evidence has been discussed [2-4]. Horswell et al, for example, describe a case simulation in which the microbial community DNA profile from soil on an "evidence" shoe was far more similar to the profile from soil taken from the shoeprint impression in the ground than either was to the profiles of unrelated soil samples taken from other nearby sites [2]. Examples such as this, though suggestive, don't provide the basic foundation required to translate the microbial profiling approach into general forensic practice. To demonstrate the general utility of the approach, there needs to be a systematic evaluation to assess the power of the technique to differentiate profiles from different sites and to link profiles from sites in geographic proximity. Specifically, we need to (a) define what differentiates profiles that are significantly similar and those that are not, (b) assess the risk that soil samples taken from unrelated sites will have similar profiles, and (c) determine whether it is possible to definitely exclude samples as having a common source. Operationally, these points can be addressed by evaluating the relationship between some measure of similarity and geographical proximity.

We describe here a pilot study to evaluate the similarity-proximity relationship in a large existing database of soil microbial DNA profiles. The advantage of using an existing database rather than generating the profile data ourselves is that we can evaluate data from a much larger and more diverse set of geographic sites; the main disadvantage is that we have to work with the sample collection design of the database originators. The database we have used for this study consists of DNA profiles for ascomycete fungi present in soil samples collected from 1536 plots distributed over 24 geographically dispersed sites in Sturt National Park, New South Wales, Australia. The samples were collected as part of an ecological study of macro- and micro-biota in this warm and arid region of Australia [5]. The microbial database was characterized in ecological terms by Green et al. [6] and Prof. Green provided the database to us for this study. The 24 sites are separated by distances ranging from a few km to over 100km and represent four distinct land systems, each with a characteristic geology, topography, and native flora. Each site was sampled on a spatially explicit nested design within a 750x750m site grid (figure 1); 64 samples were collected per site. This sampling design allows distances between samples to be determined.

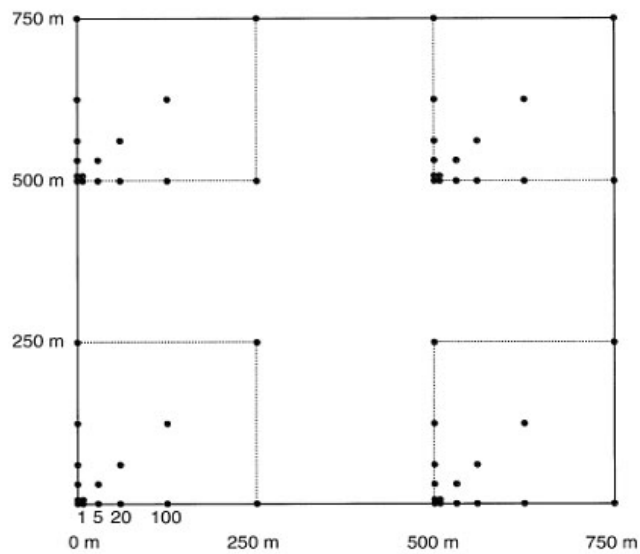


*Figure 1: Sampling grid for soil collection at study sites; samples were collected at 24 sites in Sturt National Park (reference 5)*

The details of sample collection and DNA isolation are described in Green et al. [6]. Sample profiles were generated by automated ribosomal RNA intergenic spacer analysis (ARISA), one of several commonly used techniques for microbial community DNA profiling [7]. PCR was used to amplify the spacer region between the 18S and 28S ribosomal RNA genes of ascomycete fungi. Portions of the ribosomal gene complex sequence are sufficiently conserved across microbial species such that a single pair of PCR primers ("universal primers") can be used to amplify sequences from a wide range of species. The length of this spacer region varies among microbial species and electrophoretic separation of the PCR amplicons, according to size, yields a DNA profile consisting of one or more peaks in which peak positions indicate

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[2]Professor of Forensic and Biomedical Sciences, School of Public Health, UC, Berkeley, and Forensic Science Graduate Group, University of California, Davis.

the species groups present in the microbial community and peak heights reflect the abundance of those species groups.

The DNA profile database was provided to us in an Excel format with samples indexed on the geographic location of the site and the position in the site sampling grid. DNA profiles are represented as binned data with peak information distributed into 69 amplicon size defined bins covering the range 130-568bp. Table 1 provides some summary statistics on the database and figure 2 illustrates graphically the patterns of bin occupancy for the 64 samples at one site.

*Table 1: Database Summary Statistics*

| | Total Database | Site 10 |
|---|---|---|
| Total number of samples | 1536 | 64 |
| Samples with profiles | 1348 | 64 |
| Number of bins occupied per sample | | |
| Range | 1–13 | 1-11 |
| Average (SD) | 4.7 (2.5) | 6.4 (2.3) |
| Frequency of bin occupancy | | |
| Range | 0–534 | 0-35 |
| Average (SD) | 92.7 (147.7) | 5.9 (10.2) |
| Mean difference between samples (# bins) | 7.2 | 8.3 |

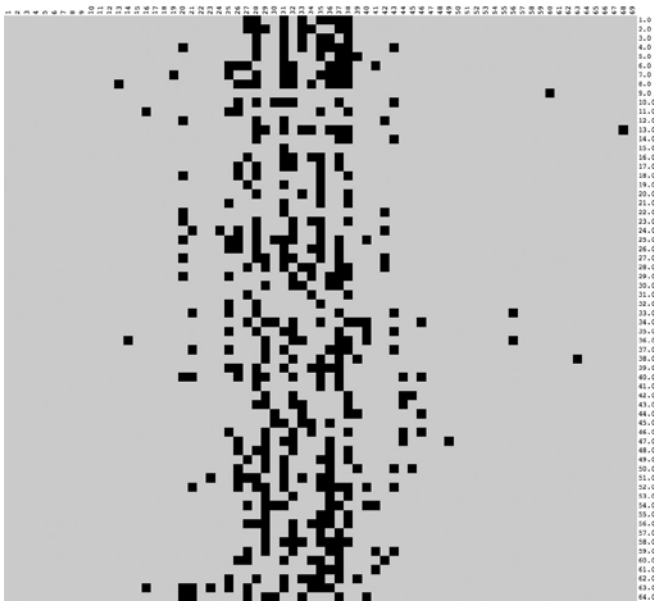

*Figure 2: Distribution of occupied bins in the 64 samples from site 10. Samples are represented in rows and the filled spots indicate occupied bins.*

For simplicity, we describe here the results of analyses on the 64 sample profiles from just one of the 24 sites, site 10; this sample subset yields 2016 pairwise comparisons and is far easier to describe and illustrate than the over 1,000,000 pairwise comparisons possible from the whole database. Summary statistics for site 10 are shown in table 1. As shown in the figure of the sampling grid, there are, within each site, four 1x1m square plots sampled at the corners. As a simple test for evaluating the power of DNA profiling to link physically proximate samples and distinguish more distant samples, we have used several statistical approaches to compare the degree of similarity between the four profiles in each of the 1m plots to the overall similarity relationships among the 64 samples from the site.

The Sorensen similarity index is a commonly used measure of the similarity between samples; this index is used in a variety of contexts, from the comparative assessment of species diversity at different sites in ecological studies to the comparison of peak profile patterns in chromatograms and electropherograms. This index assesses similarity based on categorical data (i.e., bin occupied, bin empty) and is defined as the ratio of shared occupied bins between two samples to the average number of occupied bins in the two samples. Sorensen indices for the 2016 pairwise comparison among the 64 samples were calculated using the software package EstimateS 8.0 [http://viceroy.eeb.uconn.edu/estimates]. The average Sorensen indices between the 4 samples in each of the four 1m plots were, in descending order, 0.73, 0.52, 0.43, and 0.34; these index values compare to the average index over the whole site of 0.33 ± 0.19. It is to be noted that four of the six pairwise comparisons for one of the 1m plots had index scores in the top 1% of the 2016 index scores for the total site. In the same score range, however, were 18 pairs of samples of which all but two were separated by 50m or more. Thus, by this measure, samples from one plot could be associated, samples at the other three 1m plots would not be associated, and some number of samples from different plots within the same geographic range might appear to be associated.

Because the classic Sorensen index does not take into account quantitative variation such as peak height differences, it provides an incomplete measure of the similarity between samples. To compensate for this deficiency, similarity indices incorporating quantitative data have been developed for use in ecological studies. Two of the most popular are the Bray-Curtis index and the Morisita-Horn index [8]. Computation of the values for these two indices showed the Morisita-Horn index to be the more discriminating index, but again only the samples from one of the 1m plots were clearly distinguished from the 64 sample background. Interestingly, only two of the six pairwise comparisons from this plot were in the top 1% of index values but one pairwise comparison from each of two other 1m plots were included. As before, the top 1% of index values for both indices included a number of sample pairs that were not in close physical proximity within the 750x750m site grid.

Cluster analysis based on Pearson correlation statistics provides a purely statistical approach to sample comparison. Cluster analysis was performed on the site 10 data using the statistics software package STATA with the result shown in the dendrogram in figure 3. Samples from the 1m plots are identified by the * symbol, the number of *'s distinguishing the 4 plots. Using a Pearson correlation measure of 0.8 as a threshold, seven sample clusters are identified. Of these, only one cluster containing three samples links samples from a 1m plot; these samples are from the same plot identified previously using the ecological index measures. The remaining sample from that plot is located on an altogether different branch of the dendrogram. Most of the samples from the other three 1m plots fall on different branches of the dendrogram and are not connected even at the 0.6 correlation measure. Thus the cluster analysis yields results consistent with those obtained with the several ecological similarity measures.

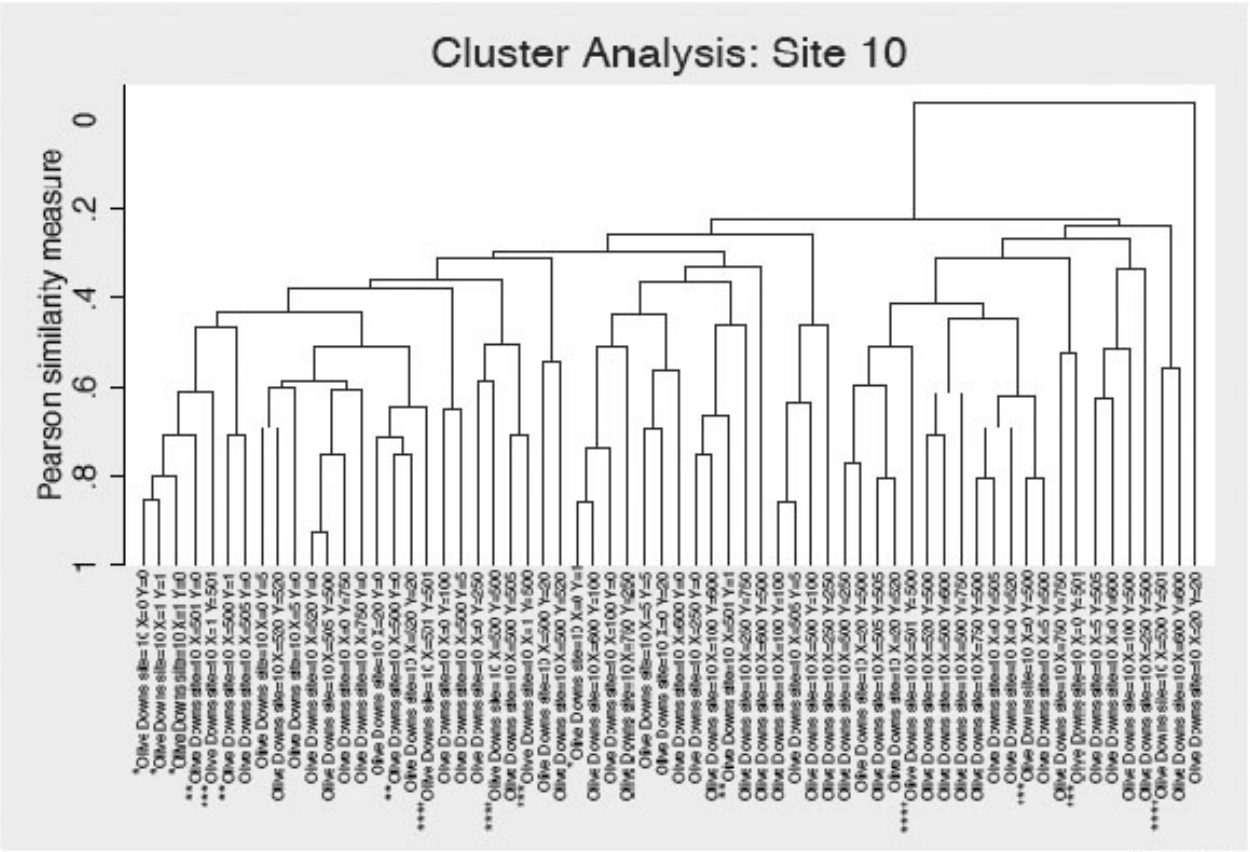


*Figure 3: Cluster analysis of samples from site 10. Samples from the 1m plots are designated by *.*

To get a clearer picture of the nature of diversity within the site 10 data, we subjected the data to principal components analysis (PCA). This is a commonly used approach for data simplification; it also allows assessment of the contribution of each variable to the total variance in the database. The multiple input variables in the database are transformed into a new set of variables, "components", with the objective of capturing most of the variance in the database in a relatively small number of components. For data in which a number of the input variables are correlated, 75% or more of the total database variance can be captured in 2 or 3 independent components and plotting the sample points along the principal coordinates will tend to cluster related samples. The results of the PCA on the site 10 data are shown in figures 4 and 5. Figure 4, a graph of the cumulative proportion of the total variance captured with the addition of each component, shows that the database variance cannot be reduced to a few components; the first 2 components capture only 18% of the variance in the data. Figure 5 graphs the 64 sample points on the first two principal components; clearly there is no clustering of the 1m plot sample points.

The several analyses described here for site 10 are representative of our finding for the whole database. Although the results are discouraging on their face, we think it premature to reject microbial community DNA profiling as a possible tool for the analysis of soil evidence. The nature of the soil in Sturt National Park, the origin of our database samples, is not typical of the general range of soils that might be encountered as evidence. As it turned out, these soils turned out to be relatively species poor, at least with regard to the ascomycete fungi that were the targets of the profiling effort. It may be that soils must exceed some threshold of species richness for reliable profiling. Moreover, the fact that the database focused on a particular group of fungi may also have tilted our findings toward poor comparison outcomes. It may be that targeting other microbial species groups or, for that matter, the broad range of all microbial species, might provide a better base for comparing soil samples. In short, we believe that considerably more foundational research is required before we can embrace or reject microbial community DNA profiling as a viable approach to the analysis of soil evidence.

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REFERENCES

1. Hughes Martiny, J.B., Bohannan, B.J.M., Brown, J.H., Colwell, R.K., et al. (2006) Microbial biogeography: putting microorganisms on the map. *Nature Rev. Microbiol*. 4: 102-112.
2. Horswell, J., Cordiner, S. J., Maas, E.W., Martin, T.M., Sutherland, K. B. W., Speir, T. W., Nogales, B., Osborn, A. M. (2002) Forensic comparison of soils by bacterial community DNA profiling. *J Forensic Sci* 47:350–353.
3. Heath, L.E., Saunders, V.A. (2006) Assessing the potential of bacterial DNA profiling for forensic soil comparisons. *J Forensic Sci* 51:1062-1068.
4. Moreno, L.I., Mills, D.K., Entry, J., Sautter, R.T., Mathee, K. (2006) Microbial metagenome profiling using amplicon length heterogeneity-polymerase chain reaction proves more effective than

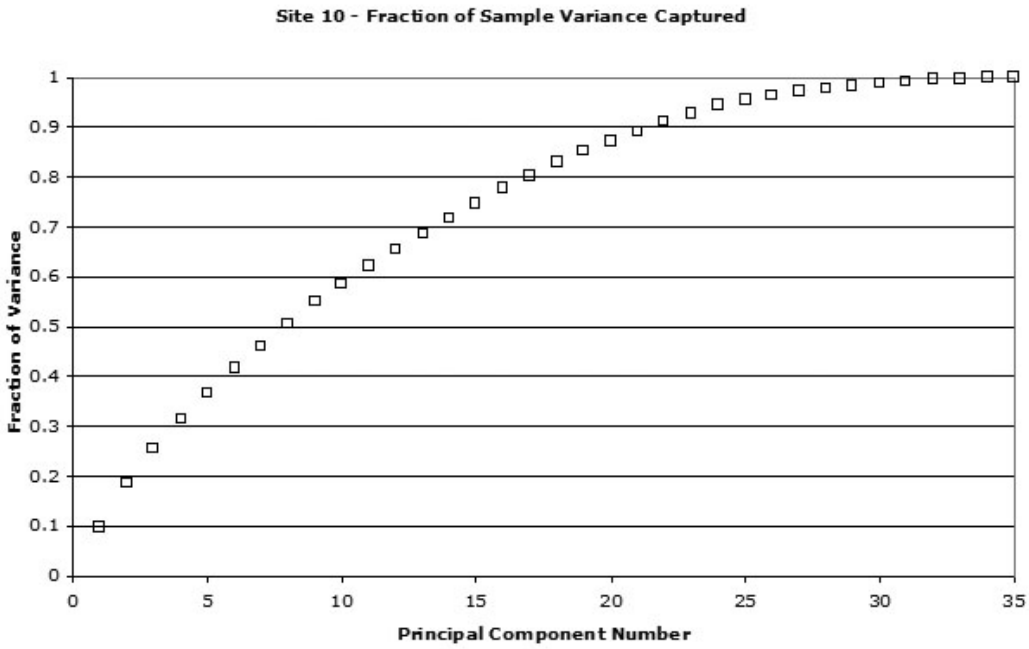


*Figure 4: Cumulative fraction of database variance captured by each component.*

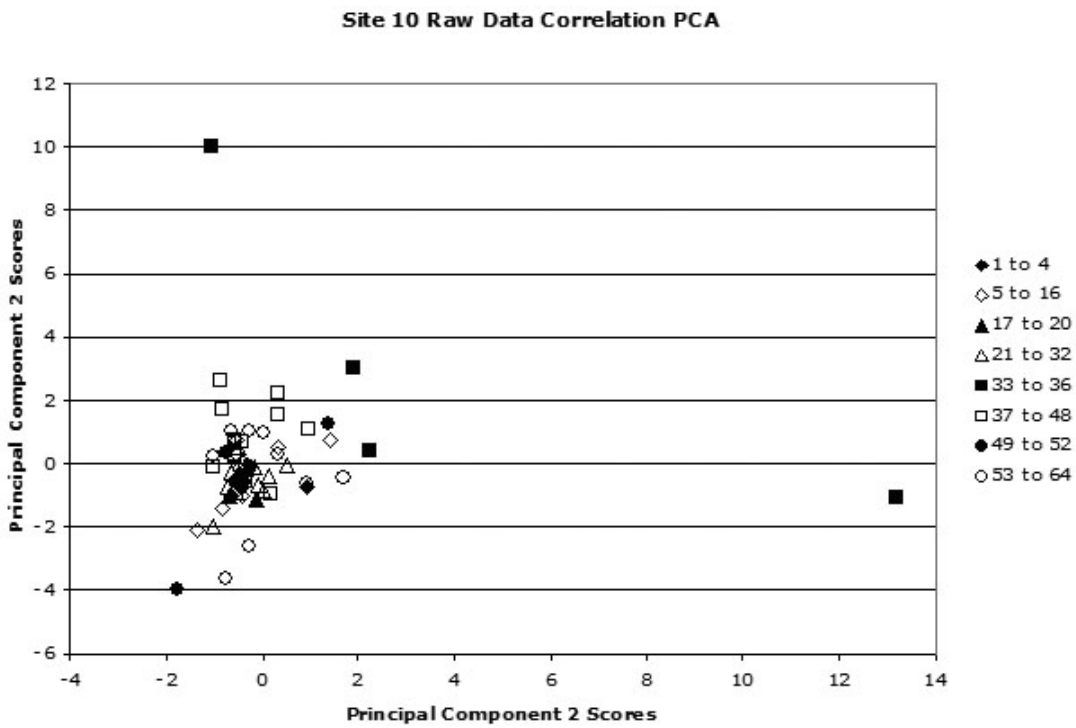


*Figure 5: Site 10 sample variance on the first 2 principal components. Filled symbols represent samples from the 1m plots.*


elemental analysis in discriminating soil specimens. *J Forensic Sci* 51:1315-1322.

5. Oliver, I., Holmes, A., Dangerfield, J. M., Gillings, M., Pik, A. J., Britton, D. R., Holley, M., Montgomery, M. E., Raison, M., Logan, V., Pressey, R. L., Beattie, A. J., (2004) Land Systems as Surrogates for Biodiversity in Conservation Planning. *Ecol. Applications*;14:485–503.
6. Green J.L., Holmes A.J., Westoby M., Oliver I., Briscoe D., Dangerfield M., Gillings M., Beattie A.J. (2004) Spatial scaling of microbial eukaryote diversity. *Nature* 432:747-750
7. Ranjard, L., Poly, F., Lata, J. C., Mougel, C., Thioulouse, J., Nazaret, S. (2001) Characterization of Bacterial and Fungal Soil Communities by Automated Ribosomal Intergenic Spacer Analysis Fingerprints: Biological and Methodological Variability. *Appl Environ Microbiol* 67:4479–4487.
8. Magurran, A. E. (2004) Measuring biological diversity. Blackwell.

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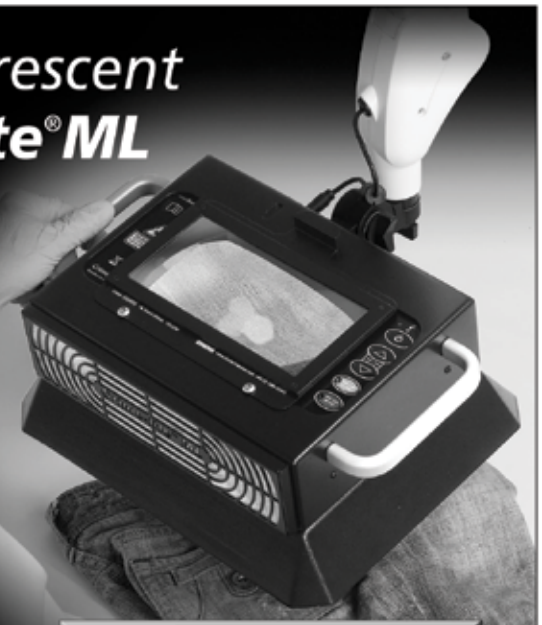

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# CAC Spring 2008 Seminar

## Planned Events

Keynote Speaker

Brian Ford

Brian J. Ford is an independent English scientist, a prolific author, and a popular interpreter of scientific issues for the general populace. He has published many works on the development of the microscope and has recreated many of the experiments carried out by pioneering microscopists. Ford has lectured in many countries and has been active in the diplomatic and political world.

## Planned Workshops

**Fire Scene Investigation (2 days)**

Instructor: John De Haan

**Crime Scene Reconstruction (1 day)**

Instructor: Tom Bevel

**DNA Workshop (1 day)**

## Planned Activities

Sunset Cocktail Cruise
Wine and Cheese Reception
Banquet Luau

San Diego
Spring 2008