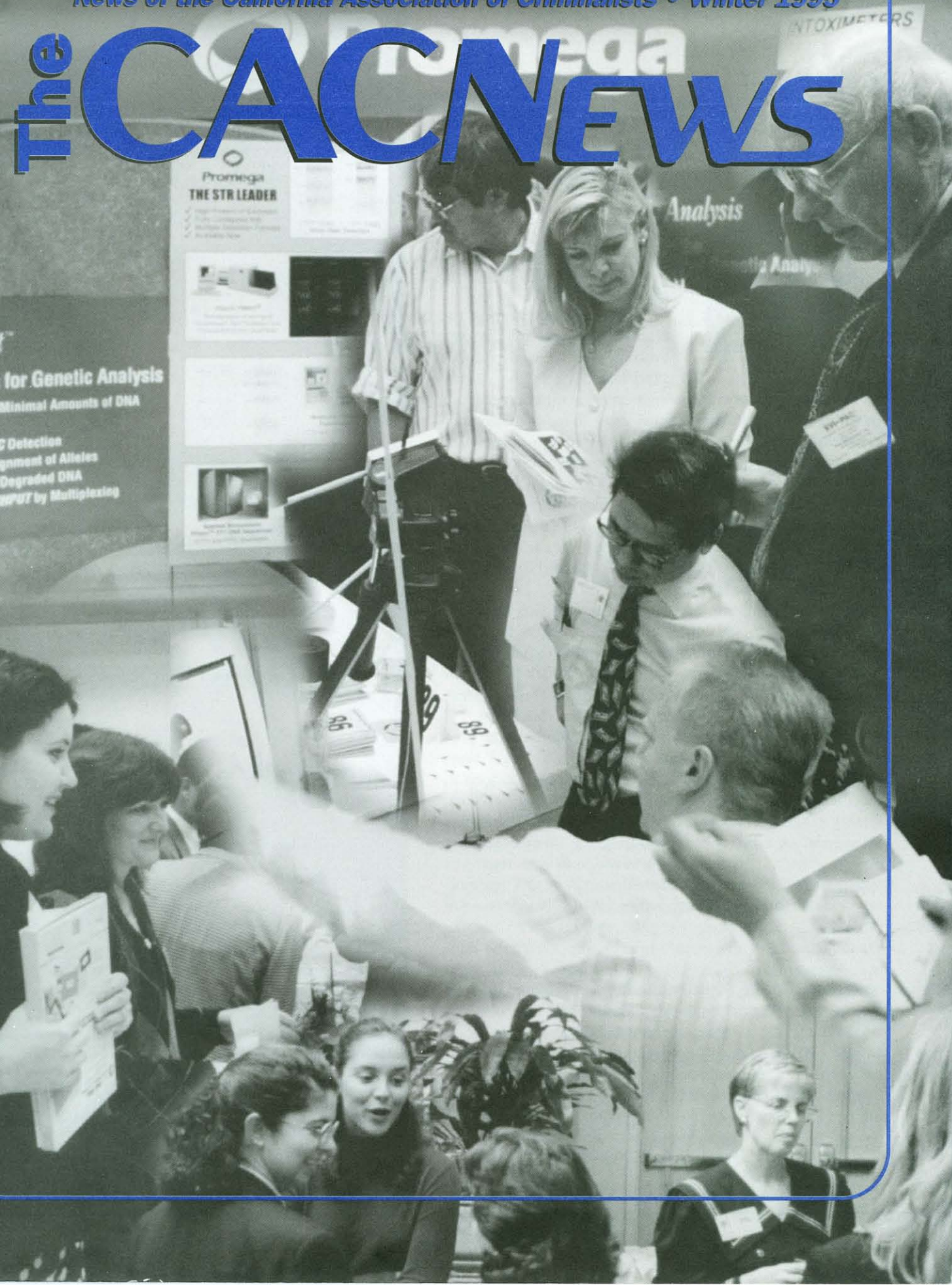


News of the California Association of Criminalists • Winter 1995

# the CAC News





# The President's Desk

Carol Hunter

For all of you that were unable to attend the *excellently produced* Fall '95 meeting in San Pedro, here are my thoughts given at the Friday evening banquet.

**Something to think about...Was this the "Year of the Criminalist?"**

In the past year the term "Criminalist" and all that we embody has become a household term. Before that, I had

to re-explain to my parents, friends, acquaintances the meaning of the word and encourage them to remember *criminalist* not *criminologist*. "We are the non-biased scientists who collect, analyze and testify about physical evidence in criminal cases", I would tell them. What has been portrayed to the public about *criminalists* during the past year? 1) Most certainly the viewpoint of a small subset of attorneys playing a strong advocate role, and 2) whatever skill and style each criminalist displayed during their time on the witness stand.

What do you think the greatest impact was upon the American public? The image conjured up by the attorneys or the image of the criminalist with the best expert witness testimony skills. *Where was our criminalistics "Knight in Shining Armor?"* Where was our spokesperson supporting our profession? —and— Where do we go from here?

I would like to see our profession become more proactive in our public relations. The CAC is and has been one of the most politically active forensic organizations in the country. We have been a leader in forensic serology quality assurance, and we have issued opinion statements in support of electrophoresis during the *Kelly-Frye* days challenging this technology. We saw a void with regard to any quality assurance guidelines for PCR—DNA technology and ultimately worked together with TWGDAM to write the PCR QA Guidelines. We have worked on an *amicus curiae* ("friend of the court") brief in support of the general acceptance of electrophoresis and now on DNA technology. We initiated the first certification program and we are active participants in the ongoing process of producing and maintaining not only the national General Knowledge Exam (GKE) but also the specialty exams. We have two excellent training mechanisms in this state —CCI and the training organized through the Training and Resources committee. The list goes on.

*continued on page 22*

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California  
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# Winter 1995



## On the cover...

Scenes from Fall Seminar '95, held in San Pedro, hosted by the Los Angeles Police Dept. Crime Lab, Joe Hourigan and Larry Blanton, Co-Chairs.

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## Notice to Contributors

This newsletter publishes material of interest to its readers and is pleased to receive manuscripts from potential authors. Meetings and course announcements, employment opportunities, etc. are also solicited. Advertisements are also accepted, although a fee is charged for their inclusion in The CAC News. Please contact the Advertising Editor for further information. Because of the computerized typesetting employed in The CAC News, submissions should be made in the form of IBM or MS-DOS compatible files on 5.25 or 3.5 inch floppy disks (high or low density). Text files from word processors should be saved as ASCII files without formatting codes, e.g. bold, italic, etc. An accompanying hardcopy of the file may be submitted along with the disk to illustrate the author's preference for special emphasis. Graphics, sketches, photographs, etc. may also be placed into articles. Please contact the Editorial Secretary for details. FAX submissions are also acceptable. The FAX number for the Editorial Secretary is (408) 298-7501. The deadlines for submissions are: December 15, March 15, June 15 and September 15.

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## BOD Candidates Sought

The CAC Board of Directors will have the following openings for the 1996 year: President Elect, Secretary, Membership Secretary, Regional Director North. Contact **Jennifer Mihalovich**, Nominating Committee

## New Member Reception—A SUCCESS!

At the Fall '95 CAC Semi-Annual meeting in San Pedro, CAC President **Carol Hunter** hosted the first New Member Reception. This was a wonderful success. Members of the CAC Board of Directors and committee chairs gathered to meet new CAC members. The room bubbled with conversation where those present ranged from new members as of the Spring '95 meeting to Life Member **Ed Miller**. Several new members were launched into their CAC careers by enlisting for a committee. The second New Member Reception will be held at the Spring '96 meeting in Santa Clara. To all the new members, Board of Directors and committee chairs: "See you there!" Look for the first "New Member Orientation" at the Spring '96 meeting in Santa Clara.

## Forensic Scientist Wanted

Qualifications include knowledge and experience in forensic principles, practices, procedures and techniques used in the examination of physical evidence such as GSR by SEM and AA, trace evidence microscopy, fire debris analysis, bloodstain pattern recognition, etc. A bachelor's degree in physical, natural or forensic science is required. Must be able to interpret analytical results, prepare written reports and be court qualified to present expert testimony. Please send resume to California Laboratory of Forensic Science/Cal Lab, 3890 Prospect Ave., Suite A, Yorba Linda, CA 92686.

## Eff Why Eye

If you have course announcements, etc. that you think would be of interest to the membership, note our next issue deadline for submissions is March 15th. Please allow up to four weeks for publication.

## Regional Director South

The 1995 Fall Seminar is now in the record books. Whether one finds it fortuitous or ironic, I think that all who attended would agree that the LAPD Crime Lab provided a highly professional and informative meeting despite being harangued over the "trial of the century." Perhaps because I was intent on observing how LAPD handled the glare of public and peer opin-

ion, I was blind-sided with a colleagues' simple question, "Where was the CAC during the incessant din of 'experts' (lawyers) hired to 'analyze' the scientific evidence for the media?" I shrugged the question off, but it left me pondering the role of professional organizations in promoting their own opinions. To what degree should the Association involve itself? While I don't think the Association should hold press conferences, I do believe it should be involved with shaping opinions about the use of scientific evidence. In fact, the Board of Directors recently supported two actions which directly reflect this proactive stance. The first was a letter from **President Hunter** urging the DNA Advisory Board to utilize the many resources already in place to promote laboratory accreditation, analyst certification, quality assurance and proficiency testing. The second action was a vote to expend CAC funds to write and file an *amicus* brief in support of DNA testing in the *Venegas* case now before the California Supreme Court. Both actions are clearly promotional messages, the type of messages I hope to see more of in the future.

\* \* \*

**Southern Section Fall Activities:** Dinner Meeting (San Diego PD and San Diego Sheriff; **John Simms** and **Marty Fink**). Guest speaker was Dan Lamborn, Deputy DA, San Diego, spoke on the Kenneth Bogard serial rapist case. Lab Tour of New San Diego Sheriff Lab (Marty Fink).

**Study Groups:** *Trace Study Group*, (**Wayne Moorehead**, **Penny Laferty**): Overview of the International Arson Symposium papers and panel discussion. **Jim Bailey**: review of Intermicro '95 held in Chicago, **John Houde**: research into soaps and detergents pertaining to chromatography in arson cases. **Marty Fink**: information regarding high explosives. **Tanya Dulaney**: new method for extracting/concentrating ignitable liquids by solid phase micro extraction. ASTM E1387-90 guidelines.

*Blood Alcohol* (**John Simms** and **Joe Jiang**) **Joe Jiang**: co-elution of ethyl chloride with ethanol. *Drinking Study*: "One Last Drink for the Road" regarding beer, wine, and hard liquors. Video on Long Beach DUI study.

*Toxicology* (**Dan Anderson** and **Chris Hargens**) -LAPD Officer Art Haversat presented "Signatures and Fingerprints: The Care and Feeding of Your DRE" regarding the role of the Drug Recognition Expert.

*Serology* (**Dean Gialamas**) Gc subtyping by IEF was discussed concerning spurious banding and sensitivity problems. The third in a series of video tapes "Against All Odds: Inside Statistics."

—Dave Stockwell



# Jobs • Meetings • Courses



## McCrone Microscopy Courses

- 101: Photomicrography - February 5-9, October 7-11, 1996
- 201: Applied Polarized Light Microscopy - October 16-20, November 13-17, December 11-15, 1995 and February 12-16, April 22-26, June 3-7, August 12-16, September 9-13, 1996 (Also in Hayward, California)
- 207A\*: Microchemical Methods - August 12-16, 1996
- 207B\*: Advanced Microchemical Methods - October 28-November 1, 1996
- 407B\*: TEM Asbestos Analysis - November 6-10 1995 and March 25-29, October 14-18, 1996
- 408\*: TEM SAED - May 6-10, 1996
- 501A: Identification of Small Particles - February 19-23, 1996
- 501B\*: Advanced Small Particle Identification - September 16-20, 1996
- 501E\*: Sample Preparation and Manipulation of Particles - November 27-December 1, 1995
- 502\*: Microscopy in the Food Industry - April 29-May 3, 1996
- 503: Pharmaceutical Microscopy - February 5-9, July 29-August 2, 1996
- 504: Forensic Microscopy - December 4-8, 1995 and April 8-12, 1996
- 505: Polymer, Fiber & Film Microscopy - November 6-10, 1995
- 505B\*: Microscopy and Microchemistry of Polymers - November 13-17, 1995
- 506: Microscopy for Art Conservators - October 14-18, 1996
- 508A: Microscopical Identification of Asbestos - October 9-13, October 23-27, November 27 - December 1, 1995 and January 15-19, February 26-March 1, April 15-19, May 13-17, June 24-28, August 19-23, September 23-27, 1996 (Also in Hayward, California)
- 508B\*: Advanced Asbestos Identification - December 4-8, 1995 and January 22-26, March 4-8, May 20-24, September 30-October 4, 1996 (Also in Hayward, California)
- 510: Forensic Soil Examination - October 14-18 1996
- 511\*: Wood and Pollen Microscopy - March 18-22, 1996
- 512\*: Special Asbestos Problems - July 29-August 2, 1996
- 514\*: Advanced Trace Evidence - (Hayward, California)
- 516: Asbestos Fiber Counting QOQSH 582 - October 2-6, December 11-15, 1995 and April 8-12, May 6-10, June 10-14, July 15-19, September 16-20, 1996
- 520B\*: Microscopical Study of Paints and Extenders - August 26-30, 1996
- 522\*: Microscopy of Explosives - October 30-November 3, 1995
- 523: Mineral Identification - August 5-9, 1996
- 526\*: Drug Identification - June 17-21, 1996 (Also in Hayward, California)
- 527B\*: Forensic Examination of Building Materials - March 25-29, 1996
- 528\*: Quantitative Asbestos Analysis - March 11 - 13, August 26-28, 1996
- 535\*: Microscopy of Sexual Assault Evidence - October 7-11, 1996
- 530\*: Microscopy of Environmental Dust - August 19-23, 1996
- 701\*: Computers in Microscopy - June 10-14, 1996 (Also in Hayward, California)

\*Prerequisite: course 201 or equivalent; 207A for 207B; 508A for 508B or 528; and 407A for 407B or 408. — Call or write Nancy Doerr, (312) 842-7100, for more information including tuition cost, McCrone Research Institute, 2820 S. Michigan Ave., Chicago, IL 60616-3292.

### TWGFIBE and TWGPAINT Info Available

Technical Working Group for Fiber Examination (TWGFIBE) and Technical Working Group for Paint Examination (TWGPAINT) minutes from the meetings have been for-

warded to the *Crime Laboratory Digest* for publication. A brief summary of each meeting will also be sent to all regional forensic organizations' newsletters. To receive issues of *Crime Laboratory Digest*, contact Denise Bennett, Managing Editor, *Crime Laboratory Digest*, FSRTC, FBI Academy, Quantico, VA 22135. You must use a business address to receive issues of *Crime Laboratory Digest*. For more information on TWGFIBE and/or TWGPAINT, contact Edward Bartick, FBI Laboratory, Forensic Science Research Unit, Quantico, VA 22135.

### Firearms Trajectory Interpretation

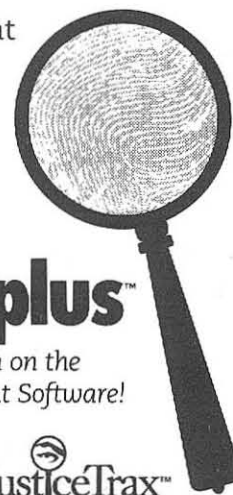
Sponsored by the Reed & Virginia McLaughlin Endowment, this CCI class is tuition-free to CAC members (\$50 materials fee charged). Instructor is Luke Haag; class scheduled Jan. 29-31, 1996. Contact Jerry Chisum (916) 227-3575.

### Criminalist Wanted—\$35,577

Tulsa PD seeks qualified person who obtains, examines, identifies and evaluates suspected evidence which may include blood, semen, hair, fibers, paint chips, glass fragments, fire accelerants, soils, drugs and blood alcohol. Contact Carla Noziglia, Tulsa Police Dept., 600 Civic Center, Tulsa, OK 74014. (918) 596-9218 or FAX (918) 596-1875.

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## It's OK Not to Feel Bad

Jerry Chisum

Those of you who were present on Saturday of the Walnut Creek Seminar heard Dr. Flint, Ph.D. discuss stress in his paper *"Stress: The Criminalist's Hazmat."*

As I listened to him speak, I thought there must be something the matter with me. He emphasized in his talk the "normal physical and psychological reactions to abnormal situations—" i.e. the stress associated with viewing dead bodies at a crime scene causes you to manifest various symptoms. Yet, I didn't have those symptoms after homicide investigations.

Is there something wrong, am I abnormal? Does the fact that I enjoy looking at crime scenes, either in person or in photographs, mean that I am *sick*? After 35 years, I find out that I do not have *normal* reactions to these "abnormal situations." I don't think so—however, how about you, the criminalist that has only now started to go to crime scenes or is anticipating going to scenes. Will you be subjected to stress or will you be one of us who does not have these symptoms.

### HOMICIDE DETECTIVES

This was not the first psychologist that I have heard speak on this subject. We had a S.F.P.D. psychologist speak to us as supervisors at DOJ a few years ago. He had the same message—we need to have counseling or other treatment for the stress we have due to the dead bodies we see. I approached him after his part of the program. I asked him if he really believed that seeing dead bodies at the crime scenes would cause extreme stress in everyone. He stated that he did. I then asked, "Why then do homicide detectives refuse promotions to stay in homicide?" His jaw dropped, "You're right they do, I never considered that."

We discussed some possible reasons for this. One is that there is a higher clearance rate for homicides than any other type of crime, there-

fore there is a high job satisfaction. Another is that these cases are interesting, cops like to talk about their cases with other detectives, the lab, the DA, etc. This is therapy, discussing the things you saw, getting them into the open rather than internalizing them. If you sit down for "war stories" with homicide detectives, you will find that the stories increase in the amount of violence or gore as the session continues.

There are those of us in society that may not react to the viewing of the dead involved in crimes in the "normal" manner. We see the crime scene as a puzzle, a mystery to be solved. The evidence, including the body, is to be examined for information that will assist us in the solution of this mystery. Homicide detectives (the ones that stay), criminalists, and, certainly, pathologists have members of this group.

### GO TO AN AUTOPSY?

A few years ago, I had a subordinate tell me that he had gone to an autopsy and fainted. I asked him why he had gone. He said he went to see if he would be able to take this part of the job. I told him he had no reason to go and that he should never go until he is involved in a case. Then he won't have a problem. A few months later he was called to a scene with seven people killed including four children. He attended the autopsies. He was describing the case to me and talking about what had happened, when I asked him if he fainted during the autopsies. He looked puzzled, then said, "No, I didn't even realize that the victims were people, they were evidence items."

### BIOFEEDBACK

I was at an ASCLD meeting at the FBI in Quantico a few years ago. The subject was stress. As part of an experiment, the speaker gave us some biofeedback dots to stick to the back of our hands. These dots change color depending on the blood flow to the hand. The amount of blood flow is known to be related to stress; the more stressed the less the blood flow.

After a break he changed the subject and started showing us some particularly bloody homicide cases. His lecture was about the circumstances of the cases. After several minutes and about 30 slides, he suddenly said for us to look at our biofeedback dots.

He wanted to know how many had gone up two or more stress levels. The answer was zero. One level? Zero again. The same level? A few. He looked very perplexed, I suggested that he ask how many had lost stress as indicated by the dots. About 90% had gone down one level, the rest of us had dropped two levels.

The instructor was shocked, he said in all the classes he had ever given, most persons had gone at least one level higher. He had no experience with a group that did not find his slide presentation stressful.

We had not been looking at the "horror" of the content of the slides. We had been looking at the slides to work through the problems presented and to learn what we could from the situations that were described. This was what we do. This was "our world" and it was familiar territory.

### AM I BOTHERED?

I do not mean to say that there are no homicides that have bothered me. I do not like the death of children. I could never understand why someone could do the things they do to someone so helpless and trusting. It even bothers me to look at photos of child victims. In those cases, I do seek a friendly, sympathetic, understanding person to talk to (like a homicide detective).

If you have any problems with these abnormal situations (homicides), you should take advantage of whatever counseling programs that are available. Don't be "macho" and try to hide these feelings. You can ruin your life by trying to overcome them on your own.

However, if you don't experience the symptoms of stress that were described by Dr. Flint after every homicide investigation, do not think you are abnormal. It's OK to not feel bad.





## Call for Nominations— Distinguished Member Award

The Awards Committee is actively soliciting nominations from the membership to add to this impressive list of Distinguished Members:

George Sensabaugh	1983	Dorothy Northey	1990
Jan Bashinski	1984	Edward Rhodes	1991
Edward Blake	1985	Peter Barnett	1992
Jim White	1986	John Murdock	1993
Jerry Chisum	1987	John Dehaan	1994
Lucien Haag	1988	Hiram K. Evans	1995
John Thornton	1989		

Any member of the Association may nominate another member for this award. Please use the form provided for your nominations. Nominations must be received by February 29, 1996.

**Distinguished Member Award Criteria:** 1) The candidate must be a member of the CAC in any category; 2) The candidate must have contributed significantly to the Association in one or more of the following areas:

a) Long term service to the Association as a member of the Board of Directors and/or in committee(s); b) Sustained production of papers or technical notes in newsletters or at seminars; c) Organization of study groups or workshops, etc; d) Significant research and dissemination of the information to the forensic science community (i.e. journal or newsletter publication, seminar papers, workshops, study groups, etc.); e) Any other unusual or significant contributions to the improvement of the profession of criminalistics.

### Nomination Form

Candidate:

Address:

Phone:

CAC Membership Status

Contributions: Please be specific when describing the contributions of this individual. For example, give dates of service and type of service to the CAC, full bibliographic information on papers, etc. Attach additional pages as required. If a curriculum vitae is available, please attach a copy to this form.

Name and address of nominating party:

Phone:

Additional references:

- 1)
- 2)

Please return completed forms to:

Ann Murphy, CAC Awards Committee Chair  
Sacramento County Crime Lab, 4400 V Street, Sacramento, CA 95817  
FAX 916-732-9620

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## From the Reader



"Yes, but did you know that..."

I have been described as being passionate about certain issues in forensic science, one of them being the use of microcrystalline tests. In a recent submission to a professional journal regarding this particular issue, it was recommended that I remove the passion from my article prior to publication. And that was the revised version! It was the one I wrote after buying a new keyboard for my computer. Seems the keys are not very tolerant of an individual punching on them. Reluctantly I agreed. But, for those that know me well, that does not translate into "Ron will never bring up the issue in other forums." Quite the contrary. I simply decided I would vent my passions elsewhere such as in newsletters as well as various forensic seminars across

Ronald G. Nichols  
Oakland Police Department Criminalistics Laboratory  
455 Seventh St., Room 608, Oakland, CA 94607

the country. One needs to vent. It helps alleviate stress in one's life.

A colleague recently sent me a touched up *Far Side* cartoon. This particular cartoon had a dinosaur speaking from behind a podium to a group of dinosaurs — the "Crystal Tests Club." The retouched caption read, "The picture's pretty bleak, gentlemen...The world's climates are changing, the *instrumentalists* are taking over, and we all have a brain about the size of a walnut." (The remark about the brain was a Larson original, not from my colleague.) Even though I am far too young to be considered a dinosaur, whenever I discuss the reliability of microcrystalline testing with those who do not use it, I feel that they look upon me as an old brontosaurus. Now don't get me wrong, it's not that I

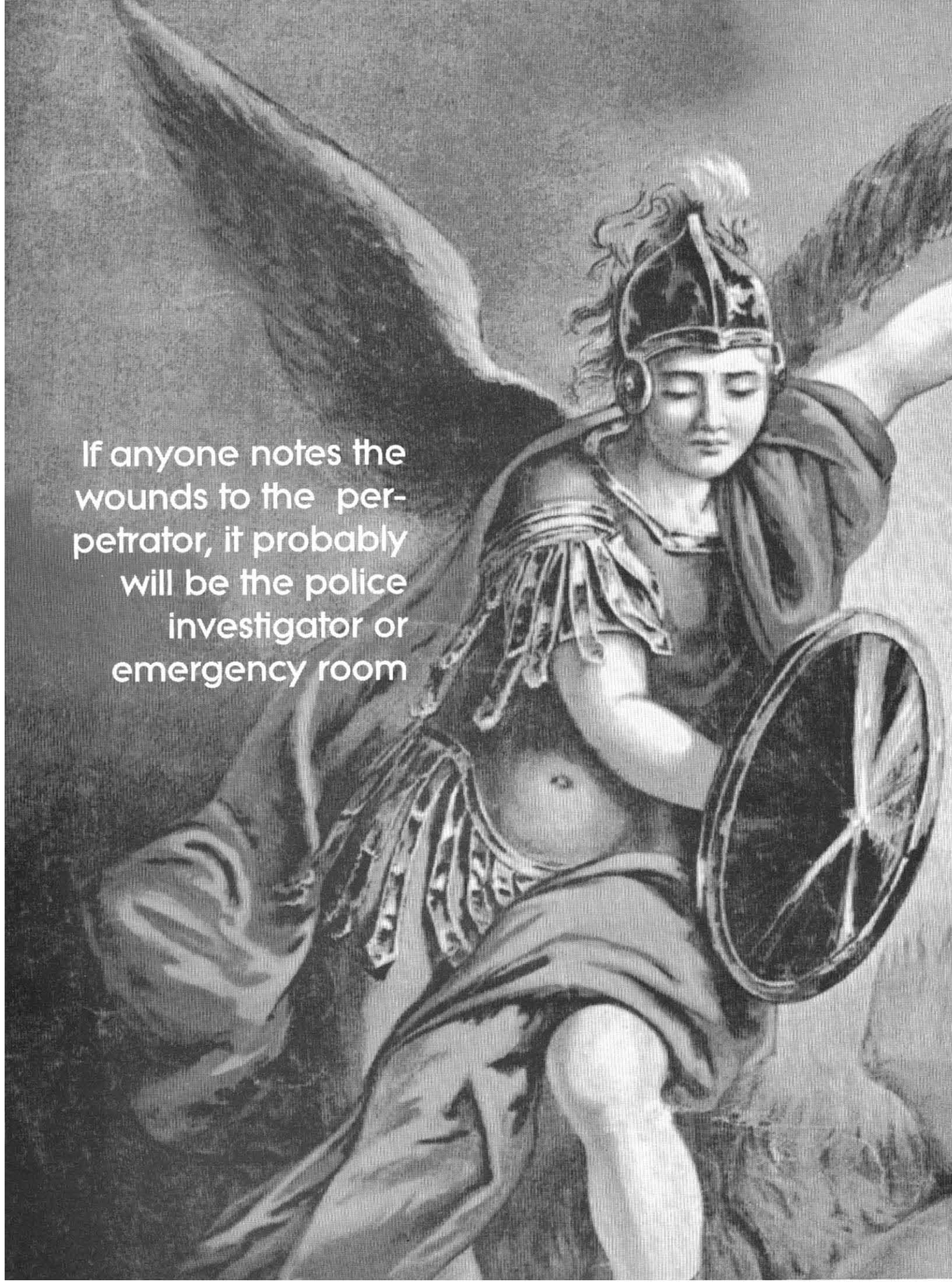
*cont'd on page 20*


### Where credit is due...

...for the photo of Edmond Locard's books on page three of the Fall '95 issue, which were graciously loaned by Paul Dougherty from his collection.



If anyone notes the  
wounds to the per-  
petrator, it probably  
will be the police  
investigator or  
emergency room





# SELF-WOUNDING OF ASSAILANTS DURING STABBING AND CUTTING ATTACKS

by Jim Varnon<sup>1</sup>, Max Courtney<sup>2</sup>  
and Thomas R. Eki<sup>3</sup>

Involvement by the authors in the investigation of homicides involving stabbings and cuttings has revealed a number of instances wherein the assailant also sustained some injuries during the struggle. Seven separate mechanisms for self-wounding by persons wielding knives or other sharp objects are proposed. A number of case histories are presented to illustrate the various mechanisms of self-wounding. Evidential implications are discussed.

## INTRODUCTION

The literature provides adequate descriptions of injuries to victims, including defensive injuries, caused by knives and other sharp instruments. (1,2) However, there appears to be a paucity of information concerning the self-wounding injuries sustained by the assailant during the attack. Brief descriptions are provided by Adelson (3); *"Occasionally the assailant is injured during the fracas ... A 'trail of blood' may be found during the investigation of a cutting or stabbing homicide, made either by the victim or the assailant."* A case history involving serial murderer William MacDonald, the 'Sydney Mutilator' of Australia, describes wounds to MacDonald. *"He cut his own hand badly, and had to go to a*

<sup>1</sup>Fort Worth Police Department, 305 W. Belknap, Fort Worth, TX 76102.

<sup>2,3</sup>Forensic Consultant Services, P.O. Box 11668, Fort Worth, TX 76110.



## Self Wounding

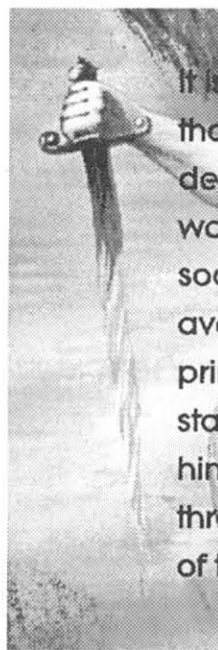
*hospital to have it stitched, claiming he had cut himself on a breadknife."*

(4) The authors have been involved in a number of cases wherein such injuries have occurred. In several instances, these injuries and the resulting physical evidence have proven of great consequence in the resolution of the case. A review of the exemplar cases gives rise to several physical mechanisms described below whereby such wounding could, and likely does, occur. If one considers the reasons for such a scarcity of information about this type of injury to the perpetrator, several possibilities come to mind. First, most forensic articles describing wound patterns are written by medical examiners; they generally see only the wounds of the deceased victim, and not the surviving assailant. If anyone notes the wounds to the perpetrator, it probably will be the police investigator or emergency room personnel; such notations are unlikely to find their way to publication in forensic journals. Also, perhaps the documentation of an injury to the suspect is viewed as counterproductive to the investigation, lending an air of sympathy or even giving rise to a self-defense claim. Possibly in some cases crime scene technicians are not adequately trained to analyze a crime scene fully and thus fail to recognize and collect evidence of injury to the perpetrator. In at least some cases, only after some time has passed do the injuries to the assailant become known, and perhaps it simply wouldn't occur initially to the scene investigator to look for evidence of such wounds. Finally, if some time has passed before discovery of the self-wounding, it is likely that in some cases poor communication simply would prevent the investigator or prosecutor from putting the two sets of facts together.

### THE KNIFE

The use of tools and weapons greatly precedes the recorded history of man. The archeological record establishes that Neanderthal man (c. 100,000 B.C.) used a pointed

stone spear head; and that Combe Capelle man (c. 35,000 B.C.) had developed a stone knife. The advent of the Bronze Age (c. 1400 B.C.) and the later Iron Age (c. 850 B.C.) brought about greatly improved weapons, including knives. (5) Hunting or combat knives are designed to protect the user. A guard is generally found between the blade and the handle (hilt), to prevent one's hand from slipping from the handle to the blade. Often a pommel or bolster is found at the handle's end to prevent the knife from slipping or being pulled from the user's hand. Much of the design history of knives as weapons is trapped in folklore. Probably the most famous fighting knife is the Bowie knife, whose exact origin is not agreed to by all. (6)



It is believed that the defendant wore the socks to avoid fingerprint[s] and stabbed himself through one of the socks.

One mythical account of its design is laid to Rezin Bowie, brother of Jim Bowie, who reputedly cut his fingers while plunging a knife into a heifer; hence the guard between blade and hilt commonly found on such knives. Another tale relates how Jim Bowie lost his grip on a knife during a hand-to-hand fight with a Native American, which led to the pommel at the end of the hilt. While knife legends abound, such design features are, nevertheless, important

to an understanding of the various methods by which an assailant could sustain self-wounding injuries, or avoid them, during an attack.

### MECHANISMS FOR SELF-WOUNDING

During a violent attack with a knife or similar sharp instrument with its ensuing struggle, there may be numerous opportunities for the assailant also to sustain injuries. By the very nature of such an assault, often with hand-to-hand combat and with multiple thrusts or slashes, it is quite difficult, or impossible, for the knife wielder to control each action. The following seven scenarios are proposed as possible causative factors in self-wounding.

**Mechanism 1:** While stabbing the victim, the assailant hits bone or otherwise resistant material. The abrupt stopping of the knife causes the assailant's hand to slide forward, allowing the hand gripping the knife to slide across the blade. Such a scenario typically would cause a slicing of the palmar surfaces of the hand or fingers. If the attack continues after the hand is cut, the presence of the assailant's blood on the knife handle reduces the gripping ability further, making even multiple self-wounding likely.

**Mechanism 2:** If the assailant wields the knife in one hand and tries to restrain the struggling victim with the other, it is possible that the assailant's hand on the victim will suffer a stab wound during the multiple thrusts. Such a stab wound would commonly be seen on the back of the hand or fingers or on the arm of the free hand.

**Mechanism 3:** If a folding knife without a locking blade, such as a jackknife, strikes a resistant surface, the knife blade can fold across the assailant's hand. Such an event would typically cause a guillotine-like knife-edge wound, either across the outer surfaces of the fingers or across the wrist or heel of the palm, depending upon the knife's orientation in the assailant's hand.

**Mechanism 4:** Due to the great momentum involved in a typi-

cal stab, the knife may be capable of becoming lodged in bone or connective tissue. If the assailant attempts to remove the knife during the continuing struggle with the victim, it is possible that the hands could grasp a partially-exposed knife blade, causing slicing wounds to the palmar surfaces.

**Mechanism 5:** In a slashing action with a knife or other sharp-edged weapon, a glancing blow against the victim or a complete miss may, by the weapon's momentum, cause a slash injury to the assailant. Because of the virtually limitless degrees of freedom in how this slashing motion may be delivered toward the victim, the resulting injury to the assailant could occur to almost any part of the assailant's anatomy.

**Mechanism 6:** Similarly, defensive actions by the victim may cause a redirecting of the weapon's arc into the assailant. Again, the variety of possible movements makes for a limitless list of injuries possible.

**Mechanism 7:** In a struggle for control of the weapon, the assailant may grab for the weapon. This could result in slicing wounds to the palmar surfaces of the hand or fingers of the assailant.

It can reasonably be seen that some of these mechanisms are directly related to the design of the knife used. The absence of a guard between the hilt and blade certainly makes Mechanism 1 more likely, since the presence of such a guard would prevent the slipping of the hand onto the blade when the knife abruptly stops. Obviously the folding blade is unique to jack knives and other pocket knives; injuries as related in Mechanism 3 would be possible only with such a knife. Also, the absence of a bolster on the end of the hilt would make extraction of a knife from a victim more difficult, possibly begetting actions similar to Mechanism 4. It would seem likely that, in some instances, a description of the types of wounds found on the assailant could be correlated with the murder weapon.

#### BLOODY PRINTS ON KNIFE BLADES

It is possible that the assailant may deposit bloody fingerprints or palm prints on the knife blade, in accordance with Mechanisms 1 and 4, above. The bloody fingerprints, of course, would be very damaging evidence in themselves if they were identified to the assailant, as would the blood, if it were associated with the suspect. Finding corresponding injuries on the hands of the suspect simply would provide additional evidence and would allow the investigator (and ultimately the jury) to better understand exactly what had happened during the assault.

#### ILLUSTRATIVE CASE HISTORIES

**Case 1:** The defendant was convicted of having murdered the victim by repeatedly stabbing her with a knife and bludgeoning her with a dumbbell. The victim was found lying across a bed. The dumbbell had come apart during the attack. Profuse blood spattering consistent with both medium-velocity impact spatter and cast-off tracks were found on and around the bed. All indicators made it apparent that the entire attack episode had taken place while the victim lay on the bed. Several feet away from the bed a pattern of dropped blood absorbed into carpet was discovered. The nature of this pattern was inconsistent with its having originated from any actions on the bed; the logical conclusion was that the attacker had injured himself and that this would prove to be his blood. Additional stains were found on the bathroom door, the vanity, and the bathtub. An open box of plastic bandages was noted on the vanity, and an empty bandage wrapper was found in the bathroom trash. Conventional serological characterizations of the stains on the floor excluded the victim, and subsequent tests showed the stains to match the defendant's blood. The defendant was arrested several weeks after the offense and his hands bore some healing wounds. He was convicted of murder and given a life sentence.

**Case 2:** The defendant was convicted of murdering his sister-in-law by multiple stabbing and cutting wounds during a sexual assault. After the attack he apparently placed his hands into the pockets of his denim pants. While numerous bloodstains from the victim on the defendant's clothing were identified by conventional serology and DNA analysis, the blood originally found inside his pockets was clearly consistent with the defendant. The defendant exhibited some fresh cuts on his hands, which he claimed were from his occupation. Further examinations of his pants revealed some additional bloodstains on the pocket flaps where they would be in contact with his lower torso. These stains were consistent with the victim and inconsistent with the defendant. The defendant was convicted of murder and was given a life sentence.

**Case 3:** The defendant was convicted of killing the victim by stabbing her and slashing her throat with a linoleum knife. Blood spatter consistent with medium-velocity impact spatter and with cast-off blood was found on the defendant's t-shirt. Conventional serological and DNA tests established the stains to be consistent with the victim's blood. Physical examination of the defendant upon his arrest hours later revealed a very fresh vertical cut on his upper right thigh, which he explained as being an old injury. The pants he allegedly wore during the attack were not recovered. Apparently no thorough search of the crime scene for possibly foreign bloodstains took place. No evidence of the defendant's blood at the crime scene was recovered. The defendant received a life sentence for the murder.

**Case 4:** Two defendants were charged with causing the death of a victim by stabbing him and slashing his throat with a throwing knife during a robbery. The body was wrapped in bed linens and carried into the garage, where it was loaded into the trunk of the victim's automobile. The body was dumped in



## Self Wounding

an isolated rural location. Examination of the crime scene showed evidence of some low-velocity blood dropping in a periodic fashion. At the scene where the body was recovered some bloodstained paper towels were found. Finally the victim's vehicle was recovered, and numerous transferred contact bloodstains were found. Fresh wounds were found on the hands of one suspect. Analysis of the bloodstains mentioned above showed blood consistent with one defendant on the garage floor, on the paper towels at the second location (co-mingled with the victim's blood), and on the car. (*Ed. note—when this case was subsequently tried, the codefendant testified that during the initial stab, the assailant reached around from behind the victim and stabbed his own left hand.*)

**Case 5:** The defendant was convicted of the stabbing deaths of two young women in their home. The victims together suffered approximately 100 stabs and cuts. Blood spatter examinations showed a path from one victim, downstairs, into a direction of obvious pursuit of the second victim, who was found upstairs. Cast-off and transfer patterns were found along this path. Beside the downstairs victim was found a pair of bloody socks with an apparent stab pattern. Numerous transfer stains, low-velocity stains and cast-off stains were shown by conventional serology and DNA analysis to be consistent with the defendant's blood. Additionally, a knife and some towels, all bloodstained, were found along the apparent escape route. DNA analysis established all of these stains to be co-mingled from the defendant and both victims. Similarly, co-mingled blood on the defendant's boots was consistent with all three persons. The defendant was found to have fresh knife-like wounds on his hands. It is believed that the defendant wore the socks to avoid fingerprint deposition and stabbed himself through one of the socks. By examining the areas where the defendant's blood was

found in the crime scene, it may be reasonably inferred that at least one bleeding wound to the defendant occurred during his attack of the first victim. The defendant was convicted of capital murder and sentenced to death.

**Case 6:** The defendant was charged with stabbing and slashing the victim outside a tavern. Wounds on the defendant's hands caused heavy bleeding. A clear track of blood was followed from the parking lot, along a sidewalk, across a busy highway, through a convenience store parking lot, and along a sidewalk to a telephone booth outside a second convenience store. The defendant was arrested at this last location, attention having been drawn to him by the cuts on his hands. Upon being confronted, the suspect gave a statement, wherein he claimed he had been attacked by the victim and had wounded the victim while defending himself. Subsequent investigation revealed that the defendant had purchased the weapon that same day. The defendant entered a guilty plea.

**Case 7:** A partially-clothed male victim was found deceased at the bottom of the stairs outside his apartment, having suffered between 45 and 50 stab wounds and cut wounds. The interior of the victim's apartment showed evidence of a violent struggle. The victim lived alone, and there was evidence that he and another person had been sitting at the dining room table drinking wine and smoking crack cocaine just prior to the stabbing attack. While investigators were at the scene, police were summoned to a grocery store less than a mile away, where a bleeding man had tried to get a ride in a taxi. This person bore deep cut wounds to the inner surfaces of all fingers of both hands. He denied being involved in the stabbing, but his fingerprints were recovered from a wine bottle and an ash tray in the dining room of the victim's apartment. The defendant entered a guilty plea and was sentenced to prison.

**Case 8:** The deceased female

victim was found lying about 100 yards from her abandoned car. She had received 47 stab wounds and cut wounds. Bloodstains in her car indicated that the stabbing episode had begun in the car. Defects resembling knife blade punctures in the driver's shoulder belt and ceiling headliner suggested that the victim was still wearing her seat belt when the knifing began, and that she fought with her attacker over the knife. Transferred bloodstains on the right front door and right front seat suggested that the killer had blood on his hands and had been in the car with the victim. Over a week later, a male was brought in for questioning. He bore an unsutured deep cut wound to the outside edge of the right little finger. Puncture wounds were observed on the back of the left hand. At first he denied any knowledge of the murder. When he was confronted with his fingerprints found on the right A-pillar and questioned about the cuts on his hands, he ceased to answer any questions concerning the murder. Later he came up with a story that he was in the murder car, but he blamed the stabbing on a third person and claimed he cut his hand while trying to take the knife away from the murderer. The jury found him guilty and sentenced him to life in prison.

**Case 9:** The defendant was convicted of stabbing the victim to death. Examination of the knife blade revealed the presence of a bloody latent print, which was enhanced with Coomassie Blue reagent. Comparison with known prints from the defendant showed the print was made by his right palm. The location of the area and the orientation of the identified edges showed that the print could have been made when the hand slipped from the handle onto the blade.

## DISCUSSION

The above cases provide some degree of documentation for the notion that knife-wielding assailants can and do injure themselves while

stabbing or cutting their intended victims. The proposed Mechanisms 1, 2, 4, and 5 are directly supported by the presented case histories. (Differentiation between 1 and 4 could be somewhat speculative.) While injuries to a defendant could be thought to indicate a possible self-defense motive, the proposed mechanisms offer several ways such wounding could take place in the absence of any aggressive behavior by the victim. Further, no evidence of self-defense was presented in any of the studied cases. It is seen that potentially valuable evidence can result when such an event occurs. If the evidence is recognized and is properly documented, collected, processed and interpreted, information about the identity of the assailant and about the chronology of events and the possible scenarios may be available. Three distinct areas of inquiry are worthy of consideration. First, the knife, if located, may have evidence that will connect it to the assailant. In addition to trace evidence and fingerprints, the blood should be compared with both the victim and the suspect. The serological testing protocol should allow for the possibil-

ity that there may be blood present from more than one individual. Photographic documentation of visible bloodstains prior to sample removal is recommended. Additionally, the suspect should be examined for cut or stab injuries that would be consistent with the weapon utilized. Such injuries should be carefully documented with photographs. It is suggested that medical attention, even if the medical need is marginal, will provide additional documentation by a medical expert who can adequately describe them, can gauge their severity, and may be able to estimate their age. Finally, the crime scene should be carefully searched for bloodstain patterns that are consistent with a bleeding assailant. Patterns away from the location of the victim, patterns out of the normal traffic patterns, and patterns consistent with cast-off stains are the best possibilities for finding blood from the assailant. Locating stains associated with the perpetrator are good evidence for identification of the suspect and also may provide vital information about the movements and actions of the perpetrator during the events in question. A useful

reconstructive analysis of the crime scene will, of course, require thorough documentation of the bloodstains that are present. All bloodstains that might conceivably have any bearing on the interpretation of the events should be collected and submitted for analysis.

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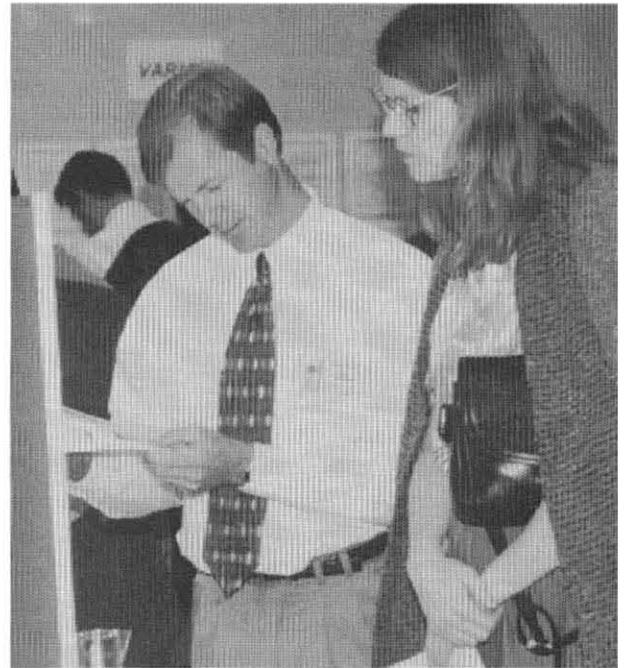
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## Vertical Compatibility of Short Tandem Repeat Polymorphic Typing Using Energy Transfer Fluorescent Primers

Jeanette M. Atherton Wallin<sup>1</sup>, Brooke A. Carpenter<sup>3</sup>, Yiwen Wang<sup>2</sup>, Jingyue Ju<sup>2</sup>, Richard A. Mathies<sup>2</sup>, and George F. Sensabaugh<sup>1</sup>

We have previously demonstrated the application of fluorescent dye-labeled energy-transfer (ET) primers to short tandem repeat polymorphism (STR) sizing using capillary array electrophoresis (CAE).<sup>1</sup> CAE offers rapid high-throughput typing on STRs but may not be readily available to smaller laboratories. In this presentation, we demonstrate the advantages of ET primers in STR typing on conventional slab gel typing systems such as those currently used in many forensic laboratories.

We have employed the STR locus HUMTHO1<sup>2</sup> as our standard since it is the model STR used by many other forensic laboratories. The primer sequences described by Edwards et al.<sup>3</sup> were used, producing PCR fragments of 179-203 base pairs in length. Two ET dye-labeled reverse primers were used. Both have a fluorescein derivative, FAM, covalently bonded to the 5' end which serves as the common fluorescence donor. One reverse primer has another molecule of FAM covalently bonded to a modified thymidine residue in the fifteenth position from the 5' end (the F14F primer). The other primer has a molecule of ROX, a rhodamine derivative, covalently bonded to a modified thymidine residue in the seventh position from the 5' end (the F6R primer). The forward primer is unlabeled. For a more complete ex-

planation of ET labeling and mechanism, refer to Ju et al.<sup>4,1</sup>

The absorption-emission spectrum of F14F shows maximum absorption at approximately 496 nm and maximum emission in the green at 525 nm. F6R shows absorption at 496 nm and Stokes-shifted emission in the red at 605 nm, with negligible residual emission at 525 nm. The distinctly separate emission peaks of F14F and F6R allow two-color detection with a single argon ion laser (488 nm) as an excitation source. The ET primers provide 2-8 times more signal than single FAM and ROX labeled primers when excited with a single laser line at 488 nm, providing more sensitivity for detection.

Our work using ET primers on CAE has been described.<sup>1</sup> Briefly, the two-color CAE instrument used has a standard CE set-up with an argon ion laser, stationary confocal optics, a scan stage allowing use of multiple capillaries, and two photomultiplier tubes allowing simultaneous two-color detection.<sup>5</sup> CAE separations were performed under native conditions using 0.8% of the replaceable sieving matrix hydroxyethylcellulose and 1-2 mM 9-aminoacridine in 0.5x TBE. Separations take approximately 15 minutes using 100 V/cm. Electrophoretic migration of identical F14F and F6R products show nearly the same mobility with an average standard deviation of approximately 0.5 base pairs. For THO1 typing, we created an allelic ladder using F6R. Unknowns were amplified with F14F and sized by comparison with the ladder.

For the present study, we investigated STR analysis on conventional slab gels using three methods of detection: ET dye-labeled PCR products, post-staining with SYBR Green, and silver staining. The first two detection modes entailed the use of a FluorImager 575, kindly loaned to us by Molecular Dynamics Inc.

The ET dye-labeled PCR products are both detectable on the FluorImager, which excites with a 488 nm argon ion laser. F14F is opti-

mally detected using a 530DF30 bandpass filter and F6R is optimally detected using a 610EFLP long pass filter; there was no significant crosstalk between the two channels. SYBR Green products were detected using a 530DF30 bandpass filter.

Separations of THO1 PCR products, amplified with ET primers, were performed on a 6% polyacrylamide gel run for 2.25 hours at 40W. Near single base resolution was achieved. Alleles 9.3 and 10 could be distinguished when run in adjacent lanes but could not be resolved in a 9.3/10 heterozygote, unless using 2 color detection.

An advantage of the two color system is that the red F6R ladder and green F14F sample may be placed together in the same lane. In a one color detection system, every few lanes on the gel must contain a ladder. This limits the number of samples that may be loaded on the gel. To increase throughput, a two color system allows every lane to be used for samples. This also serves to provide more accurate sizing of unknown samples since lane-to-lane variation (e.g. smiling) is eliminated.

To compare relative sensitivities of the various detection modes, analyses were performed on 1:3 serial dilution series made with F14F and F6R THO1 PCR products. The CAE could detect F14F PCR products at a 1:2187 dilution with resolution well above baseline; F6R PCR products were detected at a 1:243 dilution. Therefore, F14F is the more sensitive label with CAE detection. With the FluorImager, both F14F and F6R PCR products could be detected at a 1:27 dilution. This same gel was then SYBR Green post-stained. When denaturing gels are stained with SYBR Green, alleles are seen as band doublets due to the staining of both strands. The samples could still be detected down to 1:27 with the SYBR Green staining. Another gel was run with the same PCR product dilutions, and then silver stained. The samples could only be detected down to a 1:9 dilution (Table 1).

Since use of the ET Primers

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provides increased sensitivity, a reduction in the number of PCR cycles was studied. Fewer PCR cycles means less time, a better signal-to-noise ratio, and less manipulation of the sample. We began with the traditional 30 cycles and then tried 28, 26, 24, 22, and 20 cycles. Two different samples, a THO1 7,8 and a THO1 6,9, were amplified with F14F at these various cycles. On the CAE, both samples were seen well above baseline at 20 cycles. The FluorImager could detect samples well above background that had been amplified with as few as 26 cycles; with manipulation of the FluorImager software, there were slight indications of detected product cycled 24 times. This same gel was then SYBR Green stained, and as few as 26 cycles could be detected (Table 2).

#### Conclusions

This research has shown that ET primers may be used with both CAE and FluorImager detection, thereby demonstrating the vertical compatibility of this technology between detection modes. It was also demonstrated that in using ET prim-

ers, the CAE instrument is more sensitive than the FluorImager. The CAE can detect a larger dilution of PCR product and product cycled fewer times. Thus, in cases when only a limited amount of a forensic sample is available, less sample may be used to generate PCR product and less product may be used for STR sizing.

ET primers and SYBR Green staining are both more sensitive than silver staining. The ET primers offer about the same level of sensitivity as SYBR Green staining on the FluorImager instrument. However, there are several advantages in using ET primers with the FluorImager versus staining with SYBR Green. First of all, no post staining is required; this saves time, avoids increased background signal, and eliminates the need for disposal of SYBR Green waste. Second, two-color detection is available at one excitation wavelength, saving space on gels and requiring only one laser line. Thirdly, because only one strand is labeled, each allele is represented by a single band rather than by a doublet as seen with SYBR Green staining and silver staining.

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*This article was voted best paper at the Spring 1995 CAC Seminar.*

—Ed.

Table 1  
RELATIVE DETECTION LIMITS OF  
ET DYE-LABELED THO1 PCR PRODUCTS

Method	Sensitivity
ET Primers on CAE	
Green (F14F)	1 : 2187
Red (F6R)	1 : 243
ET Primers on FluorImager	
Green (F14F)	1 : 27
Red (F6R)	1 : 27
SYBR Green Stain on FluorImager	1 : 27
Silver Stain	1 : 9

Table 2  
DETECTION LIMITS OF THO1 PCR PRODUCTS  
AS A FUNCTION OF CYCLE NUMBER

Method	Minimum Cycle Number
ET Primers on CAE	< 20
Green (F14F)	
ET Primers on FluorImager	<= 26
Green (F14F)	
SYBR Green on FluorImager	26



# An Improved Method of Obtaining Ion Profiles from Ignitable Liquid Residue Samples

John J. Lentini\*



This study was undertaken to improve the collection of extracted ion profiles from mass spectral data. Using the full scan method of collecting data frequently results in a higher detection limit relative to GC/FID, and ion profiles with a noisy baseline or a baseline which is off the bottom of the scale. One goal of this study was to produce ion profiles with a more "chromatographic" appearance, and another was to decrease the lower limit of detection. Ion profiling is also known as mass chromatography, and has been used for fire debris analysis since it was first described by Smith (1982) and has been codified in ASTM E 1618, *Standard Guide for Ignitable Liquid Residues in Extracts of Fire Debris Samples by Gas Chromatography / Mass Spectrometry*.

Materials and Methods

All samples were run on a Hewlett-Packard (HP) 5890 Series II gas chromatograph connected to an HP Model 5971A mass selective detector. Data analysis was accomplished using HP ChemStation software. The column was a 25 meter HP-1, 0.2mm I.D., 0.5 µm film thickness, operated at an initial temperature of 600°C for 6 min, ramped at 200°C/min, to 280°, and held at 280°C for 4 minutes. One-microliter samples were injected in the splitless mode with an HP Model 7671 automatic liquid sampling system.

## Materials and Methods

Comparisons were made between data collected using the scan method (33—300 amu) and the selected ion monitoring (SIM) method, using the 15 ions collected as shown in Table 1. The effect of varying the dwell time for this group of ions was also studied. Dwell times of 10, 20, 50, 100, and 200 milliseconds were used. In addition, a special program looking only at Ion 57, was examined.

Weathered gasoline and kerosene, ranging in concentration from 1% down to 1 ppm dissolved in diethyl ether, were examined.

## Results

The use of the SIM mode of collecting data resulted in a significant decrease in the lower limit of detection. Identifiable ion profiles of the most important groups of gasoline compounds could be collected from samples containing 10 ppm gasoline, while it was necessary to have a concentration of 100 ppm of gasoline in order to obtain useful ion profiles when the data was collected using the full scan. When a special program designed to look strictly at ion 57 was applied to kerosene, a concentration of 1 ppm could be detected, as opposed to a concentration of 100 ppm required for the full scan method.

A dwell time of 50 milliseconds was found to be sufficiently low to allow for the resolution of the p-ethyltoluene shoulder on the m-ethyltoluene peak. Decreasing the

dwell time resulted in slightly improved resolution, but slightly increased noise.

Use of the SIM method precludes obtaining individual mass spectra from a given peak, but in almost all cases, analysts are attempting to recognize a pattern of peaks, and this can be accomplished at concentrations equal to or less than those required for pattern production by GC/FID.

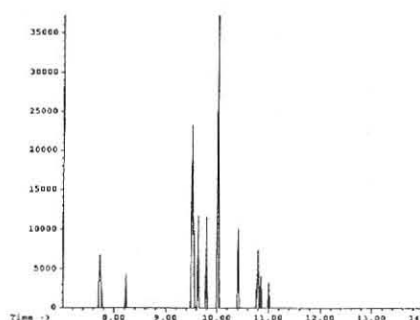
The SIM method of collecting data does not result in significantly larger signals, but there is a reduction in the background noise of between 1 and 2 orders or magnitude. The SIM ions selected result in a total ion chromatogram which very closely resembles that produced by the full scan. The reduction in the background noise provides selected ion profiles with a much cleaner, more chromatographic appearance than ion profiles extracted from full scans. A comparison of two profiles is presented as Figures 1 and 2.

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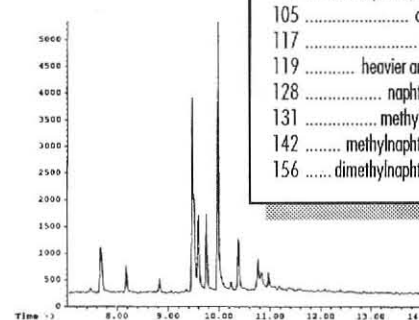
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**Table I**  
Ions Collected in SIM Mode

AMU	Ion
31	alcohols
45	alcohols
55	alkenes
57	alkanes
71	alkanes
78	benzene
83	cycloalkanes
91	xylene, styrenes
105	cumenes
117	indenes
119	heavier aromatics
128	naphthalenes
131	methylindenes
142	methylnaphthalenes
156	dimethylnaphthalenes



**Figure 1.**  
Comparison of cumene profile (Ion 105) from a sample of 100ppm gasoline run in the full scan mode.



**Figure 2.**  
10 ppm gasoline run in the selected ion monitoring mode.

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## The use of Ulexite to Collimate an Illumination Beam for Becke Line Determinations

John I. Thornton

### Abstract

A slab of the mineral ulexite placed above the substage condenser of a microscope, with the crystals of the mineral aligned with the axis of the microscope, will deliver collimated light to a specimen for the purpose of a Becke Line determination of refractive index.

**KEY WORDS:** Becke line, hydrous borate, light collimation, light pipe, Moh hardness, TV stone, ulexite

Virtually every published account of the Becke Line method of refractive index determination advocates the use of collimated, i.e., parallel, light. Some authors have suggested closing down the substage iris diaphragm, some have urged the removal of the top lens of the substage condenser, and some have recommended that the substage condenser be lowered from its optimum conventional position.

All of these suggestions suffer from the same defect; in the absence of some device to actually visualize the divergence (or lack thereof) of the beam, the analyst has very little actual control over the illuminating beam, and little justification for assuming that the beam is actually collimated. How far does one lower the condenser? How far must one close the substage iris diaphragm?

The present author wishes to report that a slab of the mineral ulexite may serve to effectively collimate a microscope illuminating beam to facilitate Becke Line determinations.

Ulexite is a hydrous borate of sodium and calcium. The composition of ulexite has yet to be determined precisely, but is probably

$\text{NaCaB}_3\text{O}_6 \cdot 8\text{H}_2\text{O}$ . Current textbooks<sup>1</sup> on mineralogy have it as triclinic; earlier works<sup>2</sup> believed it to be monoclinic. It has refractive indices of  $\alpha$  1.500,  $\beta$  1.508, and  $\gamma$  1.520. It may be encountered in virtually any rock and mineral store, where it is likely to be offered as "TV Stone." It takes its trivial name because of its ability to capture an image from a plane on which it rests and to seemingly "project" the image on the opposite side of the mineral. Ulexite is able to accomplish this because its habit is an aggregation of fine acicular crystals perpendicular to its normal cleavage. These individual crystals act as a "light pipe." It is this property that results in its being sold in rock shops as a curiosity.

More importantly in the present discussion, however, is that if a specimen of ulexite is chosen with the fibers perpendicular to its faces, internal reflectance within the individual fibers will cause the light to follow the fibers. This assures that the light leaving the ulexite will be parallel, since all of the ulexite fibers are parallel to one another. Stated differently, if the fibers are aligned axially with the microscope (which is achieved by simply placing a slab of the material on top of the substage condenser whose top lens has been removed), then the axially aligned fibers will deliver collimated light to the specimen even

if the condenser has delivered something else to the ulexite.

Rock shops will often have a box of ulexite samples displayed. The individual pieces are likely to vary somewhat in size and thickness, and will have polished faces. The individual crystals of ulexite are small, (hence the resolution of the "TV Stone"), but clearly discernible when the mineral is viewed perpendicular to the polished faces. The thickness, typically between 1 and 2 cm, is not critical, but one would want to select a sample with fibers perpendicular to the polished faces from all those offered for sale; some specimens have fibers oriented 2-3 degrees from the polished faces with the result that light emerging from the mineral, although parallel, would not be axially aligned with the microscope.

Ulexite is soft; it has a Mohs hardness of unity. Minor scratches should not detract from its use as a beam collimator, but care should be taken not to carelessly damage the surface to the extent that scattering or reflection of the light would occur at its upper surface.

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1. Contact the CAC Membership Secretary, Lisa Skinner (408)299-2224 to obtain an information packet and application.
2. Fill out and return the application to Lisa along with your first year's dues and application fee.
3. Two of the individuals listed by you as 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 by the board, your application will be presented to the membership for a vote at the next CAC Seminar.



actually care what they think about me personally (just ask my lab director!), it is just that I am genuinely concerned about their ignorance. It seems that I am constantly met with the all too familiar argument which begins, **"Yes, but did you know that..."**

**"...they're old."**

Well, so is the theory of relativity but it's still relevant today. (Okay, the pun was bad but remember, I have a brain the size of a walnut!)

If one consults the meaning of the word "old" in Webster, several meanings can be found including: "dating from the remote past"; "of long standing"; "long familiar"; and "no longer in use". Of these definitions, only the first two are really applicable to microcrystalline tests. The last two definitions are not very applicable because one, I admit they are becoming less and less familiar and two, they are still in use in Jurassic Park. However, they can be considered to be dating from the remote past (no offense intended to colleagues as old as some of these tests) and of long standing. But, does their age alone make them unreliable?

Recently, I performed a survey of CTS Drug Proficiency Tests provided to participating laboratories over a ten year period. From this survey, it appears that 1987 marked the dawn of a new era in forensic drug analysis. In the last CTS test prior to that year, GC/MS was used by 54% of the individuals responding to the test and IR was used by 63% of the respondents. In that same year, 23% of the respondents used two microcrystalline tests. In 1987, the numbers for GC/MS and IR jumped to 72% and 97% respectively, while the percentage for microcrystalline test usage bottomed out at 1%. Yet, that 1987 CTS Proficiency Test had one of the highest false positive rates in the last ten years!

These numbers are not intended to condemn instrumentation

to life as African Queen boat anchors. Further evaluation of the proficiency test results indicated that the true culprit was not the instrumental testing methods, but the individual using them. However, the "Tool Time" mentality for bigger and better instrumentation has continued. There are increasing numbers of respondents relying on instrumental methods of analysis and less and less individuals using the more classical (i.e., "old") forms of drug identification such as microcrystalline testing.

One could argue though (and I do) that there are benefits to being

## The true culprit was not the instrumental testing methods, but the individual using them.

old. One is experience. Microcrystalline tests have experienced more scrutiny than instrumental methods simply because they **have** been around for so long. And yet, like so many other things in science which are as old if not older, **they have yet to be demonstrated as unreliable**. Are microcrystalline tests old? No doubt. But that does not mean they are unreliable.

**"...they are not very useful for identifying unusual substances."**

True, but this statement is irrelevant to their reliability. I should point out that the sample for the CTS Test in 1987 (the test which had a 1% microcrystalline test rate) was MDEA. To be fair, this by itself could have and likely did cause great droves of analysts to their new instrumentation in attempts to identify this unusual substance. I can even hear the all too familiar grunts of satisfaction echo as I type this sentence.

(Oops, sorry. My kids are watching Tim Allen in the other room.)

The utilization of instrumentation in this manner can be dangerous and will often cause more problems than it will solve. Much like a lawyer should not ask a question that he or she does not already know the answer, a drug analyst should not use instrumentation without having a good idea of what the compound likely is. The primary use of an instrument in forensic drug analysis setting is to analyze a sample and either compare it against a standard or search it against a library of known mass spectral data. If a standard is available, the compound is likely to be neither unusual or unfamiliar. If a substance is a relatively new innovation of some drug chemist, it will not be in the library, yet the library will provide the best hit(s) anyway. If one is not careful and critical, it is quite possible that some new analog could be mistaken for one that has been around for some time. It appears that this was the case with this particular CTS test as the primary false positive reported was MDMA.

While microcrystalline tests may not be useful in identifying an unusual substance, they may be useful in providing information as to what the substance is not. If one is skilled in using such "negative" information, the results from an instrumental analysis will have substantially more meaning than to one who approaches the analysis with a "black box mentality."

**"...they require a great amount of skill."**

And other areas of forensics don't?! What a stupid argument. In fact, it is so stupid that I shouldn't even dwell on it, but...

The microscope is the backbone of many forensic science disciplines. I feel that it would be advantageous to develop this skill in every forensic scientist to the greatest extent possible. What better way to train an individual in the use of a microscope than through microcryst-

talline testing. Many different factors are involved for success, each requiring some critical thought. An individual well trained in this area is not likely to lose those skills. Further, since microscopy is the backbone to so many disciplines, it is also considered a basic ingredient for success. I would hope that laboratories would not wait until a person was well along in their forensic career before exposing them to this skill. At that point, it may well be too late.

***"...there is no hard copy print out to review."***

And the point is...?

In my review of CTS Drug Proficiency Tests from the ten year period, there was a grand total of 63 false positives. In 56 of these cases, there was potentially verifiable hard copy data from a GC/MS, IR or both. While the argument is true, it does not appear that it matters anyway. Either these reports were not reviewed or reviewers are incapable of independently assessing the data. Indeed, with high caseloads some reviews may consist of nothing more than "looks good to me" with little or no critical analysis of the data accompanying the case.

***"...they are not useful for mixtures and too subject to effects of diluents."***

Well, so is IR unless one goes through a lengthy extraction procedure to isolate the compound of interest. As for those who adhere to the "dilute and shoot" philosophy of drug analysis by GC/MS, they are likely to get results indicative of what they put in — garbage in, garbage out. Meanwhile, microcrystalline tests can be performed on mixtures and if the compound does require isolation, there are many easy clean up procedures that have been developed for use with microcrystalline tests including volatility and thin layer chromatographic separations.

***"...it is too easy to dry lab."***

A vital, characteristic key to the success of an individual in the field of forensics is their innovation and

ingenuity. Certainly, one having these characteristics can find a way to dry lab no matter what testing methods are used. Titles can be changed on computer generated print outs and hard copy data is NO guarantee that it represents that sample that was "analyzed." One who is intent on dry labbing will find a way to do it regardless of the testing methods employed.

The way to battle this problem lies not with the testing methods, but with a **quality** quality control program. Appropriate quality assurance and quality control methods will lessen the likelihood of dry labbing. Double blind samples are particularly useful for this purpose.

***"...it is not a structural elucidation test."***

Well, thank you ASTM for a new reason! Sounds real scientific too. Actually, it sounds like a marketing major who obtained a job in forensic science. After all, we are not only determining what the compound is, we are doing it by determining its structure. Don't we sound elite. The problem is, using GC/MS or IR could you tell the l- or d- form of methamphetamine? Is it d- or l-cocaine? It is lite or less filling?

**A drug analyst  
should not use  
instrumentation  
without having a  
good idea of  
what the com-  
pound likely is.**

Really, how many drug analysts go about their day structurally elucidating from their GC/MS and IR data? About as many as those who don't have the compound with prin-

cipal MS peaks at m/z 194, 109, 55, 67, 82, 195, 42, 110 and principal IR peaks at wavenumbers 1658, 1698, 747, 1548, 1242 and 760 in their bodies at some point during the day. (For those who are just a tad rusty in their elucidation skills, this is caffeine.)

As they are currently used in forensic labs, these instruments generate data to be *compared* against known standard data. In their proposed standard testing methods for drugs, ASTM even calls for a comparison against known standards when using GC/MS and IR. It certainly would appear to those so inclined to believe (and I am one) that the use of "structural elucidation" is nothing more than a thinly veiled attempt at restricting the use of microcrystalline tests. The bottom line is, if structural elucidation is so important, I will identify the substance using microcrystalline tests and then draw the structure. And, if they asked nicely, I might just throw in optical isomer information at no extra charge.

***"Yes, but have you heard..."***

I am certain many others have heard other adaptations of this theme. I am just as certain though that not one of them has to do with the inherent reliability of microcrystalline tests. Indeed, many people will readily admit (either out of enlightenment or a desire not to get into an argument for which they have absolutely no ammunition) that they are reliable, but... What is likely to follow is only an excuse why they don't use microcrystalline tests. Unfortunately, these excuses have begun to transform into issues of reliability which they clearly are not. Yes, ladies and gentlemen, it is indeed true. Microcrystalline tests are old, they are not very useful for identifying unusual substances, they do require a great amount of skill, there is no hard copy print out to review and it is not a structural elucidation test. However, I submit to you that that does not make them unreliable! □



(CAC Members Only)

## SEROLOGY

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- ☐ DNA Workshop — Spring 1993

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- CBS News 4/27/92: "Animation Reconstruction"
- Alex Jason / Jim Mitchell: "Trial Animation"
- ☐ TAPE 2: 48 Hours 9/25/91: "Clues"

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  - ☐ Walter McCrone — Spr '90
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## Hunter, cont'd

We have much to be proud of.

We know that we have done these things. Perhaps we should let the judicial system know... and the public.

There is a reason why we so frequently feel like pawns in the courtroom—we have never asked to be viewed as anything else. And yet we are an integral part of this country's judicial system. We are depended upon to deliver, in an impartial manner, key evidentiary information every day.

To begin to expect the respect that we so very much deserve, we need to begin to *show* the judges, the attorneys and the public the reasons why we deserve that respect. Let's begin to work toward this goal.

To begin, as the organization that wrote the first certification examination, let's work toward 100% of our membership being Diplomates in the ABC. Take advantage of the excellent training courses made available through the T & R committee. Management and analysts should begin working together. *Together* is the key word here, to improve the work product for their end user. This includes all there is about criminalistics: collection, analyses, reporting and testimony, from beginning to end.

Through our new Public Information committee, we shall update our CAC brochure, design and produce a video tape about our profession, and perhaps even initiate an awareness campaign about those activities which will help educate the legal profession and the public about Criminalistics.

Thanks for listening; I hoped to stir up your brains. I look forward to ideas, suggestions, and assistance toward these goals. In fact, I am currently looking for a chairperson for the new Public Information committee. There are many challenging tasks awaiting you!

*Carol*

Name six famous forensic experts...



A



B



C



D



E



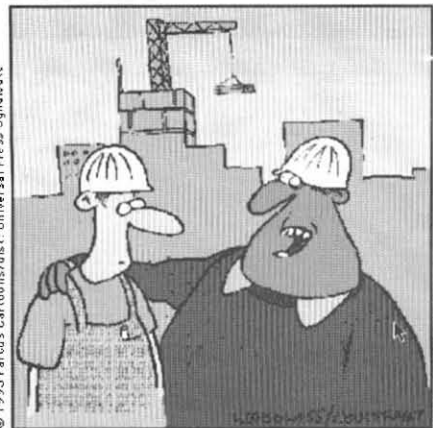
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answers next page

# Recreations

## Farcus

by David Waisglass  
Gordon Coulthart



"Sure, we have an incentive plan —  
if you screw up, you're fired!"

## Farcus

by David Waisglass  
Gordon Coulthart



"My new boss is a control freak."

## Farcus

by David Waisglass  
Gordon Coulthart



"Rumor has it, Filman, you've taken  
a second job."

## Name Game Answers

- A. **Alphonse Bertillon** (1853-1914) Paris. First to use anthropometry for ID of subjects. Source: *Modern Criminal Investigation*.
- B. **Franz Holzer** (1903-1974) Innsbruck. Early serologist; discovered secretor status. Source: *Crime and Science*.
- C. **Paul Uhlenhuth** (1870-1957) Greifswald, Germany. Invented precipitin test. Source: *NIJ Sourcebook in Forensic Serology*, (Unit IX).
- D. **Leone Lattes** (1887-1954) Turin. First to do forensic ABO grouping. Source: *NIJ Sourcebook in Forensic Serology*, (Unit IX).
- E. **Rudolph Reiss** (1874-1929) Lausanne. Early forensic photographer. Source: *Modern Criminal Investigation*.
- F. **Harry Soderman** (1902-1956) Stockholm. Locard student; founded many crime labs around the world. Source: *Policeman's Lot*.

Compiled by Edwin L. Jones, Jr., Ventura Co. SO Lab



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