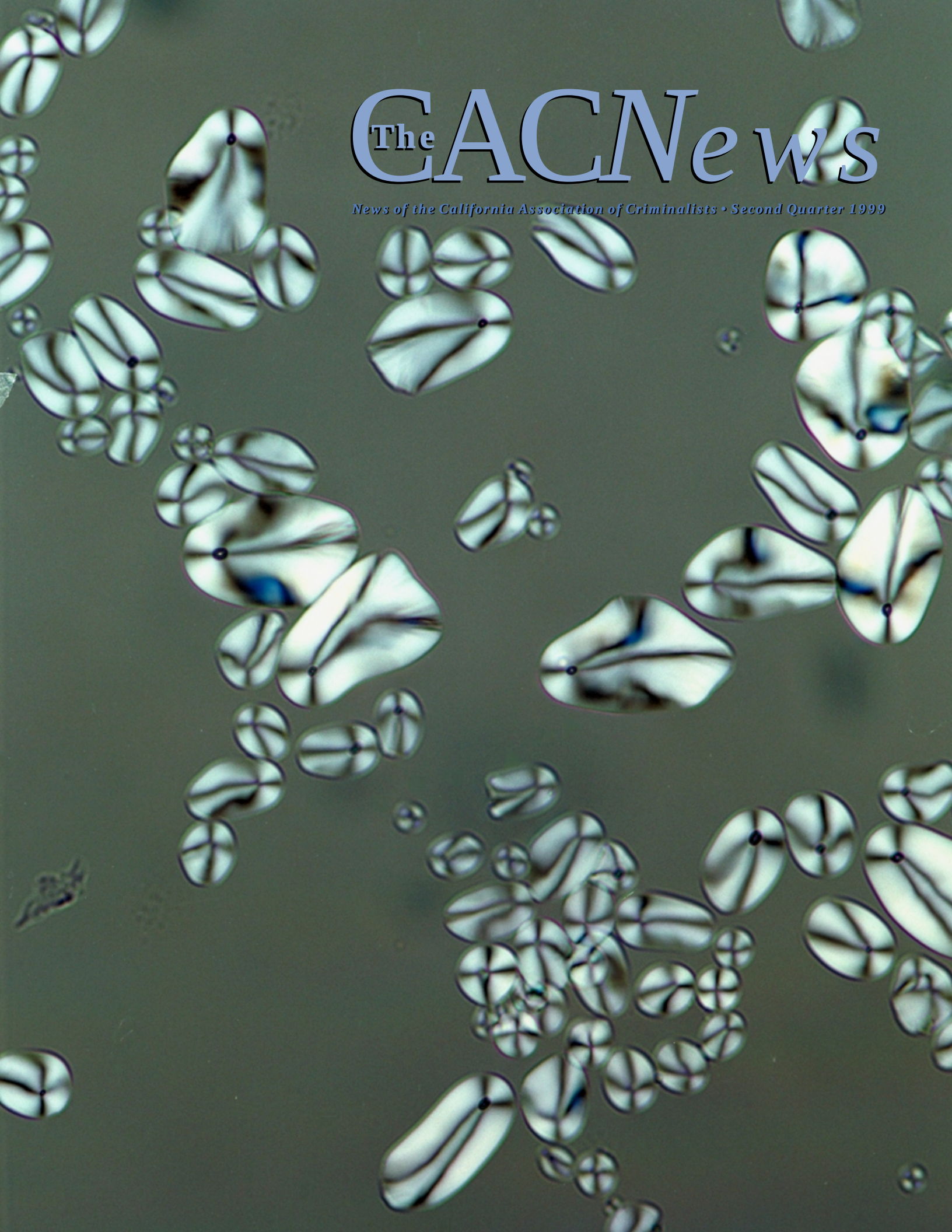


The CACNews

News of the California Association of Criminalists • Second Quarter 1999

RON**NICHOLS**

I have been back in school now for almost 2 years. But, doing things the way only Ron could ever conceive of doing them I am participating not in one, but in two different Master's programs. I have been reading books and writing papers until they have been coming out of my ears. Through all that and through writing these messages I have found one thing to be most difficult, writing an opening line. So how about if I write a few of them and then you get to choose which one will best fit the rest of the message. "As I reflect back upon my last year…" "It has been a distinct honor and privilege…" "We've laughed a little, we've cried a little…" "Light…no, less filling…" Geesh, after a year you would think that I would actually get serious about this huh?

If there is one thing I have learned about this job, it is that you can make it as easy or as difficult as you want. Carolyn told me that when I was considering running for President-Elect and it is very true. So I set out at the beginning ideas that I wanted to implement that would make my job a little tough, but not overly challenging. Those two ideas were specifically to design and implement leadership workshops at upcoming seminars as well as develop a mentoring program. Why don't we briefly examine the progress of these two platform items in particular.

If there is one thing I have learned about this job, it is that you can make it as easy or as difficult as you want.

Leadership workshops are pretty easy to put together. All that needs to be done is to determine the need and desire of the membership and to hire the right people to do the job. Of course, there are individuals within the organization who can do this type of workshop. One of the programs I am currently involved in deals with leadership development. I am certain that within the next couple of years we will see regular leadership workshops.

The mentoring program is the second issue I would like to discuss. I broached the concept at the Monterey meeting. That paper was then reprinted in the third quarter 1998 *CACNews*. I addressed the CACLD on this very issue and received a clear sign of support from laboratory management across the state. The concept has either been discussed in, or been the focus of, the three newsletter addresses I have written. I took the opportunity in the last address to make a very strong statement that required relatively little in return. I pledged a five-year commitment on my part once my term as President expired. In return I asked for, "a total of at least 50 positive responses to this idea from the membership before I will make my own personal commitment and commit this board and study groups chairs to this task." I also indicated that, "I am not asking for a five-year commitment, just a show of support and interest."

Since the publication of that newsletter and the writing of this, I have received a grand total of eight responses, eight responses from a membership of approximately 500. More than half of the responses came from members who are willing to be mentors. Those included individuals who were even willing to consider adjusting training programs and permitting facility use for the purpose of this program. To be honest, I really was not expecting 50 even though that represents only 10% of the membership. But, just as honestly, I was disheartened at only eight responses representing less than 2% of the membership.

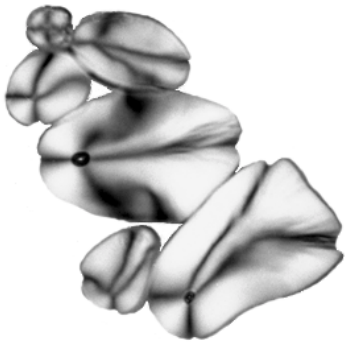
Do these numbers say anything? Well the first thing that must obviously be considered is that such a program is not deemed necessary at this time. I would refute that thought for several reasons. This profession is becomingly increasingly complex with every passing year. Technology and innovation have soared beyond our reasonable expectations. The need for training is high, yet the resources for training are low. Much of what we do is not well suited to a classroom instruction setting. The bottom line is that once you leave the classroom, the knowledge has to be applied. This initial application has to be done under a watchful, experienced and encouraging eye. When all is considered, there are few professions that actually have greater need for solid mentoring programs than the forensic field and its multitude of disciplines.

Another reason for the lackluster response could be that although there is a need, that need is not recognized. I would also refute this thought based on the following reasons. The first is that companies nationwide have recognized the need for such a program. More has been written in the last fifteen years on the concept of mentoring than was seen in the previous 60. The American Academy of Forensic Sciences has recognized the value of mentoring, calling for mentors and apprentices. The majority of the responses I did receive were from some of the most experienced, respected and influential people within the field and they were willing to serve as mentors. I procured the support of CACLD that demonstrates they rec-

please see NICHOLS, page 31

Second Quarter 1999

C O N T E N T S



On the cover: Potato starch grains under polarized light, photographed with slightly uncrossed polars.
Photo courtesy Wayne Moorehead, Orange County Sheriff-Coroner.

The CACNews

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Notice to Contributors: We publish material of interest to our readers and are pleased to receive manuscripts from potential authors. Meetings and course announcements, employment opportunities, etc. are also solicited. Advertisements are also accepted, although a fee is charged for their inclusion in *The 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 MS-DOS compatible files on 3.5 inch floppy disks or by e-mail (john@calicopress.com). Text files from word processors should be saved as ASCII files without formatting codes, e.g. bold, italic, etc. An accompanying hardcopy of the file should be submitted along with the disk. Graphics, sketches, photographs, etc. may also be placed into articles. Please contact the Editorial Secretary for details. The deadlines for submissions are: Dec. 1, March 1, June 1 and Sept. 1.

NOTICE: The use of the CAC logo is restricted to official communications and by other authorization of the CAC Board.

Bonnie Choy Selected for Award

The 1998 Edward F. Rhodes Memorial Award was given to Bonnie Choy, a CAC member since 1992. Since joining the CAC as a student at Cal. State Sacramento, she has been active in CAC study groups and committees. Currently she chairs the Public Information Committee. As a result of this award, Bonnie was able to attend the August 1998 Joint Meeting of the Forensic Science Society and the Canadian Society of Forensic Science in Nova Scotia. There, she presented a paper entitled, "The Correlation Between the Level of Amylase Activity and the Number of Epithelial Cells Found on Cigarette Butts." The paper resulted from her work as a serologist at the Serological Research Institute. An upcoming issue of the newsletter will feature a column from Bonnie on her experiences at the meeting.

State Audit of Crime Labs Completed

The California State Auditor/Bureau of State Audits has completed its audit of 19 California Crime Labs and recently issued a report of its findings. The report's summary includes statements like: "CACLD (Cal. Assn. of Crime Lab Directors) believes that as a result, laboratories are open to attack on the credibility of their work." and "We reviewed the 19 laboratories to assess their readiness to obtain ASCLD/LAB accreditation. We found that 13 of the laboratories have not developed or implemented one or more of the components of a quality control system."

You can read the summary at: http://www.bsa.ca.gov/bsa/97025sum.html and from there download the full report. The responses from many of the labs is available as well.

Jobs seen on the //WWWEB

FBI Lab Research Chemist $47,066 - $85,978

The Forensic Science Research Unit of the FBI Laboratory located at the FBI Academy in Quantico is seeking highly qualified candidates for a research chemist position in liquid chromatography. The minimum qualifications include a Ph.D. in Anal. Chem., 5 yrs exp. and a solid knowledge of liquid chromatographic theory and application. Experience with the development, validation, and implementation of HPLC, ion chromatography (IC), capillary electrophoresis (CE), and solid phase extraction (SPE) methods is required. Experience in the analysis and separation of compounds of interest to forensic science including drugs & drug metabolites, explosives, hazardous materials, and chemical or biological agents is highly desirable. Publication in referee'd journals, teaching, professional presentations, project management and supervisory skills are also desirable.

Interested candidates should submit resumes no later than 12/27/99 to: FBI Headquarters, 935 Pennsylvania Ave., NW, Laboratory, Attn: RSCHMST, PA-1301-200, Washington, DC 20535. Resumes submitted after the closing date will not be considered. Only those candidates determined to be the best qualified will be contacted to proceed in the selection process. You must be a U.S. citizen and consent to a complete background investigation, polygraph, and drug test as a prerequisite for employment. For additional employment opportunities, call the FBI employment job line at (202) 324-3674 or visit the FBI web site: www.fbi.gov. The FBI is an Equal Opportunity Employer.

Faculty positions available

Two tenure track positions are available at Florida International University (FIU) for Fall 1999. The Department of Chemistry at FIU invites applications for appointments as Assistant or Associate Professor in: 1. BIOCHEMISTRY: a full time position in the Department of Chemistry (www.fiu.edu/orgs/chemistry) with biophysical or bioinorganic preferred but all areas will be considered; and 2. STABLE ISOTOPE MASS SPECTROMETRY: a joint appointment with the Southeast Environmental Research Program (SERP) (www.fiu.edu/~serp). A Ph.D is required and postdoctoral experience is preferred. The successful candidates are expected to establish active, externally funded research programs as well as demonstrate a commitment to excellence in teaching at the undergraduate and graduate levels. The Chemistry Department has a new Ph.D. program with foci on biomedical and environmental research and with close alliances with SERP and the International Forensic Research Institute (IFRI)(www.fiu.edu/~ifri) on FIU's campus. Visit the FIU Chemistry web site for more information. (www.fiu.edu/orgs/chemistry)

Firearms/Tool Mark/Drugfire Examiner

Regional Crime Laboratory, Fort Pierce, Florida Salary $45,000 (starting)

Qualifications: Graduation from an accredited college or university with a bachelor's degree in a natural science or forensic science, and five years of forensic firearms/toolmarks experience. Drugfire experience is also required.

Responsibilities: Performs firearms/toolmark examinations as required in a forensic laboratory, rendering court testimony as needed. Also responsible for maintaining the section to ASCLD-LAB accreditation standards. The selected candidate will be required to undergo polygraph and background examinations and participate in an ongoing random drug testing program.

Contact:

Daniel C. Nippes Regional Crime Lab @ IRCC 3209 Virginia Avenue Ft. Pierce, FL 34981 (561) 462-4765 Fax (561) 468-2313 dnippes@ircc.cc.fl.us

Latent Print Examiner $3,786 to $4,576/mo

The San Diego Police Department currently has openings for two (2) Latent Print Examiners. The position is "open" but may close at any time after reviewing the submitted applications. REQUIREMENTS: Any combination of full or part-time work which equals one year of full-time experience in the comparison and identification of latent prints. Qualifying experience must include testifying in court as an expert witness on all phases of friction ridge identification. Applicants must submit a letter of court acceptance as a qualified expert in latent print identification. A letter from a Municipal or higher Court Judge or District Attorney will suffice as verification of court acceptance as expert witness. DUTIES: Evaluate latent prints to determine quality and identity; prepare and enter latent prints into an Automated Fingerprint Identification System (AFIS); compare known prints with latent prints; prepare photographs and other materials for demonstration of evidence in court; serve as an expert in court on all phases of latent print identifi-

cation; and maintain logs and records of examinations performed. HOW TO APPLY: Acquire, complete, and submit the application to the City of San Diego Personnel Department; 1200 3rd Ave., Suite 300; San Diego, CA 92101. Phone: (619) 236-6467. For further information about the position please call Gary Avery in the Crime Laboratory at (619)531-2648 or e-mail at calgfa@yahoo.com

Check out the following address for even more job listings:
http://www.povn.com/~4n6/jobs.htm

CACNews does not verify the accuracy of internet postings.

Alaska Hosts Northwest Meeting

The Northwest Association of Forensic Scientists (NWAFS) meeting will be held in Anchorage Alaska, April 19-23, 1999, at the Hilton Hotel, hosted by the Alaska Scientific Crime Detection Laboratory. Scheduled workshops include "Statistics / Population Genetics," instructors: George Carmody, Ph.D. and Bruce Budowle, Ph.D. Attendees will receive one undergraduate college credit through the Univ. of Alaska, Fairbanks, upon successful completion. The workshop will include lectures on introductory probability and statistics, population genetics, and forensic applications. Also: "STR Workshop," instructors: Debbie Hobson, MPH, Jill Smerick, MS, and Alice Brown, BS, FBI Lab, DNA Unit I, and Jeanne Willard, MFS, Armed Forces Institute of Pathology Annex / AFDIL. Validation studies, interpretational guidelines, trouble shooting, software, and case related issues will be discussed during this workshop. FOR MORE INFORMATION, e-mail: George_Taft@dps.state.ak.us, or contact: Karen Tabios, APOA / NWAFS Conference, SCDL, 5500 E. Tudor Road, Anchorage, AK 99507, Phone: 907-269-5582, FAX: 907-338-6614.

Midwest Association to sponsor Vehicle Lamp Examination Workshop

Instructors: Ken Baker, Northwestern University Traffic Institute, Thad Aycock, Northwestern University Traffic Institute (retired). Offered June 2-4, 1999 at the Quality Inn, Bowling Green, OH (419) 352-2521 $50.00 / room (single / double). Tuition is $500.00 with a class size of 15-20. Maximum is 20 students. The coordinator is Ted Manasian, phone: (419) 353-5603 fax:(419)353-5709 e-mail is tmanasian@ag.state.oh.us

This 3-day workshop is for laboratory personnel who examine lamps to determine if they were on or off at the time of an impact. Ted J. Manasian Forensic Scientist Ohio BCI&I.

Bruce Weir to Teach May Workshop on Statistics and Population Genetics

Applications are now being accepted for the next 3-day workshop on Statistics and Population Genetics for Forensic Scientists. It will be at NC State University on May 26,27,28. The course will be taught by Drs John Buckleton and James Curran and Bruce Weir. The text "Interpreting DNA Evidence" by Evett and Weir will be used. The cost is $300. This is an abbreviated, non-credit version of the graduate-level course that will be offerred on the web again next Spring. The workshop does provide Continuing Education Units from NC State University. An application form can be found on our web page, or can be requested from Ms Debra Hibbard at: hibbard@stat.ncsu.edu Bruce Weir Program in Statistical Genetics, Phone: (919) 515-3574 Department of Statistics. Fax: (919) 515-7315 North Carolina State University, Raleigh NC 27695-8203 URL: www.stat.ncsu.edu (click on "statistical genetics").

Teaching Position Offered

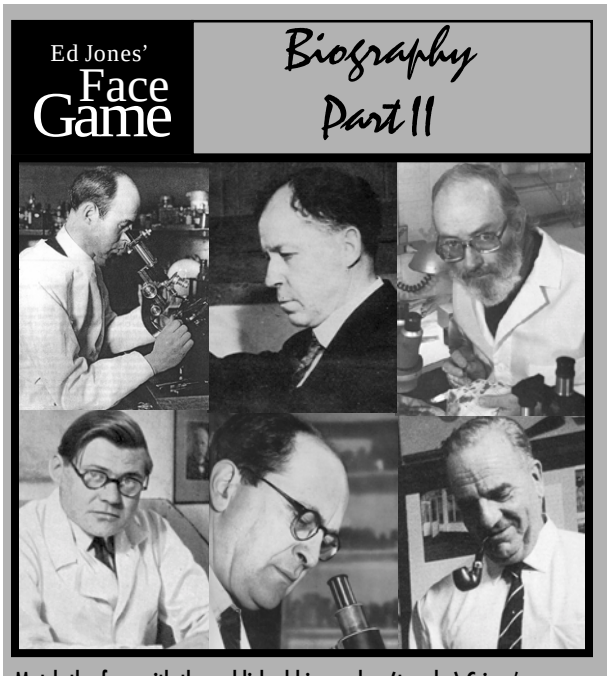
Associate Lecturer / Lecturer. The University of Technology, Sydney (UTS) is expanding its teaching and research in forensic science. It requires an enthusiastic teacher and researcher to undertake the following duties: 1. Lecturing to advanced and first year classes in forensic science. 2. Supervise honours and postgraduate students in forensic science. 3. Write and obtain grants from the Australian Research Council, other government bodies and industry.

Salary range: Associate Lecturer - Level A: AU$34,030 - AU$46,181 per annum. Lecturer - Level B: AU$48,613 - AU$57,715 per annum (to mid-level only). The University offers attractive superannuation and salary packaging. Position closes: March 26, 1999

APPLICATION PROCEDURE: Prospective applicants should first obtain the selection criteria by contacting the Recruitment Office on +61 2 95141087 (Ph) or email ann.leadbitter@uts.edu.au, and ensure that their application addresses the criteria for the position.

Southern Association Meeting

The 1999 Spring SAFS meeting will be held April 12 - 14, 1999 in Atlanta, GA at the Holiday Inn Select in Decatur, Georgia, Monday April 12, 1999. An ABC GKE course will be offered. For more information please contact Lynn Henson, 404-362-7265. Members: $ 115.00 per person if received by March 22, 1999. After March 22, 1999 or at the door is $150.00 per person. Non-members: $ 135.00 per person if received by March 22, 1999. After March 22, 1999 or at the door is $170.00 per person. Offered workshops include: Paint Database Query, GRIM2, Microspectrophotometry, Gunshot residue, FibreFinder, Expert Witness, HP Chemstation Macro, Toxicology, SERO / DNA, Drug ID Lab safety.



Match the face with the published biography: (top, l-r) Crime's Nemesis, The Wizard of Berkeley, The Evidence Never Lies, (bottom) Policeman's Lot, Crime Chemist, Crime Scientist.

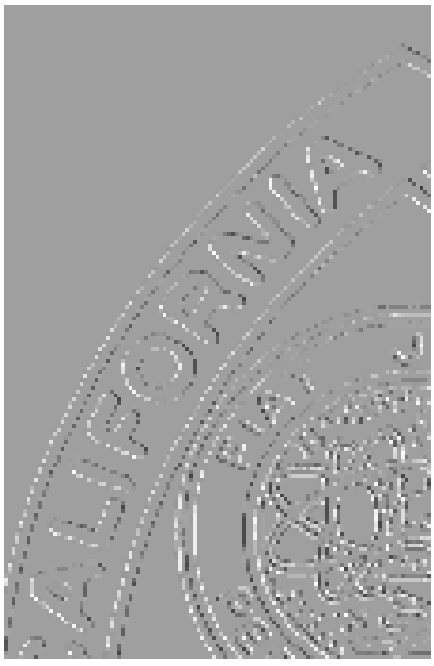
Answers: (l-r top) Luke May, E.O.Heinrich, Herb MacDonnell, (bottom) Harry Soderman, Charles Taylor, John Thompson

Candidate's X Statements

CAC BOARD OF

For CAC Treasurer
Michelle Fox

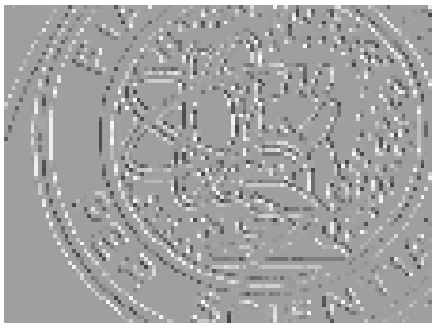
The treasurer of the CAC performs many important responsibilities. These include handling membership dues, maintaining financial records, monitoring endowment fund investment activities and generating financial reports for the Board of Directors. My experience includes serving on the Financial Review Committee for the past three years. This has allowed me to become familiar with the financial aspects of the CAC. I have also performed as assistant treasurer to the current CAC treasurer, Michael Parigian, for the past six months. My first task as assistant treasurer has been to handle the 1999 membership dues. Some of you may recognize my name from your latest dues request. The position of treasurer is no small assignment, but my experience, work ethic and commitment to the CAC make me suitable for the job. I look forward to serving you as the treasurer of the CAC, and ask for your support of my candidacy.



For President-Elect
Lisa M. Brewer

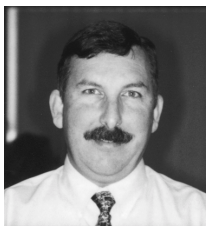
I have been a member of the CAC since I began my professional career almost fifteen years ago. I recognized early the importance of this organization's commitment to professional development and as a leader in the forensic science field. I have been involved in the organization at various levels, including serving on the Board of Directors as editorial secretary from 1991 to 1995. During my tenure as editorial secretary, a publications committee was formed consisting of dedicated and talented individuals who transformed a simple newsletter into the *CACNews*. The continuing efforts of this committee, especially John Houde and Editorial Secretary Raymond Davis, have made this publication what it is today.

As an organization, the CAC has always played an active role in addressing issues important to me and the profession. Currently, themes such as professionalism, quality assurance and standardization are echoed throughout the country at meetings and in many publications. As an ASCLD / Lab inspector and DNA technical leader, I'm acutely aware of these issues in the forensic laboratory. I support those efforts that would help a laboratory improve the quality of its work and in the professional development of the forensic scientist. I would welcome the opportunity to work with the membership in addressing these and other important issues. Thank you for your consideration of my candidacy.



For Regional Director, South
Jim Stam

I have been a member of the CAC since 1975. I was very active including being southern regional director in 1980-1981. My family commitments curbed my ability to serve on the board; however, I have continued to serve on committees such as Training and Resources and Ethics. The southern regional director position will give me the chance to jump right in and help with the CAC. It will also allow me to become better acquainted with the newer members of the association. Currently I am a supervising criminalist with the San Diego Police lab and have been with SDPD for over 20 years. I have roots in northern California also having worked at Alameda county from 1975-1978. I have a large number of contacts throughout the state including membership in CACLD. I will be a very active director and will continue the work that Joe Hourigan has done. Your vote for this position will be appreciated.



D I R E C T O R S

For Regional Director, South

Dean Gialamas

My name is Dean Gialamas and I am running for regional director, south. I have been active in the CAC for most of my nine years of membership: I have served as a committee member on the Ad Hoc Journal Committee from 1992-93, chair of the Southern Section Serology Study Group from 1993-96, and have co-chaired the Training and Resources Committee and the CCI User's Advisory Board Committee since 1994. I regularly attend the CAC semiannual seminars and have presented papers at most of those meetings. I have really enjoyed my activities in the CAC (heck, it's been fun most of the time!) and have decided to run for a position on the CAC Board of Directors.

For those members who do not know me, I am a supervising criminalist at the Los Angeles County Sheriff's Department crime lab and have a strong interest in professionalism, ethics and certification. Although we are a small regional association, we have been instrumental in the development of these areas. Needless to say, I am proud to be a CAC member. I would be honored to be the Southern representative on the CAC Board of Directors and would appreciate your vote for Regional Director, South.

For Editorial Secretary

Nancy McCombs

I am a senior criminalist with the Department of Justice, Fresno Regional Laboratory, and have been a CAC member since 1995. I have received a brief orientation regarding the editorial secretary position and what it entails. I believe I am up to the challenge. Our current editor, Raymond Davis, has been responsible for providing us with an outstanding newsletter. I would be honored to continue to provide the association with this level of quality, as well as encourage the growth of our newsletter.

The editorial secretary position involves having open communication with several individuals from both inside and outside our association. I have always had a passion for writing and enjoy editing and interacting with people. As reflected in past issues, the creativity of the editor contributes significantly to the product; I believe I possess this potential. I would appreciate the opportunity to serve our association and encourage you to read and make contributions to the *CACNews*.

RAYMOND**DAVIS**

The Walrus Said

The time has come the Walrus said to speak of many things . . . Service, Giving Thanks, Seminar Abstracts and Changes

***SERVICE*:** This is my final article as the Editorial Secretary of the *CACNews*. With the May Board of Directors and the CAC Seminar Business Meetings my final duties as a member of the Board of Directors will come to an end. It was my privilege to serve on the board and I enjoyed the responsibility of putting out this quarterly issue. Many have served on the board of directors over the past 45 plus years and I am grateful to have had the opportunity to serve four years and have my name added to that list. I've also had a chance to work with people who I had only known by name or reputation. This was an unexpected bonus that has provided me with a great sense of satisfaction. Our state has so many labs spread out over a large geographic area that most of us could spend a whole career and not meet half of the people employed in our profession. I'm going to miss working with the people on the current board. It's feels like there was an alignment of the planets creating harmony and good will amongst us. I have enjoyed the camaraderie and the work we have accomplished on the board that it has made it worthwhile being together.

The *CACNews* could not and would not exist if it weren't for two things.

First, those who contribute to its pages and second, those who read it.

I've particularly enjoyed the confidence of **Joe Hourigan**, the thoroughness of **Pete Barnett**, the humor of **Hiram Evans,** the dedication of **Carol Hunter** and the diligence of **Michael Parigian**. If there was one person I would single out for exemplary commendation that would be **Carolyn Gannett**. She has been on the board of directors for 7 straight years and has done her job with a high level of professionalism, humor and confidence. As you read the candidate statements in this issue pause for a moment and reflect on the time and energy they will be giving to our organization over the next 2 years. And for those who have not served on a committee or on the board, do yourself and the CAC a favor and consider serving. If the time is right for you just let the nominating committee chair, **Don Jones** know of your interest. It will sure make his job a lot easier.

GIVING THANKS: The *CACNews* could not and would not exist if it weren't for two things. First, those who contribute to its pages and second, those who read it. The CAC spends about $11K per year to ensure that we have a way to communicate with one another. My biggest thanks goes to **John Houde**, Art Director. He is the man! The quality of the *CACNews* is due wholly to John's efforts. He is such a stickler for detail and having the best print quality possible that I have seen him reject things that I couldn't fault. We're fortunate to have someone with such high standards. Over the years John and I have communicated by phone, email and in person and the one thing we talk about the most is the *CACNews*. He spends a great deal of his time, money and energy without compensation to crank out 4 issues a year, every year. I know my successor will appreciate working with John. My only regret on leaving the board is not being able to continue working with John Houde. And if you haven't read his book, "*Crime Lab, A Guide for Nonscientists,*" do so. It's a very good read and gives you a comprehensive view of the crime lab the likes of which haven't been seen in a while. Thanks John. You done good.

Additional thanks goes to the other members of the *CACNews* staff, **Greg Matheson**, Features; **Jennifer Milhalovich**, Advertising and **Frank Cassidy**, Technical. My final thanks which has nothing to do with the newsletter goes to **Lou Maucieri**. His support and encouragement over the past 26 years is one of the reasons I have been successful in life. Lou is a program manager at CCI and is a very busy man. Yet, he never lets that get between us when I've called him for advice or information. Lou is the driving force behind a number of training classes including the Courtroom Presentation of Evidence class which has been presented over 40 times since 1991. Thanks Lou, you're a pal.

***SEMINAR ABSTRACTS*:** We have decided to incorporate the semi-annual CAC seminar abstracts into the *CACNews* rather than as an insert. Some of you may be disappointed with this change, however, I believe it will facilitate storing and retrieval of this information by simply accessing the appropriate issue. In order for the abstracts to have value for the readers some standards need to be adopted. The most important standard is that the abstract should be written in such a manner that a person not attending the seminar will get as much information from the abstract as if they had attended the seminar. Writing a small introductory paragraph and then using this well worn phrase, "will be discussed during the presentation," doesn't benefit the reader who could not attend the seminar. So the challenge is to ask yourself this question: What

would I tell a colleague about my paper if they did not have the opportunity to attend the seminar? Your abstract should have an introduction, a body and conclusion. In the conclusion you may add that handouts will be made available to inform the reader. They may wish to contact the author for more information. Two examples of good ones can be found on pages 10 and 11 of this issue (DeHaan, Kennedy).

CHANGES: So what's on the horizon for me as I leave the board? I've had that question posed to me a number of times over the past year. Well, to begin with, more travel. I just got back from 10 days on the Big Island of Hawaii. I played more golf (and lost more golf balls) than I have in a long time. We are going to Costa Rica where we have friends who run a bed and breakfast there. For the near future, I will continue to teach at CCI (Courtroom Presentation of Evidence) and San Jose State University in the Criminal Justice bureau. I've also signed a contract with OCJP (Office of Criminal Justice Planning) to teach Sexual Assault Nurse Examiners courtroom training skills. I conducted a 2 day class in San Diego in December with nurses and deputy DA's from the District Attorney's Office. The training was conducted in an actual courtroom providing a sense of realism that was appreciated by the nurses. I will be repeating that training in Sacramento this month. Eventually, I will be providing all of the training for the nurses on Sexual Assault Response Teams throughout the state. I will also be participating at the CAC seminar in Oakland giving both a paper and conducting a workshop.

Since leaving the crime lab 2½ years ago, I have concentrated on teaching rather than on working cases. However, I was retained in a death investigation case in Seoul, Korea. If the case is handled by the US Navy, the defendant will be tried in a court martial. I have never testified outside of the US and I'd look forward to the experience. I have testified in approximately ten Courts Marshal cases over the years the last one being on the aircraft carrier *USS Carl Vinson*. This case may well be my last case as a criminalist. The time has come to focus on something new. For the distant future, my wife and I have contemplated moving to Sweden and might make the move within the next 12-18 months. The move would not be permanent just in case I go stir crazy. I have a fairly good conversational skill in Swedish but by no means am I fluent in Swedish (as my relatives remind me by starring at me slack jawed when I use a word or phrase incorrectly) We would probably buy a small flat in Stockholm a city I have visited many times over the past 25 years. Many people speak English in Sweden, some of them better than me. I know my wife really misses her family and culture and she has traveled home often over past 22 years. I'm not sure what the hell I'm going to do there but I'm sure I'll find something to keep me occupied.

All in all, everything is going quite well for me. I can't remember the last time I was stressed out. Actually I do, but those memories are fading fast. In fact, the olderI get, the faster my memories fade (good and bad)! I'm still running and plan to run the Rock & Roll Marathon in San Diego in the end of May. I Look forward to seeing you at the May CAC seminar. I know the folks at Forensic Science Associates and SERI are planning a great seminar for us. Don't miss it and if you do, I'm hoping the presenters will provide a comprehensive abstract for your reading pleasure.

p.s. One final thought: whatever you do, do it well. Good work is its own reward.

Raymond

From the Reader:

I was disappointed when Raymond told me he would not be seeking re-election to his post as Editorial Secretary. What a wild ride it has been, working with him for the last fifteen or so issues. His thought-provoking editorials have been a great addition to the newsletter and to the membership as well. Under Raymond's direction, the *CACNews* has matured, progressing from a simple newsletter to an editorial review publication. He was always open to new ideas when I wanted to experiment with color or previously untried techniques, and a willing "whip" when it came time to bug the authors to get their stories and papers in before deadline.

Few men are so positive in their criticism, or to paraphrase Dale Carnegie, "hearty in their approbation and lavish in their praise."

I look forward to working with the incoming editor, yet to be elected, and I know the *News* will be a continued success.

Raymond wrote in his candidate's statement, "My challenge ...was simply to organize the material for publication." Ah, Raymond, you've done far more than that. Our best wishes for you and Birgitta. Tack så mycket.

John Houde
Ventura

I wanted to thank you for the nice things you printed about me in the latest issue of the *CACNews*. Those are the kind of things usually said at memorial services, after one has passed on, so it was kind of neat to hear them before it was too late to, er, retaliate. Actually, I thought it would be useful to explain why there were no photographs and why so few people heard about "my" event in Sacramento, before the hate mail starts: "That so-and-so had a party and didn't invite ME!" You know, that kind of thing. I need to explain that it wasn't really a retirement party, it was just a going-away luncheon, like: I won't be darkening YOUR doors again and aren't we all glad about that! I was only at CCI for eleven years and people get tired of giving you parties just because you can't hold a steady job. I did not want a big production because I HAVE NOT retired, just gone on to do other things. (Pam at CCI got it all just right: all the right people and none of the ones I'd rather not deal with again, in this lifetime, anyway.) I am starting a one-man consultancy with an office in Vallejo to provide specialized training, lectures, and consultant (review) services in fire and explosion cases. I spent too many years setting (er, studying) fires and explosions to let all that information go to waste now. I have only been at this for 29 years, and just figuring some of it now. By now, you're thinking: HEY, he's sneaking in a plug for a new business without paying me for it! No, I'll be sending in a proper ad when I get my office phone and fax, and, wait for it....YES, e-mail!

Let my friends, colleagues (and others, I suppose) know that I will still be around to offer opinions (scientific or otherwise) for years to come and present, er, unusual papers at CAC seminars (for comic relief, if nothing else).

John DeHaan, Ph.D.
Vallejo

Fall 1998 CAC Seminar Abstracts San Diego

From the Bench to BB Stacking: The Trials, Tribulations and Observations of a "New" Supervisor

Tom Abercrombie, DOJ Berkeley, DNA Lab

One area of critically needed expertise that has for too long been overlooked in the field of criminalistics is that of supervision or administration. Too often, technical staff are promoted to management positions for which they have absolutely no training or understanding. Even after promotion, the skills needed to adequately perform as a supervisor are generally not made available in any concerted or organized manner. These skills are critical to maintaining moral and ensuring case-productivity as well as appropriate quality assurance. This presentation will deal with what the author feels are the minimum necessary "tools" to adequately address the needs of both the "new" supervisor as well as forensic scientists who are thinking of moving to management at any time in their future careers. The approach to the presentation will be "real world" from the perspective of a "new" supervisor.

SEM 101: New Approaches to Training and Learning

Steven Barlow, Electron Microscope Facility, San Diego State University

The scanning electron microscope (SEM) is widely used in a number of different fields from police forensics to plant taxonomy. High-resolution images from this machine are used to observe surface features, while concurrent x-ray analysis provides chemical composition of samples. Given increasing workloads and the need for uninterrupted sample analysis, it can be difficult for new users to get trained to use a heavily utilized SEM. There are two recent innovations that can address this problem. First, there are simulation packages available for SEM. These programs can provide some 'virtual' experience, which can shorten 'hands-on' training sessions. Second, it is now possible to connect to a SEM over the Internet. In this case, the operator in his / her office can view samples on a microscope located at a distance (across the hall, street, city, etc.). Training would therefore take place via a remote link to other machines without interfering with the in-house analysis of samples or the necessity for a new operator to travel somewhere else to receive training. The details of the SEM-Internet link, such as the one currently available at SDSU, will be discussed. see www.sci.sdsu.edu / emfacility / CUCMEoutreach.html

Wound Ballistics For The Criminalist & Gunshot Wound Pathology

Patrick Besant-Matthews, MD, Dallas, TX and Eugene J. Wolberg, E.J. WOLBERG FORENSICS

The science of wound ballistics seeks to understand the interaction of bullets and living tissue. In short "how bullets work" or more specifically, what happens when people are shot. Mr. Wolberg will discuss the methods of bullet incapacitation on humans and their effect on the reconstructive efforts of the criminalist at a shooting scene. Terms like "stopping power & knock down power" will also be addressed.

The identification and documentation of gunshot wounds in shooting events is of critical importance to the reconstruction criminalist. Dr. Besant-Matthews will discuss the characteristics of different types of gunshot wounds on skin. Also discussed will be how to assess and use an autopsy report in the reconstruction report and what classic errors one should be aware of.

Extinguishing Myths: Science V. Tabloid Logic

John DeHaan, Ph.D., California Criminalistics Institute

Myths were the creations of primitive peoples to try to explain, or at least put into some perspective, events or phenomena that were mysterious beyond their knowledge. Ancient gods made the wind, the sun, the stars, volcanoes, and plagues. Modern myths are the creations of people whom, when confronted by something they cannot readily explain, turn to the popular press as a source of guidance. When several alternative explanations are offered, the selection of the most outrageous or illogical of them is called "tabloid logic", since many of them seem to originate (or at least propagate) through tabloid print and TV media. Thus arise the myths of living Elvises, sewer alligators, and spontaneous human combustion (SHC). Of all modern myths, SHC is one that criminalists are likely to encounter via otherwise rational police and fire investigators. The author will present the results of combustion tests carried out on animal tissue and carcasses (and on human tissue using room and core calorimetry) that document the ignition and combustion properties of fires involving bodies as the primary fuel. The combustion of bodies is possible when 1) a rigid, porous wick is present, 2) the body fat represents the most significant fuel (i.e., absence of furniture that would produce a conflagration), 3) a prolonged external flaming ignition source is available, and 4) sufficient time is allowed for the resulting low energy, flaming fire to consume the body tissues. Test results will be presented (via videotape) and case examples will be offered. The role of science in defeating such myths will be discussed.

Mitochondrial DNA (mtDNA) Analysis in the FBI Laboratory

Joseph A. DiZinno, FBI Laboratory

The FBI Laboratory began research into the use of mtDNA analysis for forensic casework in 1992. After approximately four years of research and successful completion of validation studies, mtDNA analysis was first applied to forensic casework in June 1996.

Mitochondrial DNA analysis is applied to casework where tissues to be analyzed contain very small or degraded amounts of DNA. Most of the cases analyzed for mtDNA involve the analysis of mtDNA extracted from hairs, bones or teeth. Currently, the success rate for analysis of questioned forensic samples is over 80%.

The forensic community will learn about the utility and applicability of mtDNA analysis in forensic casework and become familiar with the applications and limitations of mtDNA analysis. Personnel from the FBI Laboratory have testified to mtDNA analysis results a number of times in hearings and jury trials at the local and federal level. The major challenges to mtDNA analysis and the response to those challenges will be presented.

The future of mtDNA analysis in forensic casework will be discussed. The presentation will refer to the ongoing research to improve and streamline current procedures. Other possible areas of application of this technology will be discussed as well as future plans for possible placement of mtDNA sequences from missing children / persons and missing children / persons reference samples into the Combined DNA Indexing System (CODIS) database.

Computerized Crime Scene Diagrams

Karen Goodman, San Diego police Department

This presentation will address the ease and benefits of using computers to recreate a crime scene diagram. Karen has created over 200 diagrams for court use on Homicide, Sex Crimes and other investigative uses. In addition to showing examples previous high profile cases, a basic crime scene will be created as a part of this workshop.

The Design, Composition, Exterior Ballistic-, Terminal Ballistic- and Wound Ballistic Properties of Contemporary Frangible Ammunition

Lucien Haag

This unique ammunition if gaining popularity on law enforcement and other indoor shooting ranges because of its totally lead-free construction. Such ammunition if also being used in Police "shoot houses" and has been considered for use in entry (raid) situations because of its reduced range and frangible nature when striking 'hard' objects such as walls, windows, doors, etc.

At least three manufacturers are now supplying frangible ammunition in a number of popular calibers each with its own special composition and design features.

As these products become more popular, they can be expected to show up in case work where the first surprise will be that these bullets cannot be associated with the gun that fired them nor are these bullets necessarily frangible.

Following a description of the design, composition and exterior ballistic characteristics of these cartridges, their terminal ballistic behavior in various targets and tissue simulants will be illustrated.

Investigative Aspects of Forensic Anthropology

Madeleine J. Hinkes, Ph.D.

Forensic anthropologists apply standard scientific techniques developed in physical anthropology to identify human remains and to assist in the investigation of crimes. In addition to assisting in locating and recovering remains, forensic anthropologists evaluate the age, sex, ancestry, stature, and unique features of a decedent.

This presentation will demonstrate some of the unique contributions forensic anthropologists can make to death investigations, including collection of human remains, and associated materials, analysis of crime scene, documentation and interpretation of trauma and cause of death, recovery of trace evidence, and interpretation of problematical fire scenes.

Cathodoluminescence Microscopy of Architectural Paint Samples

Thomas J. Hopen, Richard S. Brown*, R. Keith Wheeles* and Wilfried Stocklein**, *MVA, Inc., Norcross, GA, **Bundeskriminalamt, Kriminaltechnisches Institut, Wiesbaden, Germany.*

The layer sequence of multilayered white and off-white paint chips usually encountered by the forensic scientist in cases involving structural and / or maintenance paint is sometimes difficult to discern when utilizing commonly employed microscopical methods. This layer sequence information becomes vitally important when comparing a questioned paint sample to a paint sample of known origin. Techniques such as reflected light microscopy, fluorescence microscopy, and scanning electron microscopy (SEM) coupled with energy dispersive x-ray spectroscopy (EDS) may not provide the needed discrimination. Also, binder information may not be available for comparison since the thinness of the layers the difficulty in detecting individual layers, and the abundance of the extender pigments may preclude analysis by infrared microspectrophotometry.

Cathodoluminescence microscopy (CLM) may provide the needed layer sequence information and discrimination when analyzing and comparing multilayered white and off-white paint samples. Cathodoluminescence (CL) is the emission of radiation from the sample in the visible light region and neighboring wavelengths during excitation by electrons generated from a cathode electron gun. CLM provides further discrimination of layer sequence of multilayered white and off-white paint samples since cathodoluminescence is sensitive to phase differences, trace amounts of foreign atoms, and other lattice imperfections. For example: calcite which is a common pigment / extender in paint samples, may show orange, red or brown CL colors; titanium dioxide which is a common pigment shows blue CL colors with the anatase crystalline phase but shows no colors when present in the rutile crystalline phase; and zinc oxide, another common pigment in white paints, may show blue, green, or white colors.

Analysis of polished cross-sections by CLM was accomplished utilizing a light microscope with an attached vacuum chamber coupled with a cold-cathode electron gun. Comparison of layer information from CLM, dark-field reflected light microscopy, fluorescence microscopy, and SEM-EDS of the several paint cross-sections will be presented.

Forensic Barefoot Morphology

R.B. Kennedy, Forensic Identification Research and Review Section, Royal Canadian Mounted Police

Forensic barefoot morphology deals with the comparison of the weight bearing areas of the bottom of a bare foot in order to establish a link between the bare foot of an individual and an impression found in mud, blood or inside of another shoe that has been matched back to a crime scene. Footwear impressions are quite often found at crime scenes and many

times a match between a suspect footwear and the crime scene can be established, but it becomes necessary to establish the wearer of the footwear in order to link a suspect back to the crime scene.

As a result of several murders which took place in New Brunswick in 1989 and the necessity of linking the suspect to a pair of work boots that had been identified back to one of the murders, a research project was set up to study the uniqueness of barefoot impressions. A computer database has been constructed, using linked barefoot impressions from volunteers. The data consists of 19 different measurements and tracings of the impression of each foot, using a digitizing tablet and AutoCad software. It became clear that much research had to be done in order to establish the uniqueness of the human foot, as no extensive study of the sort had ever been carried out. To date 5000 volunteers have given their linked impressions (10,000 feet) and approximately 2500 individuals (4,000 feet) have been entered and searched through this database. Each entry was searched against all previous entries and no matches have been found. To date this research has shown that a great degree of uniqueness does exist between the bare feet of individuals.

It is a known fact that anyone committing a crime, must walk to, from, and around the crime scene, leaving telltale footwear impressions, and at times, barefoot impressions. There are a number of instances where the examination of a footprint, recovered at a crime scene, can be extremely important. The most obvious example is the comparison of a suspect's bare foot with that on an impression found at a crime scene in mud, blood or some other medium. Often overlooked, but equally important, is the possibility of eliminating a suspect whose feet do not match the crime scene impression. Also dependant on the uniqueness of a barefoot impression is the technique of matching a foot to the impression found on the inside of a shoe. Crime scene footwear impressions, having several accidental characteristics, can be positively identified to the shoes that made the impression at the crime scene. If a suspect is not found in possession of this footwear, it may still be possible to link the suspect to the footwear and hence to the crime scene. This is accomplished by comparing the wear areas on the outsole of the shoe, the wear areas, caused by the tops of the toes, on the inside uppers of the shoe, and the darkened and indented sweat areas found on the insole of the shoe, to the shoes the suspect may have been wearing at the time of arrest and with the inked barefoot impressions taken from the suspect.

Heaven's Gate: The Crime Scene

Gene Lawrence, Criminalist, San Diego County Sheriff's Department Crime Lab

The mass suicide in Rancho Santa Fe received media attention comparable to events such as the Branch Davidian cult siege, the bombings of the World Trade Center and the Oklahoma City federal building. Most of the attention centered on the Heaven's Gate cult, their beliefs, their leader and the members themselves. Very little attention has been paid to the event as a crime scene, since no apparent crime was committed. Even though all the members died of their own free will, there were volumes of information that needed to be gathered, such as who they were, how they died, why they committed suicide, how many more cult members were there out there. The evidence to answer these and other important questions were found, preserved and collected at the scene. The Heaven's Gate mass suicide as a crime scene can give valuable, insight to approaching future major, high profile crime scenes involving multiple fatalities and many agencies in the aftermath.

Elemental Distribution Of Gunshot Residue Particles Using X-ray Mapping

David L. Exline, A.J. Schwoeble and Kristin R. Lee

Computer Controlled Scanning Electron Microscopy coupled with energy dispersive spectroscopy has become a common method of analysis for the detection of gunshot residue on the hands or clothing of a suspected shooter. Following the detection of potential unique (Pb-Ba-Sb and Sb-Ba) and characteristic (Pb-Ba, Pb-Sb, Pb, Sb, and Ba) particles by this automated method, the particles are relocated and manually examined to confirm the composition. The distribution of elements in a single gunshot residue particle is an important consideration when determining the overall composition of a particle. Due to the process of gunshot residue formation following the discharge of a firearm, one may infer that the chemical composition of the resulting particle is homogeneous. This study shows the heterogeneous distribution of the elements within gunshot residue particles. X-Ray Mapping is used to analyze the cross sections of individually selected gunshot residue particles.

Church vs. Science: Turin Shroud and the Vinland Map

Walter C. McCrone, McCrone Research Institute

Science, as practiced by most of us, is being challenged by the growing belief that newer instruments and techniques are better than older instruments and techniques; automated, especially computer-controlled, methods are superior to methods requiring use of single instruments by scientists trained to use hands and brain; electron and other particle beams are far superior to photon beams. These beliefs are resulting in banning the use of older methods such as optical crystallography and microchemical tests and disbelief in such results. Obviously, we now all this is stupid. I will illustrate with two highly visible cases how the use of "modern" methods yielded incorrect results whereas the microscope as used for over 150 years yielded the correct result.

Dispersion Changes in Some Cargille Refractive Index Liquids

Wayne Moorehead, Orange County Sheriff-Coroner

While teaching a low explosives analysis class, the instructor noted that students using a recently purchased high dispersion refractive index liquid were into observing dispersion staining colors consistent with those typically observed for the strontium and barium nitrate standards. Evaluation of the standards and the Cargille liquid used by the students revealed sound standards but that the students' liquid differed from the instructor's older liquid. Quick replacement of the liquid by Cargille did not improve the dispersion staining colors. The Research and Development Director of Cargille Laboratories stated that the formulation had changed, possibly causing the reduced dispersion staining colors. Comparing the dispersion values in the literature with those on the bottle labels shows that the dispersion number has gone up (less dispersion) for some liquids and down (more dispersions) for others over the years.

"Ethics" is not a dirty word

John Murdock, Bureau of Alcohol, Tobacco and Firearms

It is the author's view that adherence to a properly written Code of Ethics helps ensure that quality forensic casework is produced and that balanced reports are written which help described the results. The development of ethics codes and enforcement procedures within the California Association of Criminalists and the American Society of Crime Laboratory Directors will be discussed as well as the views on the ethics held by the California Association of Crime Laboratory Directors. The relative value of detailed ethics codes versus brief statements of values will be discussed. The use of ethical dilemmas as a training tool will be stressed and the issue of incompetence as a defense in allegations of unethical conduct will be explored. And finally, a method for requiring adherence to the CAC ethics code by non CAC member employees of public agencies will be described.

Classification of Flammable Liquids Using Gas Chromatography-Mass Spectrometry

Jack Nowicki, Forensic Science Center, Chicago

The laboratory analysis of fire debris samples for the presence of flammable liquid residues has progressed significantly over the last fifteen years. Dramatic improvements have occurred in the areas of extraction techniques and analytical instrumentation. Results from sent CTS Proficiency Tests, however, indicate that while most laboratories demonstrate adequate delectability limits, many labs have difficulty in the interpretation of the analytical data.

The author will discuss the development of more specific guidelines for the classification of flammable liquids utilizing mass spectral information. Computer programs to assist with the interpretation of fire debris samples will be described. Also, the impact of the choice of extraction technique on the interpretation of the mass spectral data will be discussed.

Oklahoma City Bombing

Conrad A. Grayson, Unit Commander, San Diego County Sheriff's Department Arson/Explosives

This presentation will consist of a slide presentation of the post-blast investigation of the Oklahoma City Bombing. Sergeant Grayson was a rescuer for eight days at the Oklahoma City Federal Building bombsite from April 27th to May 4th 1995. He was assigned to rescue / search Team 2. This team was the last team to scale the nine story Federal building for a final search for bodies and physical evidence of the bomb. The presentation will demonstrate the tremendous amount of manpower needed in a crime scene of this magnitude.

Methods for Determining the Provenance of Unknown Soils

Skip Palenik, Microtrace

Although most forensic soil examinations are comparative in nature, situations occasionally arise in which it would be useful to be able to describe the location or discover the geographic source of a sample of sand or soil collected in the course of an investigation. Thoughtful study of the mineralogical, biological and anthropogenic components of these samples can often provide enough evidence to answer these questions to at least some degree of satisfaction. Biological and anthropogenic particles, with minerals in a subordinate role, are particularly useful in building up a picture of a location. Grains of minerals and rocks, along with botanical particles, serve best to locate a particular geographic origin. The microscopical and microchemical techniques which permit these investigations to be undertaken are well established although this application is somewhat novel. It is frequently essential to call in specialists, particularly field botanists and geologists to fully exploit the information collected from the assembly of microscopic particles. The techniques which the author employs to answer these questions are illustrated with actual examples from casework.

Heaven's Gate Toxicology

Dwight Reed, San Diego Medical Examiner's Office

On March 26, 1998, the San Diego Sheriff's Office received a call indicating that a mass suicide had occurred in Ranch Santa Fe. Preliminary investigation found numerous bodies, some decomposed. A HAZMAT team cleared the scene after which investigators from the Sheriff's Office and pathologists and investigators from the Medical Examiner's Office examined and documented the scene and the bodies. The next morning autopsies and toxicological testing began. Phenobarbital was detected in all decedents. Other drugs were detected in some bodies. Central blood and fluids from the decomposed bodies contained high concentrations of drugs. Examination of fluids from peripheral sites revealed lower concentrations. The deaths were certified as suicides with the causes reflecting drugs, alcohol and suffocation by plastic bags.

Examination and Forensic Significance of Botanical Traces

John Shane, Ph.D., McCrone Research institute

Forensic examiners often encounter a variety of botanical matter in their investigations. However, too often these important particles are overlooked or simply ignored. Botanical traces can indicate information regarding location and timing of crimes. In addition, important geographical information can also be gleaned by identifying specific and endemic botanical particles on articles and products.

Pharmacognosy is an almost forgotten specialty involving botanical traces. However, with the recent and dramatic increase in availability and use of vegetable drugs, herbs and food additives, there is an increasing need for the forensic scientist to be knowledgeable enough to identify some of the most common ones and not mistake non-controlled herbals with those that are controlled.

I will discuss a variety of botanical traces, including; pollen, spores, wood, and herbs. Each of these traces has its own story to tell and I will outline the anatomy and morphology of each, as well as their significance.

Recent public case histories will be discussed, as well as my own research and cases involving counterfeiting and other crimes where botanical traces played a significant role in solution of the puzzle.

The Necessity for Dental Identification in Modern Homicide Investigations

Norman D. Sperber, DDS

Identification of burned, decomposed and fragmented

bodies is essential in homicide investigations. In a number of cases the perpetrator will attempt to obliterate their victims through the application of lye-type compounds, burning and dismemberment. In some cases, the facial tissue has been sectioned and removed.

Through the use of color slides, the lecturer will present a number of actual cases, in which obliteration of the victim was attempted. Each case will be complete from the discovery of the body remains, to the final outcome in court.

The benefits of dental identification as compared to DNA findings are speed and low cost.

TWGDRUG Update

Erin A. Trujillo, Los Angeles County Sheriff's Department

The Technical Working Group for the Analysis of Forensic Drug Samples (TWGDRUG) was established in September 1998. TWGDRUG's mission is to make recommendations for internationally accepted minimum standards for the forensic examination of seized drugs. Four subcommittees have been established: Education and Training, Methods and Reports, Quality Assurance, and Communications, each with a specific scope of responsibilities. This presentation will focus on the informing the forensic community of the existence of TWGDRUG and to provide an update on the progress of each subcommittee and any recommendations that TWGDRUG has developed to date.

Sub Class Characteristics of Sequentially Rifled .38 Special S&W Revolver Barrels

Frederic A. Tulleners and James S. Hamiel, California Criminalistics Institute

This article illustrates subclass characteristics found in groove impressions on lead bullets that were fired from 10 sequentially manufactured 38 Special, Smith & Wesson revolver barrels. These subclass characteristics were present on some, but not all of the ten sequential barrels and in some but not all of the grove impressions. The rifling impressions of these barrels were the result of the step cutting broach-manufacturing process. These subclass characteristics were not found on the land impressions of the fired lead bullets or on the land or groove impressions of the copper-jacketed bullets.

A National Data Base For Ignitable Liquids: Are We Ready?

John (Jack) Wallace, Orange County Sheriff-Coroner

Ignitable liquids in fire debris are currently identified by comparison to exemplars collected locally and analyzed in-house. A significant concern with this approach is the wide number of ignitable liquids available on the market, and the concern of generating false negative results simply because the ignitable liquid is missing from the analyst's exemplar library. This paper discusses whether a national data base of ignitable liquids would ameliorate this situation, and if so, the key features that such a data base should include. Because laboratories employ a range of analytical conditions, of primary concern is whether ignitable liquids analyzed by different instruments under different conditions can be compared. It is seen that there is little hope of comparing data generated by GC / FID, but that the comparison of GC / MS data collected under different conditions appears much more feasible.

The Transfer from Public to Private Practice in Forensic Science

Richard Watkins, Forensic Science Laboratory

Preparation: Start early. Prior to making the transfer, do civil cases or any others that your organization will allow you to do on the side (moonlighting). It is important in private practice to have a curriculum vitae (C.V.) that demonstrates your experience and expertise in the areas of forensic science that you plan to work. Doing research and writing papers to be published or presented at scientific seminars are also important to your development as an independent forensic scientist.

The work: In my areas of work (alcohol, firearms, tool marks, and general criminalistics) the trend in private practice appears to be less number of cases involving a wider variety of activities, when compared to public practice. A typical private case will include extensive review of the whole case, including DR's and lab reports, conferences with the retaining attorney, evidence examination, writing questions for my own testimony and the expert on the other side of the case, attending depositions, and testimony at trial.

Questions of ethics: My experience has been that there is no pressure from the retaining attorney to slant or bias my work. There is pressure to go as far as is justifiable with ones opinions. To control this pressure I believe it is important to carefully define the scientific basis of the opinions and remain firmly on that basis.

Business considerations: If you aren't a self-starter don't go into private practice. Billing and record keeping take a much larger portion on the day than you expect. Little tricks, like including the retaining attorney's phone number with the case reference number on your copy of the invoice, make your independent consultant life more efficient and leave more time for test firing, etc. Court appointed work can be an eye opener. Find out the limit of the funding for your work before spending your time on the case.

The Role Of The Forensic Nurse Examiner In Sexual Assault Evaluation And Evidence Collection

Margaret Whelan, BSN, RN, Pomerado Sexual Assault Response Team

California law enforcement officials are mandated to provide the means to collect evidence from victims of sexual assault. Due to the increased workload on hospital emergence departments and downsizing of staff, forensic nurses, as independent practitioners, are providing essential services for victims of sexual assault. These services include the use of colposcopic examination, chemical markers, alternate light sources, and other techniques in the forensic examination process. These technical advances were previously unavailable by traditional means both in the clinical setting and in the post-mortem examination of deceased victims in suspected sexual assault cases. The effective evaluation of sexual assault trauma is a complex process requiring the combined expertise of a

variety of professionals working together as a team. This multidisciplinary team includes, among others, experienced law enforcement investigators, forensic nurse examiners, forensic pathologists, toxicologists, and criminalists. Clearly, the evaluation of findings in sexual assault is fundamentally dependent upon accurate data identification, collection, and preservation processes of valuable biological and trace evidence. This presentation is designed to describe the most advanced methods of evidence collection based on current scientific research and to introduce the role of the forensic nurse examiner of the Sexual Assault Response Team (SART) San Diego County.

Flagging the Defense

Fred Whitehurst, Forensic Justice Project

Public concerns about proprosecutorial bias within forensic science have been raised in recent years as more and more examples of past misconduct within forensic laboratories have come to light. This paper explores implications of such attitudes and actions on the part of forensic scientists and offers possible solutions to the problem which already exist within the justice community. After a short history of publicized cases of forensic misconduct, the legal and practical implications of this misconduct are discussed and then solutions ranging from the Hard Lock Doctrine to the Highest Corporate Official Doctrine, both derived from environmental law, are offered as solutions. The issues are explored within the context of the 1930's case involving the Scottsboro Boys and their inability to protect themselves within an adversarial justice system due to their abysmal ignorance. The analogy is made between those defenseless young men and defendants in modern courts of law unable to protect themselves from biased science.

Semiautomatic Rifle in the "Assault Weapons" Control Act of 1989

Eugene J. Wolberg, E.J. Wolberg Forensics

With the passing of the "Assault Weapon" Control Act of 1989, the identification of so called "Assault Weapons" has caused much confusion and erroneous identifications. The end results are numerous erroneous prosecutions and convictions. The firearm that has caused the greatest number of bad identifications is the "SKS with DETACHABLE MAGAZINE." The author will identify the relevant variants of the SKS including just what is a "detachable" magazine and what is a "removable" magazine. While a specific model of SKS with a detachable magazine does exist and is correctly identified in the Attorney Generals Identification Guide, conflicts with the firearms terms of art of "detachable / removable" and the plain use of the term "detachable" has lead to misidentifications and subsequently to prosecutions for the wrong firearm. The differences in identification concepts of both the Federal and the State of California "Assault Weapon" identification will also be discussed.

JOHN**SIMMS**

Quality Assured

They Asked For It—They Got It!

ASCLD-LAB has solicited feedback on the many different aspects of their process, including the fee structure and inspection process, all in the interests of restructuring. Both the Northern and Southern QA Study Groups met separately to discuss how the inspection process might be improved to achieve both consistency and the appropriate level of thoroughness. Both groups offered advice to ASCLD/LAB. In this column, I will present the many suggestions that came out of those group discussions.

Paid Inspectors: Both the Northern and Southern Groups recommended paid Team Captains and the Northern group recommended paid inspectors.

QA Managers: The Southern group felt there should be at least one QA manager on each inspection team. The daily routine of a QA manager is process review.

Inspection Week Interaction: There should be clearer guidelines on the interaction between the ASCLD/LAB board member assigned to the inspection and the inspection team captain. In fact, it was felt there should be daily contact even for the review of routine issues. The Northern group felt that in the event of conflicting opinions, a PRC (proficiency review committee) for the particular area being inspected could help resolve the issue.

Advance Materials: it was made apparent that the materials from the lab to be inspected were not being consistently sent out to team members in advance for preparation before the inspection week arrived. The board must make certain that every captain sends those materials out for greater efficiency and effectiveness during the inspection week. An all inclusive website should be created that would have all of the board decisions listed as reference.

Surveys: This is the one suggestion that the Southern group felt the strongest about. Currently, the inspection process includes a survey sent to the lab manager after the inspection and accreditation process. This survey is very general and voluntary. Restructuring should include a mandatory survey sent to the supervisors of the units that were inspected. The surveys should address the process of the unit inspection and the level of detail that was assessed by the inspector. In fact, it should be made so that the process does not move forward without the surveys being completed and mailed in to the board. The surveys would remain on file as reference for future captains in choosing team members. Of course they should be reviewed by the board to determine if the field inspectors were doing a proper job or not.

Competency: Both groups felt the board in some way needs to establish an expertise check on the inspectors who claim to be experts in certain fields. This might be done through testing, verification from the lab manager, establishing certain minimum qualifications to be deemed an expert, or any other number of ways.

There are many ideas about how ASCLD/LAB can change the process to make things more consistent.

Additional Northern QA recommendations included:

1. The team captain must remain constructive, positive, and helpful—not punitive.
2. Do not accommodate the TWG standards at this time due to the continuous change mode they are in.
3. Tighten up on criteria and how to achieve it.
4. Annual update training, multi-media usage.
5. Do not participate in pre-inspections.
6. The inspection teams should have PRC discrepancy information.
7. Move to the ISO Guide 25 with inspections every 2.5 years.

As you can see, there are many ideas about how ASCLD/LAB can change the process to make things more consistent. Where the recommendations will take us is a complete unknown at this time. Some of these recommendations cost little or no money at all, such as making the survey tool more prominent in the process. Other suggestions such as paid team captains and/or inspection teams, cause us to wonder just who is going to pay these additional costs . . . and the answer is, of course, we are in some way or another.

But I am fortunate enough to have been invited to the strategic planning meeting being held in Fort Lauderdale, Florida, on April 24-25. If you have any additional ideas that you would like me to carry back to the Orlando meeting, just call me at 619-531-2576, or e-mail me at tzfan@yahoo.com.

I will report on the happenings of the strategic planning meeting as well as the international symposium on QA being being held in San Antonio in May, in my next column.

John

Treasurer's Financial Report

General Association Account
Account Balances, July 1, 1998 to December 31, 1998

Cash Balance July 1,1998		$49,546.57
INCOME		
Interest	$663.42	
Meetings	-	
Seminars	$12,220.36	
Membership dues	$29,972.50	
Membership applications	$2,790.00	
Newsletter	$240.00	
Advertising	$75.00	
Endowment income	-	
Other	-	
(Seminar Visa Income Holding)		
Total income	$45,961.28	$45,961.28
EXPENSES		
Travel	$1,555.72	
Printing	$8,306.28	
Postage	$1,102.68	
Supplies	$57.99	
Bank fees	$682.25	
Accounting service fees	-	
Awards	$1,111.84	
Meetings	$53.89	
Seminars	$668.67	
ABC support	-	
Memorial donations	-	
Endowment Exp., admin.	-	
Journal	-	
Phone	$67.29	
Refunds	-	
Newmember	$19.20	
Consultations	-	
Other	$226.44	
Total Expenses	$13,852.25	$(13,852.25)
Cash Balance December 31, 1998		$81,655.60

Cash on hand 31-Dec-98	Savings	$72,869.23
	Checking	$5,286.37
	Fall 98 seminar	$1,000.00
	Spring 99 seminar	$2,000.00
	Fall 99 seminar	$500.00
		$81,655.60

Michael John Parigian CAC-Treasurer

Note: Merchandise Account Balance December 31, 1998 $1,268.02

The Design, Composition, Exterior Ballistic, Terminal Ballistic and Wound Ballistic Properties of Contemporary Frangible Ammunition

*L. Haag**

Keywords
frangible-, copper-, tungsten-, nylon bullets, disintegrating bullets, training ammunition

Abstract

A new generation of frangible ammunition is gaining popularity on law enforcement and other indoor shooting ranges because of its totally lead-free construction. It is also being used in police "shoot-houses" and has been considered for use in entry (raid) situations because of its reduced range and frangible nature when striking 'hard' objects such as walls, windows, doors, etc. Other proposed uses include prisons, banks and other commercial institutions employing armed security forces as well as certain other specialized security applications.

At least four manufacturers are now supplying frangible ammunition (as defined here) in a number of popular calibers each with their own special compositional and design features.

As these products become more popular, then can be expected to show up in case work where the first surprise will be that they can*not* be associated with the gun that fired them in the usual manner. The second surprise is that these bullets are not necessarily frangible. There are several other revelations awaiting the criminalist when shooting incidents involving this 'new' type of ammunition arrive in the laboratory.

INTRODUCTION

Frangible bullets are not a new form of munition. Special 30 caliber machine gun cartridges with plastic bullets containing lead particles were developed in the Second World War for gunnery practice against real airplanes. So-called 22 rimfire 'gallery' cartridges for use at shooting galleries at carnivals, etc. were loaded with bullets made of powder iron in an organic glue-like matrix. Like the military practice ammunition, these were of relatively low velocity compared to the standard ammunition from which they were derived. Similar 22 rimfire cartridges with powdered iron bullets are still available for use in slaughter houses where they are usually fired directly into the brain of the animal to be processed. The ammunition described in this paper is quite different from these historical examples and represents a new product line available from several sources. These new, centerfire cartridges have been designed to provide a training round with comparable recoil, velocity and accuracy of the regular factory ammunition in the same caliber but with the added safety of bullet break-up on the target back stop and the removal of lead and other heavy metals from the shooting area.

Any meaningful discussion of these new and interesting products must start with a definition of *frangible*; ***adj.*** capable of being broken; breakable. A frangible bullet is *not* synonymous with a disintegrating bullet even though the contemporary product literature from the manufacturers will typically show these bullets disintegrating into relatively fine particles upon impact with steel backstops such as those employed in indoor shooting facilities. This is what they are designed to do in this application. When these projectiles are used (or misused) in some other application, they may behave like a very hard, full metal jacketed bullet and undergo little or no deformation or they may only break into 2 or 3 fragments. In this latter situation they are more like a ceramic material than a metal projectile. In a few instances, these projectiles will break in many very small pieces and approach the disintegrating situation depicted in the manufacturers' brochures during their intended use [see **Photograph 1A** and **1B**]. It should be pointed out that this use has been prompted by the Federal Government's plans to lower / remove airborne lead from indoor shooting ranges. Clearly the ammunition industry has no interest in making a product that will defeat identification efforts by criminalists and forensic firearms examiners. I am compelled to say this because there will be (and already have been) those of the 'sanction *things* rather than wrongdoers' who will run to their nearest legislator after they read this article and will want all frangible bullets banned.

As of this writing (February 1999) there are at least four potential sources of the type of frangible ammunition described in this article. These are:

Delta Frangible Ammunition
P.O. Box 2350
Safford, VA 22555

Longbow, Inc.
P.O. Box 624
Burns Flat, OK 73624-0624

Ranger Frangible Ammunition
Winchester Div. - Olin Corp.
427 N. Shamrock St.
East Alton, IL 62024-1197

Green Shield Training Ammunition
Simunition Technologies
Le Gardeur, Quebec, Canada

These companies presently supply ammunition in most to all of the following calibers: 9mmP, 38 Spl. / 357 Magnum, 40S&W , 45 Automatic and 5.56 x 45mm (.223 Rem.). Bullet weights vary between manufacturers but all are lighter than their equivalent ball round (full metal jacketed bullet of the same approximate shape and dimensions).

*Forensic Science Services, P.O. Box 5347, Carefree, AZ 85377
Winner, Al Biasotti award for most outstanding presentation at the Fall 1998 CAC Seminar in San Diego, CA.

Composition and Class Characteristics

The Longbow and Green Shield bullets are composed of copper particles in a plastic matrix (nylon). The Delta and Winchester compositions consist of copper and tungsten particles in either nylon 6 or nylon 11 (depending on the particular bullet). These latter two companies have incorporated tungsten in the mix to elevate the mass of the bullet and to cause the fragmented particles to settle rapidly (rather than remain airborne in the shooting range environment). All of these bullets are made by forming or casting the molten blend of metal particles in the nylon matrix. They all possess a reddish-brown color due to their substantial copper content. Copper provides weight and lubricity; the nylon provides the 'glue' to hold the metal particles together. In the intact or relatively undamaged condition, their source (brand) can usually be differentiated by their shape and / or mould markings on their bases. If featureless fragments are all that is recovered and submitted as evidence, an SEM / EDX scan will quickly reveal both the morphology of the metallic particles and the metallic makeup of the original bullet [see **Photograph 2** and **Photograph 3**]. **Figure 1** and **Figure 2** show the SEM / EDX spectra of one of the Delta brand bullets (composed of copper and tungsten particles) and one of the Longbow 9mm bullets. The source of the calcium and sulfur in the Delta bullet are presently unknown. Both Longbow and Delta / Winchester ammunition were used the by this writer, for the various studies carried out.

Note: Winchester purchased the right to assemble and market the tungsten-containing Delta bullets under their "Ranger" product line so many of the later shots fired in this study were carried out using Winchester Ranger Frangible ammunition containing the same design and weight of bullets as the original Delta product.

Exterior Ballistic Performance

An Oehler Model 43 Personal Ballistics Laboratory system (Oehler Research, P.O. Box 9135, Austin, TX 78766) was used to calculate muzzle velocity and ballistic coefficient for these bullets- the latter being an expression of how well such bullets perform (insofar as velocity retention) over distance. Multiple shots (5 to 10 rounds each) were carried out with two sets of down range sky screens set at 10 feet and 100 feet beyond the muzzle of the test guns. These firearms consisted of a Ruger P85 (9mmP-4.25" barrel), a Beretta Model 96 (40S&W-4.9" barrel), a SIG P220 (45 Auto-4.25" barrel) and two AR-15 rifles (5.56mm-20" barrel, one with a 1 in 12" twist and the other with a 1 in 7" twist). Based on the round holes in the down range targets, all of these bullets were spin-stabilized. This was of some considerable interest since one of the ballistic problems encountered in the design of such light weight bullets made out of non-standard materials is their spin-stabilization when fired through conventional firearms. **Photograph 4A** provides a profile view of representative 9mm and 45 caliber members of the frangible bullets evaluated in this study alongside their standard full metal jacketed counterparts. **Photograph 4B** shows the Longbow and Winchester / Delta 5.56mm rifle bullets. **Table 1** provides the results of actual test firings of representative members these rounds with additional calculated down range velocities at 100 and 200 yards. These entries are of some interest in the event one were to mistakenly conclude that these light weight bullets simply fall to the ground after a few hundred yards of flight. Measured values for standard cartridges fired from the same test gun under the same conditions are also included in italics so the reader can have a rapid means of comparing performance of the frangible bullets against a common, full metal jacketed bullet in each caliber. These fir-

TABLE 1

CARTRIDGE	Bullet Wt. & Design	Avg. M.V.	50 yds.	100 yds.	200 yds.	B.C.
PMC 9MM	*115 gr. - FMJ-RN*	*1113f/s*	*1009f/s*	*936f/s*	*830f/s*	*0.13*
DELTA 9MM	85 gr. RN	1407	1106	952	779	0.074
LONGBOW 9MM	95 gr. TC	1226	1013	897	743	0.074
WIN. 40 S&W	*180 gr. TC*	*969*	*897*	*840*	*744*	*0.11*
DELTA 40 S&W	105 gr. TC	1259	1032	911	755	0.076
FED. 45 ACP	*230 gr. FMJ-RN*	*754*	*724*	*696*	*643*	*0.16*
DELTA 45ACP	125 gr. RN	1139	974	874	733	0.077
LONGBOW 45 ACP	140 gr. TC	1004	887	801	668	0.071
FED. 5.56MM	*55 gr. FMJ-BT*	*3209*	*2944*	*2695*	*2235*	*0.19*
DELTA 5.56MM	33 gr. RN	3174	2566	2034	1223	0.078
LONGBOW	35 gr. TC	3206	2486	1871	1062	0.065

RN = round nose TC = truncated cone FMJ-BT = full metal jacket - boat tail

ings were carried out at 1650 ft. MSL, temperature of approximately 80^0 F and relative humidity of about 15%. Winds were calm. The G_1 ballistic coefficient values have been corrected to standard sea level conditions.

A study of this table reveals several interesting facts. The frangible pistol bullets are all lighter in weight that their standard counterparts but their muzzle velocities are considerably higher. The frangible 5.56mm rifle cartridges also possess lighter bullets but their muzzle velocities are comparable to the standard M193 ball round. As expected, the ballistic coefficient values for the frangible bullets are all low due to their light weight and relatively poor ballistic shape. The value for the 55 gr. FMJ-BT rifle bullet is somewhat less than the expected value .26. This is most likely due to the initial in-flight instability (slight yawing) of these relatively long rifle bullets combined with the short range (100 feet) over which they were fired in these tests.

Since rifles are frequently used for shots at greater distances than those taken with handguns, it was deemed desirable to extended the down range calculations for the 5.56mm rounds. This is shown in **Table 2**.

TABLE 2

5.56mm RIFLE DATA: EXPANDED OUT TO 500 YARDS

CARTRIDGE	Bullet Wt. & Design	Avg. M.V.	100 yds.	300 yds.	500 yds.	B.C.
FED. 5.56MM	*55 gr. FMJ-BT*	*3209f/s*	*2695f/s*	*1824f/s*	*1197f/s*	*0.19*
DELTA 5.56MM	33 gr. RN	3174	2034	905	641	0.078
LONGBOW	35 gr. TC	3206	1871	815	552	0.065

Note: Five shot averages. All cartridges fired from a Colt H-Bar with a 1 in 7" twist and 20" barrel.

As can be seen from **Table 2**, even at 500 yards, neither of the frangible 5.56mm bullets have dropped to velocities that would be expected to be non-injurious (e.g.- below 200f/s).

Internal Ballistic/Identification Considerations

Although the lands of the firearm in which such cartridges are discharged satisfactorily grip and spin these bullets to achieve gyroscopic stability for their journey through the atmosphere, the land impressions on the recovered bullets range from *very* subtle (Winchester/Delta bullets) to visible but not sharply delineated. Land and groove counts as well as direction of twist can usually be established but these bullets *lack* the striae needed for bullet-to-gun identification. **Photograph 5** shows a view through the comparison microscope of a normal jacketed bullet on the left and a frangible (Longbow) bullet on the right fired through the same pistol. The galled appearance of the land impression in the frangible bullet helps explain why substantial quantities of copper particles are expelled from the muzzle of the gun with these bullets.

It was noticed that multiple shots with these cartridges left streaks of the nylon composition in the bores of the various test guns used in this study [see **Photograph 6**]. This was not viewed as problematic from a practical standpoint since several shots with traditional ammunition readily removed these deposits. It is, however, the possible presence of this material as important trace evidence that should be recognized.

The presence of tungsten particles in some of these products raises the possibility of relatively rapid changes in the minutia in the bore associated with the individual characteristics imparted to traditional bullets. This is due to the greater hardness for tungsten compared to steel (ca. 7 vs. 5 on the Mohr scale with copper and lead at 3 and 1.5 respectively).

Examination of one of the Delta bullets under the SEM revealed some of these tungsten particles to even have somewhat pointed ends in some instances [see **Photograph 2**]. To test this hypothesis, two firearms that yielded reproducible striae on copper jacketed bullets were selected. These were a Model 39 S&W 9mm pistol and a Colt 45 Automatic pistol both of which had broached barrels in good condition with conventional rifling. The bores of these pistols were cast with gray Mikrosil to record the surface features of the lands and grooves prior to any shots with the tungsten-containing frangible bullets. Common full metal jacketed bullets were also collected from each pistol (Winchester 115 gr. FMJ-RN and Winchester 230 gr. FMJ-RN respectively). These could easily be matched among themselves under the comparison microscope. After thirty shots through each pistol using Winchester Ranger frangible ammunition, multiple copper jacketed bullets were again collected using a water recovery tank. These 'post-frangible' bullets could once again be matched among themselves with no difficulty. But when compared with the 'pre-frangible' bullets, the comparisons were much more tenuous. In an effort to remove any expectations or bias on the part of this writer, these sets of bullets were scanned and intercompared by Howard Kong with the IBIS system at the BATF Laboratory in Walnut Creek, CA with comparable results, i.e.- very high correlation for members within the pre- and post-frangible sets but low correlations between same gun members before and after the discharge of the tungsten-containing frangible rounds. Re-casting of the bores of these pistols and comparisons with the pre-frangible casts revealed *no* discernable changes consequently the author is uncertain where the changes in these barrels have taken place. They are, nonetheless, undergoing change as a consequence of shooting the tungsten-containing bullets.

The recovered cartridge cases also possess some characteristics of forensic interest. The headstamps on many of the Delta cartridges are "DFA" at 12 o'clock with cartridge designation at 6 o'clock but some with Winchester and - (Star)

headstamps have also been encountered. The headstamps of the lead-free Longbow pistol cartridges were "LB-NTF" at 12 o'clock, a shallow, vertical "LF" on the nickel-plated primer and the cartridge designation at 6 o'clock. Longbow's 5.56mm cartridges possessed the R-P (Remington) headstamp and the vertical "LF" on the nickel-plated primers.

Note: remnants of the LF imprint in the primers of *fired* cartridges can be very faint to non-existent depending on the size of the firing pin, the nature of the breechface and / or the pressures achieved during the discharge process. **Photograph 7** shows an unfired and fired Longbow 9mm cartridge with primers possessing the 'LF' imprint. A vestige of the upper portion of the 'L' can be seen in the fired cartridge at the 11 o'clock position to the firing pin impression.

FTIR analysis of the primer mix in the Longbow LF (lead-free) 9mm ammunition showed Dinol (DDNP or diazodinitrophenol) to be present. This was also the case with the Winchester Ranger Non-Tox ammunition. This is an organic, impact-sensitive explosive whose I.R. spectrum in shown in **Figure 3**. SEM / EDX analysis of the residues in the Longbow LF primers revealed substantial levels of barium (from barium nitrate)[see **Figure 4**]. Note: these primers are most likely manufactured by Blount who also makes a "CleanFire" primer with a CF imprint in the primer. The CleanFire primers will show strontium (from strontium nitrate) but *no* lead, barium or antimony upon EDX analysis.

The Winchester Ranger products have had either" WIN" or "W-W"headstamps at the 12 o'clock position, brass cases, nickel-plated primers and a dark blue primer annulus lacquer. The 45 Auto cases were also noted to have oversized flash holes. SEM / EDX testing of the interior of cartridges primed with Winchester lead-free primers will show a large potassium peak [see **Figure 5**].

Analysis of this primer mix showed it to be potassium nitrate, boron and dinol. It was also observed that small amounts of lead may also be detected inside any of the non-toxic (lead-free) cartridge cases but this lead is *not* from the primer mix. Rather it is the result of back-flow deposition of lead from a bore contaminated with lead from the previous discharge of standard ammunition. This was verified in a study by this writer and Rob Bates of the Mesa Police Crime Laboratory, Mesa, AZ wherein as many as 15 to 20 rounds of Winchester Ranger Non-Tox (lead-free) Frangible ammunition was fired through a previously-uncleaned pistol and lead was still appearing inside the fired cartridge cases. Simple cleaning of the bore with a tight-fitting cotton patch eliminated any recognizable lead from the interior of subsequent fired cartridge cases.

*There are now a number of brands and product lines from American manufacturers loaded with so-called non-toxic priming compositions meaning that there is not only no lead but there may also be *no* barium or antimony in the primer mix.

Terminal Ballistic Performance

Since some of the proposed applications of these products relate to situations where bullet ricochet and / or the penetration of various objects and barriers is *un*desirable, a number of potential materials were studied. These included 1 / 4 inch windshield glass, 1 / 8 inch window glass, common gypsum wall board, 2x4 pine boards (used as studs in the construction of walls in homes), and 22 gauge automotive sheet metal. Low incident angle ricochet tests (I 6^0) were carried out against several substrates ranging from heavy steel plates to pine boards and wall board. The frangible pistol bullets typically remained intact after striking wall board, sheet metal, standard 1 / 8 inch window glass and pine boards. Some recovered Delta and Longbow pistol bullets recovered after they perforated some of these barrier materials are shown in **Photograph 8** along with several bullets fired into major bones mounted in ordnance gelatin. Windshield glass, with its greater thickness and double-layered construction, was a somewhat more formidable barrier to these bullets and produced greater fragmentation. When these bullets did break up, it was usually into several major pieces rather than small fragments and / or particles. Such fragments were almost ceramic in nature and could be reassembled just like any other physical match evidence. **Photograph 9** shows two re-assembled 45 Automatic bullets after their recovery from a gelatin block in which they struck and penetrated a beef leg bone.

During ricochet tests from various substrates, there was occasional to some fragmentation when these pistol bullets were ricocheted from an unyielding steel surface. This fragmentation increased as one would expect when the incident angle was increased to about 12^0. The 5.56mm frangible rifle bullets broke up into numerous small fragments even at the relatively shallow incident angle of 5^0 to 6^0. Softer, more yielding surfaces like wooden boards, wall board, soil, etc. typically allowed the frangible pistol bullets to ricochet intact but destabilized.

As with the ricochet tests, the frangible rifle bullets were much more inclined to fragment particularly with substantial barriers like 0.25 inch thick windshield glass. Nonetheless, both the Longbow and Delta 5.56mm rifle bullets readily perforated 0.10 inch thick steel leaving relatively 'normal' appearing holes with fragmentation upon exiting [see **Photograph 10**]. Very little, if any, fragmentation occurred on the entry side of this steel panel as evidenced by a cardstock witness panel placed on the impact side of this target. It should be noted that this particular steel panel is comparable to a heavy steel bumper on a full-sized automobile or pickup truck.

One very disconcerting matter that appeared during the course of these tests is that these bullets do *not* leave the typical gray ring of 'bullet wipe' around holes in cloth, soft wooden boards, filter paper or other like materials where 'bullet wipe' would be expected. The margins of bullet holes produced by such bullets can be expected to be lead-free since the bullets contain no lead nor do most of the primers used with these cartridges. Microchemical tests for copper however (such as the DTO test and / or the 2-NN test previously described by this writer at the Spring '96 CAC Seminar in Milpitas and published in the CCI-DOJ *Firearms Trajectory Analysis* syllabus) should yield positive results when carried out by either direct application (when appropriate) or by the transfer method.

While the absence of the customary grayish, lead-containing bullet wipe around the margins of holes produced by these bullets falls in the minus column for the forensic scientist, there is one (possibly two) positive aspects insofar as gunshot residue is concerned. At muzzle-to-target distances of a few inches to perhaps several feet, *numerous* small particles of copper-containing bullet composition, eroded and galled from the surface of the projectile during its journey down the bore, are ejected much like partially-burned powder particles. These particles along with the often novel lead-free primer constituents

and partially-consumed powder particles will be deposited on the surface of close-range objects. Careful examination of such surfaces under the stereomicroscope should allow some of these particles to be recovered for testing. The use of the previous reagents for copper (preferably by the transfer method using aqueous 2:5 ammonium hydroxide on filter paper (or Whatman BenchKote paper) will develop these close-range copper deposits. This pattern can be used much like a powder pattern to estimate the muzzle standoff distance. **Photograph 11** shows a 12 inch muzzle-to-target deposit on filter paper produced by a round of the Winchester Ranger 45 Automatic ammunition after approximately ½ of the pattern was sprayed with the DTO reagent for copper.

Wound Ballistic Performance

For this purpose, the well-recognized tissue simulant, 10%w / w ordnance gelatin at 4^0C, was employed. Fresh bovine leg bones were inserted approximately 2 inches deep in a number of the gelatin blocks to simulant heavy bones such as a femur in an adult leg.

Despite the lighter weight of the frangible pistol bullets, they penetrated quite deeply into the blocks of calibrated gelatin. (Standard 5.3 gr. .173" diameter steel air rifle BBs were used to 'calibrate' each block of gelatin. The impact velocity / penetration values are included in [ ] with each result for the various frangible bullets fired into ordnance gelatin.)

Selected results are given in **Table 3** through **Table 7** and seldom fragment unless substantial bones are struck during the early phase of gelatin penetration.

From the foregoing, it can be seen that insofar as the pistol bullets are concerned, they are not particularly frangible when shot into the standard tissue simulant. Even impact with sub-

TABLE 3
DELTA 85 gr. 9mm BULLETS in
4^0C - 10% ORDNANCE GELATIN

V_{IMP} (f / s)	Penetration (in.)	Comments
1381	17.2	Intact bullet remained nose forward [580f / s BB⇨4.0"]
1375	14.8*	Intact bullet exited* out the side of the block after 14.8" of penetration 580f / s BB⇨4.0"]
1391	16.5	Intact bullet reversed itself after ca. 6"penetration., experienced approx. 15^0 deviation. [584f / s BB⇨3.8"]

TABLE 4
DELTA 105 gr. 40S&W BULLETS into
4^0C - 10% ORDNANCE GELATIN

V_{IMP} (f / s)	Penetration (in.)	Comments
1383	25+	Intact bullet perforated block, straight track, no indication of yaw [580f / s BB⇨3.8"]
1380	17.0	Bullet yawed at ca. 6", broke into 2 pieces [580f / s BB⇨3.8"]
1343	25+	Intact bullet perforated block, straight track, no indication of yaw [580f / s BB⇨3.8"]

TABLE 5
DELTA 125 gr. 45 AUTO BULLETS into
4^0C - 10% ORDNANCE GELATIN

V_{IMP} (f / s)	Penetration (in.)	Comments
1152	18.5*	Intact bullet exited* out the side of the block after 18.5" penetration [580f / s BB⇨4.5"]
1148	21.0*	Intact bullet exited* out the side of the block after 21.0" of penetration [580f / s BB 4.5"]
1149	20.5*	Intact bullet exited* out the side of the block after 20.5" of penetration [580f / s BB 4.5"]

TABLE 6
RIFLE BULLETS into ORDNANCE GELATIN
LONGBOW 35 gr. 5.56mm BULLETS into
4^0C - 10% ORDNANCE GELATIN

V_{IMP} (f / s)	Comments
3210	Partial disintegration of bullet in6½" block of gelatin
3212	Partial disintegration of bullet in 9" block of gelatin; some fragments exited the gelatin block

DELTA 33 gr. 5.56mm BULLETS into
4^0C - 10% ORDNANCE GELATIN

V_{IMP} (f / s)	Comments
3175	Near-complete disintegration of bullet in 9" block of gelatin; 2.5" temporary cavity in the first 3.5"; 6.6 gr. fragment (base) at 8.5", straight track [578f / s BB⇨3.9"]
3250	Near-complete disintegration of bullet in 9" block of gelatin; 3.0" temporary cavity in the first 3.5";3.0 gr. fragment at the end of a 6.5" straight track [606f / s BB⇨4.0"]

See **Photograph 12** of gel block and fragments.

TABLE 7
SHOTS INTO HEAVY BONE

DELTA 85 gr. 9mm BULLETS into HEAVY BONE

POSITIONED 2 INCHES DEEP in
4⁰C - 10% ORDNANCE GELATIN

V_{IMP} (f/s)	Comments
1390	Bullet intact; fractured bone

BONE POSITIONED 3 INCHES DEEP in
ORDNANCE GELATIN

V_{IMP} (f/s)	Comments
1427	Bullet fragmented; perforated one side of 0.28" thick wall of 1.5" diameter bone; no exit only small fragments recovered

LONGBOW 95 gr. 9mm BULLET into HEAVY BONE
POSITIONED 2 INCHES DEEP in
4⁰C - 10% ORDNANCE GELATIN

V_{IMP} (f/s)	Comments
1208	Bullet fragmented; perforated one side of 0.30" thick wall of 1.5" diameter bone; only several large fragments of bullet recovered

DELTA 125 gr. 45 AUTO BULLET into HEAVY BONE
3 INCHES DEEP in 10% ORDNANCE GELATIN

V_{IMP} (f/s)	Comments
1119	Bullet intact; fractured bone

LONGBOW 140 gr. 45 AUTO BULLET into HEAVY BONE
2.5 INCHES DEEP in 10% ORDNANCE GELATIN

V_{IMp} (f/s)	Comments
978	Bullet fragmented; perforated one side of 0.28" thick wall of a 1.5" diameter bone; only several large fragments of bullet recovered

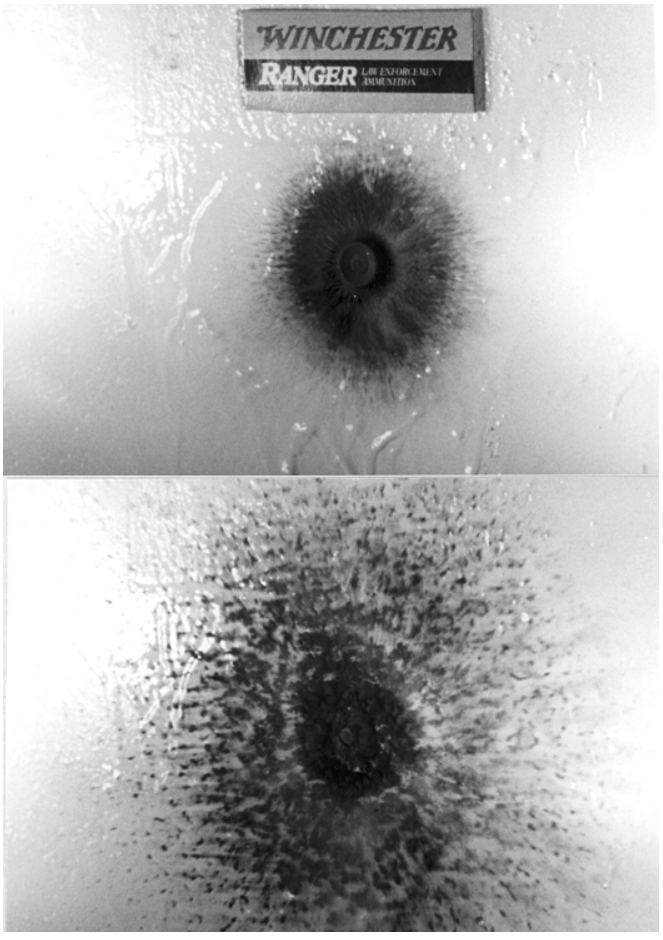
stantial bones during the first few inches of gelatin penetration typically results in the sort of 2 to 3 major fragments such as those shown in **Photograph 9**. In the absence of an impact with bone, these bullets penetrate deeply (15 to 20 inches and more) and are likely to exit typical human torsos under such conditions.

In a very preliminary evaluation, several shots using the Winchester-Ranger 9mm and 45 Automatic fired into common soft body armor used by American law enforcement were defeated (stopped).

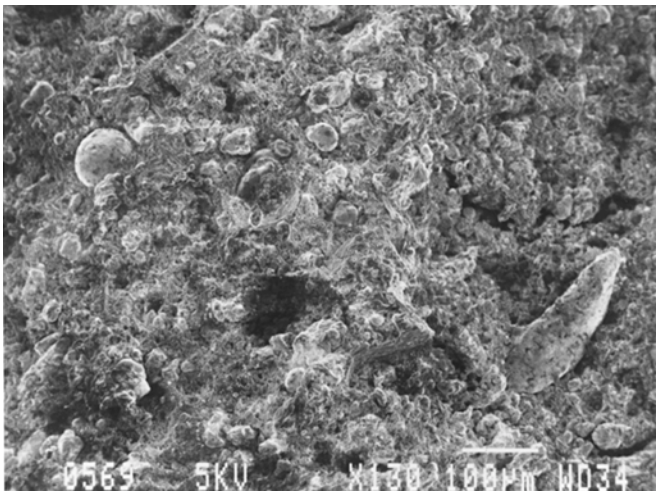
SUMMARY and CONCLUSIONS

These new and interesting products stand to fulfill a useful role in reducing airborne lead and other heavy metals in training environments. If they are used (or misused) in other environments, they will present some interesting challenges and new opportunities to the criminalist and firearms examiner. This is due to their unusual composition, non-standard primer constituents and ballistic performance. Traditional 'bullet wipe' around the margins of bullet holes in garments is not likely to be found. On the other hand, the deposition of finely divided copper particles in a plastic matrix will occur around the bullet hole when this ammunition is fired at close range. Characteristic deposits stand to be left in the bore of guns that have fired such ammunition. When such bullets fragment, they behave much like a ceramic material consequently the fragments can often be reassembled. The composition of each manufacturers' bullets, their design features and certain combinations of letters, numbers and/or raised dots on the bases of these bullets can serve to identify the manufacturer. Examples are shown in **Photograph 13**.

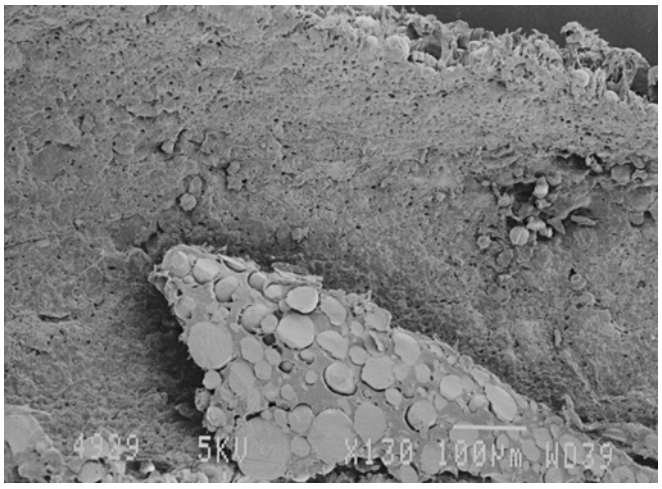
Although these bullets have poorer ballistic coefficients than their traditional counterparts, they will retain significant velocity for many hundred yards. Furthermore, their wound ballistic characteristics are substantial in that the pistol bullets penetrate deeply and do not break up into small fragments. The 5.56mm frangible rifle bullets, on the other hand, break up into many small fragments and penetrate much less deeply than the pistol bullets.



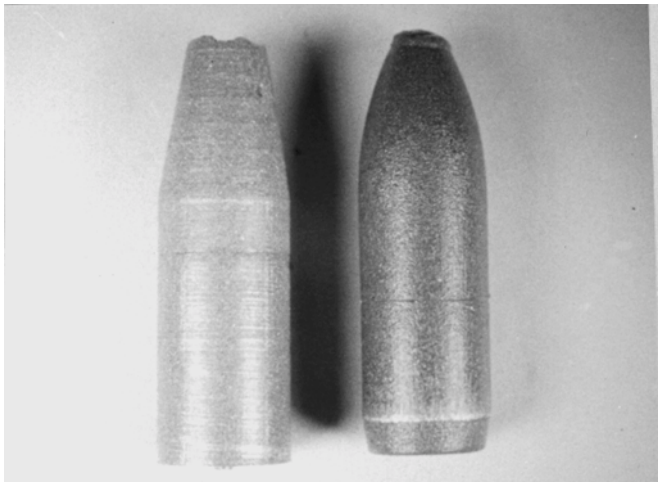
Photograph 1A / 1B
Two high speed photo-frames of a winchester ranger 45 auto bullet (125 gr.) striking a 1/4 inch steel plate (57-60 B.H.)



Photograph 2
SEM view (130x) of a Delta brand 45 auto bullet showing particles of copper and tungsten.

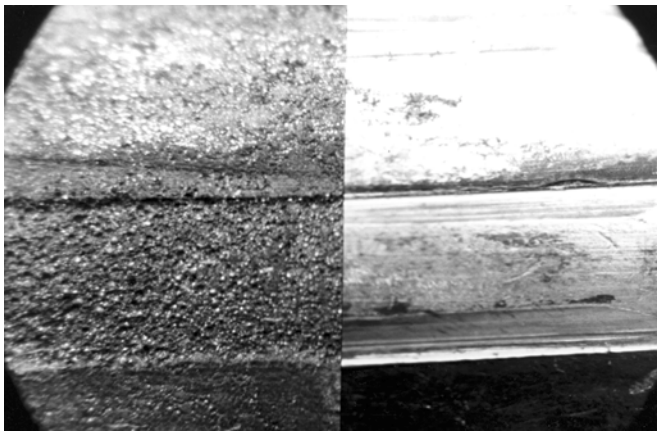


Photograph 3
SEM view (130x) of a shaving from a Longbow 9mmP bullet showing particles of copper.
Note 1: Triangular portion is a shaving cut with a scalpel; remaining area is the normal exterior surface.
Note 2: This sample had to be lightly gold coated due to charging from the non-conductive nylon.

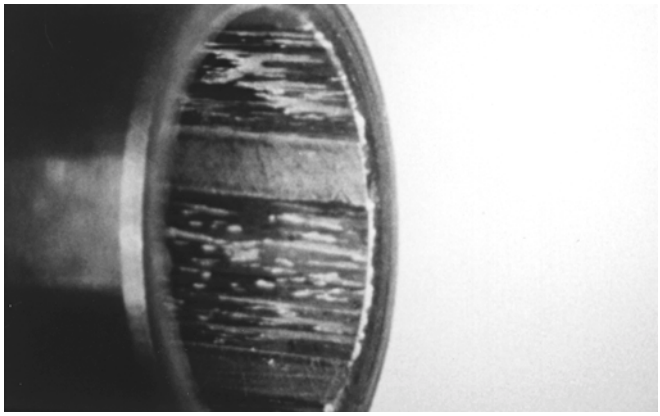


Photograph 4A
Fired standard and frangible pistol bullets: (l-r) 9mm FMJ, Longbow 9mm, Winchester/Delta 9mm, 45 auto FMJ, Longbow 45 auto, Winchester/Delta 45 auto.

Photograph 4B
UNfired Longbow (l) and Winchester/Delta (r) 5.56mm rifle bullets.



Photograph 5
Comparison microscope view of a 9mm Longbow bullet (left) and a standard copper jacketed bullet fired through the same pistol.

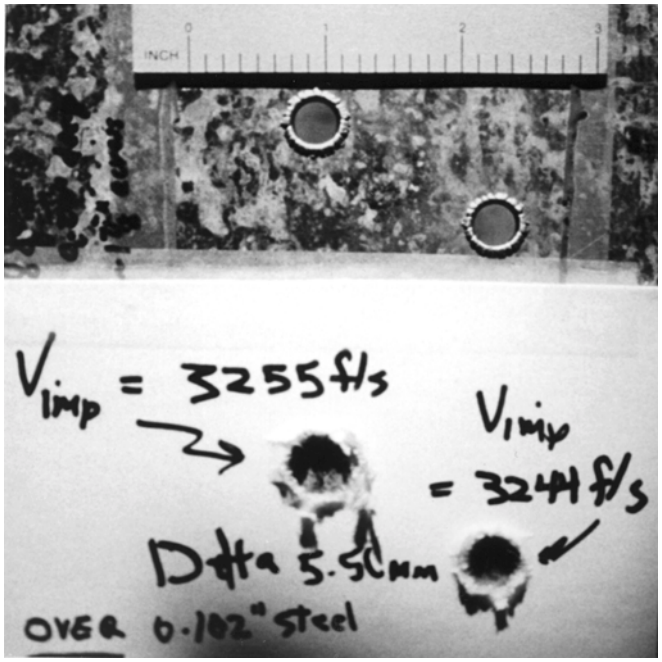


Photograph 6
Streaked deposits of frangible bullet composition in the bore of a 45 automatic pistol.

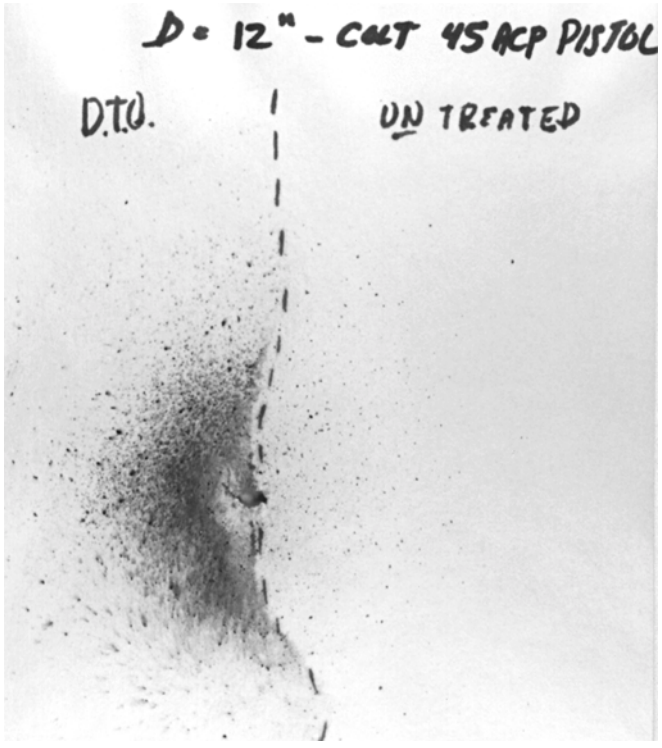
Photograph 7
An unfired 9mm Longbow cartridge showing the "LF" imprint in the lead-free primer.

Photograph 8
Recovered pistol bullets as shown.

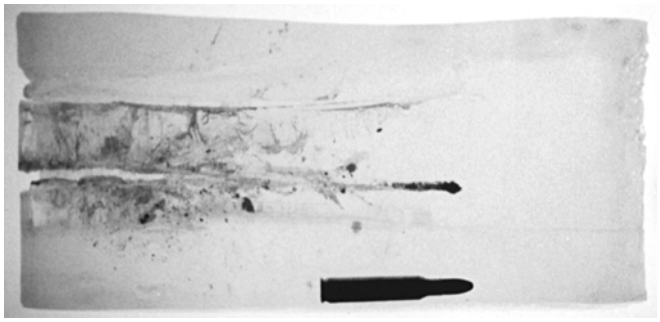
Photograph 9
A reassembled Winchester-Ranger and Longbow 45 auto bullet after impact with a heavy beef leg bone in ordnance gelatin.



Photograph 10
Entry bullet holes in 0.102 inch thick steel produced by Winchester-Delta and Longbow 5.56mm rifle bullets. (Note: The cardstock witness panel in the lower portion of the photograph was on the surface of the steel when these bullets struck with the measured impact velocities shown.)



Photograph 11
Filter paper witness panel with discharge residues for a shot fired at a standoff distance of 12 inches using Winchester-Ranger 45 automatic frangible ammunition. (The left side of the pattern has been treated for copper residues with dithiooxamide.)



Photograph 12
Delta 33 gr. frangible 5.56mm bullet fired into a 9 inch block of 4^{0}C - 10% ordnance gelatin: Impact velocity = 3250 f/s.

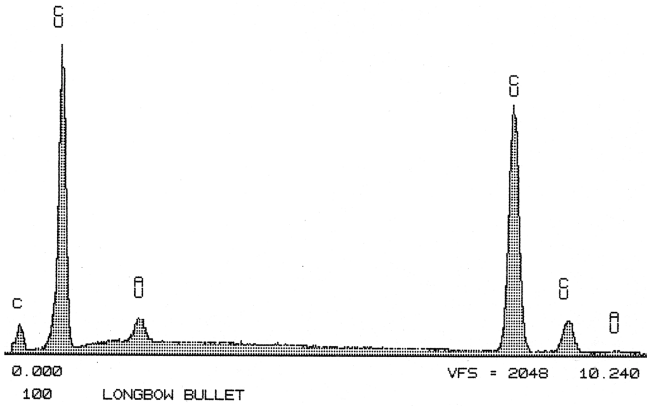


Figure 2
EDX spectrum of a Longbow brand 9mm bullet.

Photograph 13
Typical base markings on Longbow frangible 9mm and 45 auto bullets and a Winchester-Ranger 9mm bullet (bottom). Note: Various numbers and/or letters appear on the longbow bullets; the Winchester-Ranger bullets have varying numbers of raised dots.

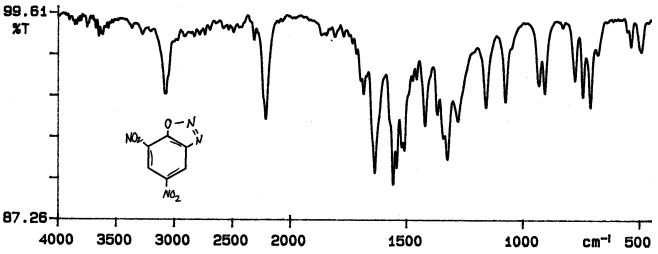


Figure 3
FTIR spectrum of dinol (diazodinitrophenol). (Diffuse reflectance in KBr - Kubelka-Munk conversion.)

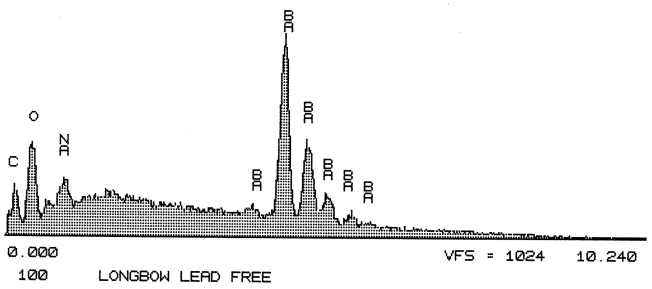


Figure 4
EDX spectrum of the Longbow lead-free ('LF') primer residue

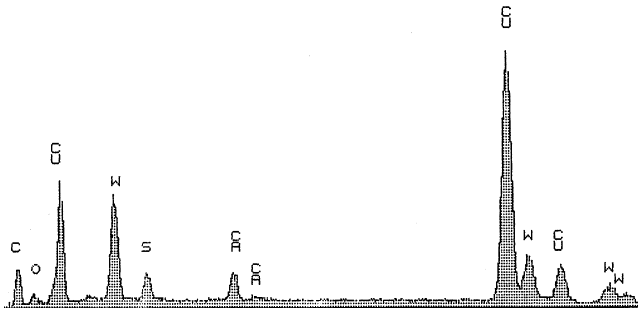


Figure 1
EDX spectrum of a Delta brand 45 auto bullet.

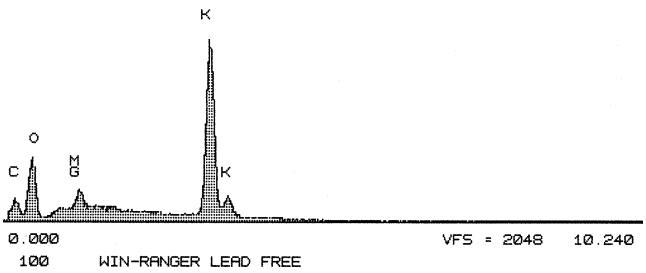


Figure 5
EDX spectrum of the Winchester-Ranger lead-free primer residue.

The State of the California Criminalistics Institute: CCI- 1999

*Victor C. Reeve**

Graphic displays are useful in outlining broadly where we have been and in projecting where we are going. Following the familiar paths and providing the same training with the same staffing and facilities, demonstrates that CCI can routinely train about 700 students (see Fig 1) per year through the delivery of about 50 classes (Fig 2) or 25,000 student training hours (Fig 3), which are allocated to a variety of professionals associated with high level processing of physical evidence (Fig 4).

In calendar year 1998, the category of physical evidence professional, both in California and out of state receiving the 25,000 hours of student instruction, is outlined in a pie chart labeled Figure 5. The miscellaneous category, which composes 25% of that figure, consists of agencies who received 38 hours or less of CCI instruction.

The information in the bar graphs (Figs 1—3) indicates that unless CCI changes its method of delivery or its hands-on approach to instruction, we have plateaued. Alternate methods of instruction such an computer-based instruction may have potential (i.e., Bloodborne Pathogen CD based training). However, this type of training package is very expensive to produce, making considerable demands on staff, since it is very labor intensive.

During Fiscal Year (FY) 1998/99, the California Criminalistics Institute survived a 60% cut of its operational budget. We were able to absorb this with reimbursement programs that we had implemented, commencing in the early 1990's. I refer to this because of the marked impact reimbursement has had on CCI's development over the last 7 years. The mix of local/state CCI students varies as a function of the local agency's POST funding, and in the case of the State crime laboratories, the available general fund. How these funds trickle down to the particular crime laboratory determines if an agency can send a student to our classes. Funding (and how it is designated) is the food of innovation for CCI. CAC Endowment funds open-up select classes to CAC members. Consequently, the CCI tentative course schedule is partially formulated by available reimbursement funding and by the CCI Users Advisory Board members.

I hope you are still with me, because on this framework I am going to outline CCI's plans for the future, both in the short and long term. Right now we are rebuilding CCI. Recently, two experienced and capable program managers, Jerry Chisum and John DeHaan, after working a combined 20 man-years in CCI, decided to retire. We are struggling to maintain training in other areas and are scheduling interview panels to select two new program managers in an attempt to replace these talented individuals. Candidates will be drawn from appropriate Bureau of Forensic Services applicants, and the positions will be filled at the Criminalist Supervisor level. In addition, we are completing the process of adding a laboratory technician position as support staff. This position will replace a latent fingerprint position that was at one time filled by Nancy Masters. These positions, once filled, will return CCI to 1991 staffing levels.

CCI depends on federal grant funding for courtroom testimony and DNA courses. We also continue to seek support from the CAC Endowment for newly proposed offerings (e.g., Advanced Courtroom Testimony, Technical Writing). These funding sources are short-term and my efforts are focused on finding alternate funding. Currently, I am negotiating funding via the community college system. Student hours reimbursement will allow more flexibility regarding the type of classes that we will be able to offer. If successful in this effort, we should be able to further expand the availability of the CCI reimbursement funded programs to California based students. CCI has had to teach at least two reimbursable classes each year exclusively to out-of-state clients. In that regard, we are contracting with the federal government to develop and educate laboratory scientists. At the completion of this project CCI will be able to offer one-week courses to California criminalists who are interested in taking the General Crminalistics Examination for Certification through the American Board of Criminalists (ABC). California laboratories and individuals who are seeking ABC certification should have available a one-week orientation designed to prepare them for the general criminalistics examination.

We are working with the University of California and the California State University systems to achieve university credit for our classes and our instructors. Not only do we anticipate university credits for CCI courses, but we plan to share instructors with the UC Davis Forensic Science Masters Degree program. As the Los Angeles State program progresses, we anticipate opening CCI South with courses being offered in conjunction with the Los Angeles State Univ. Criminal Justice program at their campus.

CCI has been charged with developing a specialized trace analysis section for the benefit of all laboratories in California. This is a project for which funding is being sought and should be accomplished as a multi-governmental process, including local and state support.

A broader consultation service with the CCI Health and Safety program is contemplated for all crime laboratories in California. The increase in laboratory accreditation cries for the expansion of the overburdened CCI Quality Assurance pro-

*Laboratory Director, California Criminalistics Institute, Sacramento, CA

gram, not only for BFS laboratories but also for all California crime laboratories If the Office of Traffic Safety and / or P.O.S.T. funding permits, we intend to develop another computer-based training package delivered via CD-ROM. This training will prepare California's law enforcement community for hand-held calibrated, court accepted, breath alcohol testing.

I hope this preamble gives you some idea of CCI's state of health, future plans, and educational intentions. Despite working on a starvation diet, the core laboratories of California and their support services do a yeoman service. We are all in this together and we are going to need more to shoulder the responsibilities and requirements of accreditation. The more we find ways to work together and share our resources, the better we will succeed.

Fig. 1

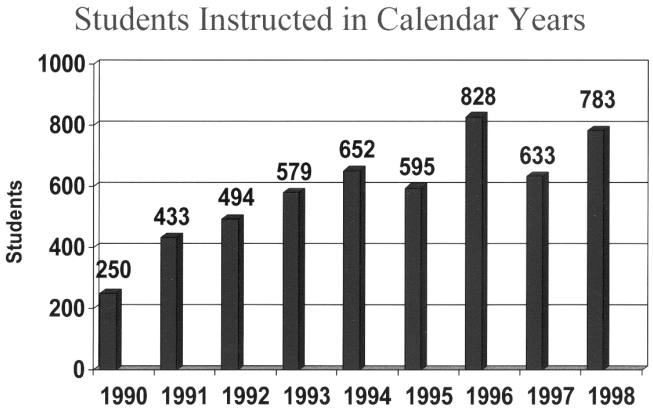


Fig. 2

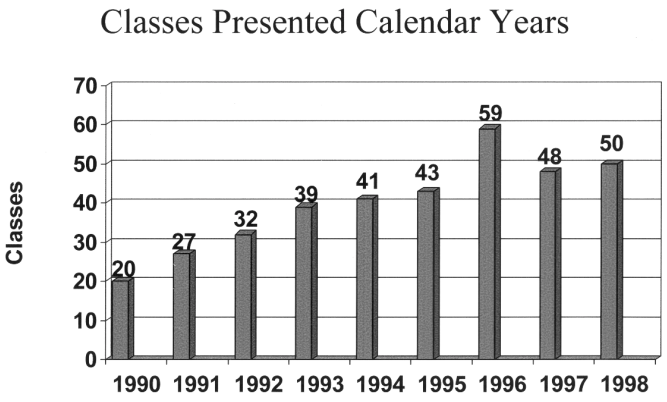


Fig. 3

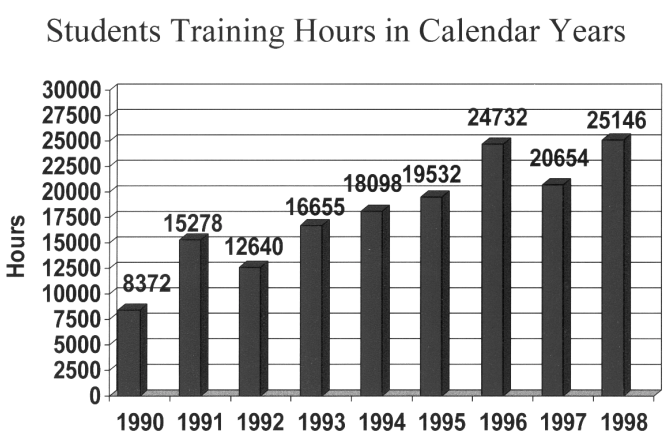


Fig. 4
Student Profile

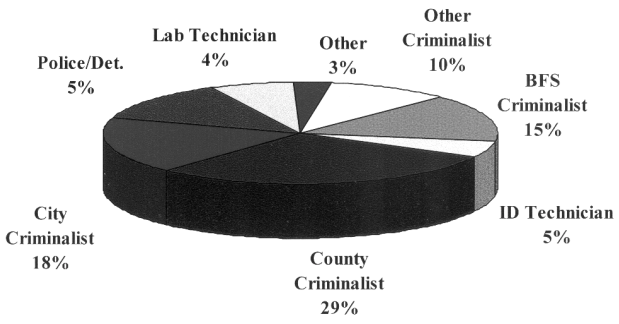
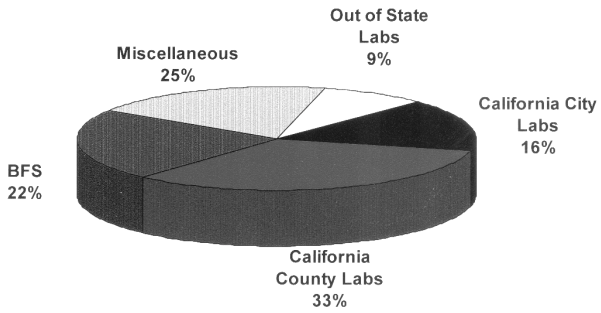


Fig. 5
Allocation of Training Hours



HIRAM EVANS ***Book Review***

CRIME LAB:

A Guide for Nonscientists

By John Houde

Calico Press: 206 pp., $24.95

This is a book organized in the conventional way with the chapters on blood spatter interpretation, crime scene investigation, perishable evidence, instrumental analysis, trace evidence, blood analysis, DNA, controlled substances and alcohol, and firearms and toolmarks with each area discussed well, but at a level understandable to the investigator, attorney, and juror. In short, for the non-scientist specified in the title. If it were just that, it would be a worthwhile book, but it is more. The author ties the chapters together with the thread of a single crime investigation giving life to what can be in the hands of some authors merely a collection of stand-alone chapters. Such entities, while interesting and technically correct, miss some of the value of forensic science is assembling a set of information derived from physical evidence and certainly bypasses the 'fun,' or more properly the challenge, which makes the profession of criminalistics more than a job. Detailed points are illustrated with examples clearly gleaned from an experienced criminalists' collection of "war stories."

What this book is *not*, is another of a raft of either print or television versions of the wonders of forensic science in which what *can* be done is left with the reader / viewer as what is *always* done. These, I fear, lead customers, investigators and attorneys, to expect criminalists to pull a rabbit from every hat and jurors to believe there must be major physical evidence analyses on every case which comes to trial. This book has an injection of realism, which accurately reflects the working crime lab.

The final chapter also distinguishes this book from the run of the mill; "Credibility" serves both to review the evidence assembled during the preceding chapters and discusses report writing and the criminalists' expert witness testimony. Accreditation, certification, and quality assurance round out the chapter, which brings this book right to the present moment.

A well illustrated, reasonably priced, good book for anyone who explains criminalistics to the layman, as indeed we all do when we get to the witness stand, it will be the basis of my own reorganization of my own "Basic Academy" lectures. The book's dedication, "For the juror" really says it all; would that we could make it required reading by every member of the jury.

NICHOLS, cont'd from page 2

ognize such a program as a need within their own laboratories. Based on all of the above, I hardly think that there is not a need for such a program in this profession.

I have reflected upon this situation and can think of only one other reason for the lack luster response. One word sums it up quite well. That word is apathy. "But Ron, maybe they simply did not read the newsletter." My response, "Apathy." This is by far the finest regional organization newsletter you will ever find with much more than simply job announcements and meeting announcements. I find little excuse for not reading the newsletter aside from apathy. "But Ron, maybe they figured someone else would respond." My response, "Apathy." I am beginning to think that someone else is the name of a real person. No wonder someone else didn't call, because someone else is already too busy doing everything else. "But Ron, maybe they thought you were asking for a commitment?" My response, "Apathy." I quoted my previous newsletter address and it was quite explicit. I was looking only for a "show of support and interest." "But Ron, maybe they are too busy." My response, "Apathy." I was only looking for a show of support and interest. Could they be too busy to mail, e-mail or pick up a phone? "But Ron, maybe…" The excuses are running thin.

Are we too busy to care? I don't know, but it's quite obvious we are never too busy to gripe and moan. We are never too busy to moan about how laboratories are selling out to ASCLD/LAB. We are never too busy to gripe about the Technical Working Groups and how they are attempting to standardize away perfectly good methodologies. We are never too busy to gripe about the recurring costs of ABC Certification. We are never to busy to discuss *ad nauseum* whether or not someone should have to be a generalist before a specialist. If we took half the energy we use to gripe, moan and complain and apply it constructively to these very issues, I don't think these other issues would be a problem. I have some news and maybe for some it will be earth-shattering. Not only is *someone else* to tired to do it anymore, but I have talked to *someone else* and he is getting sick and tired of having to do everything.

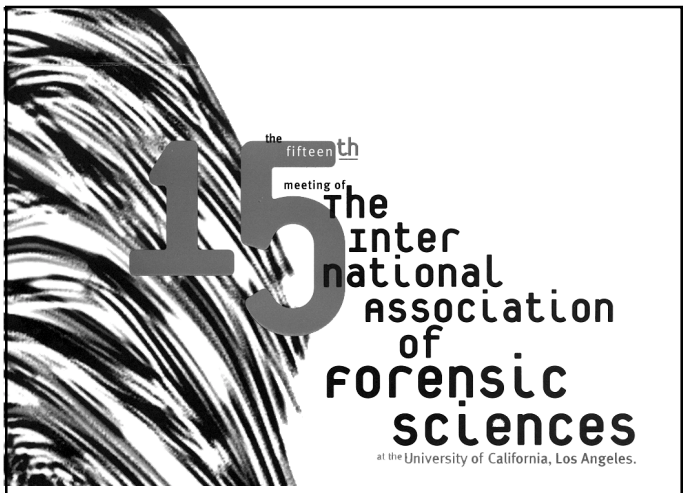
It is time to step it up. I am and will remain forever grateful to those who have fought to maintain the integrity of this profession. I am encouraged by those who did express interest in developing the leaders of tomorrow. Earlier, I mentioned how Carolyn said that this job could be as easy or as difficult as I want it to be. In other words, if the president decided to simply tread water, the organization would survive. But the leadership position that this organization holds within the profession cannot be maintained if the entirety of the membership decides that they wish to tread water. This organization has far too much to offer to allow this to happen.

If you look back in my previous address I warned all of a possible "spleen emptying" and it just happened. I must say that when Nancy McCombs addressed and e-mail to "Spleen Man," I had some explaining to do to my wife. I know that most of you probably are not wondering, but have you thought about which of my selection of opening lines would best fit this address? "Light…no, less filling," would be a good choice. In that commercial, all that ever occurred was arguing about which was better. Nothing was ever resolved.

Things in this profession are changing rapidly and significantly. We must channel the energy that we use to discuss these issues and actually begin to do something about them. It is easy to tell *someone else* to do it, it is easy to let *someone else* do it, but *someone else* is now dead. Let's have a funeral service for *someone else* and let that poor soul rest in peace. Let's step up and take some responsibility for where our profession is and where it is headed.

I look forward to hearing from you and cannot wait until we meet up once again in beautiful downtown Oakland at the upcoming May meeting. It is going to be an informative meeting with much to offer. I hope that many of you will find the time and resources to attend. Until we meet again, my best to you and to your families.

Ron



Once every three years, a unique event occurs in forensic science: the triennial meeting of the International Association of Forensic Sciences. What's more, this is the first time since 1978 that the IAFS has been held in the U.S. Imagine 2000 forensic scientists from around the globe meeting to exchange ideas and share experiences and you begin to have a notion of IAFS-1999.

Held on the campus of UCLA between August 22-28, the meeting officially begins on Weds. with plenary sessions on biological and chemical terrorism, human rights investigations and new technology. Attendees will have the opportunity to attend workshops on a subscription basis on Mon. and Tues. The meeting registration fees include two receptions and a Fri. evening banquet. A major exhibition is scheduled in Pauley Pavilion (the home of UCLA's famed basketball team) and an accompanying persons program may entice some out of the scientific sessions.

UCLA provides a lovely location for an international conference. The campus maintains housing accommodations in student apartments for most every budget. We hope that colleagues will bring their families to this meeting and enjoy the many vacation sites southern California has to offer.

The most up-to-date information about the meeting my be viewed at the IAFS web site. We hope to see you in August in Los Angeles. *—Barry Fisher*

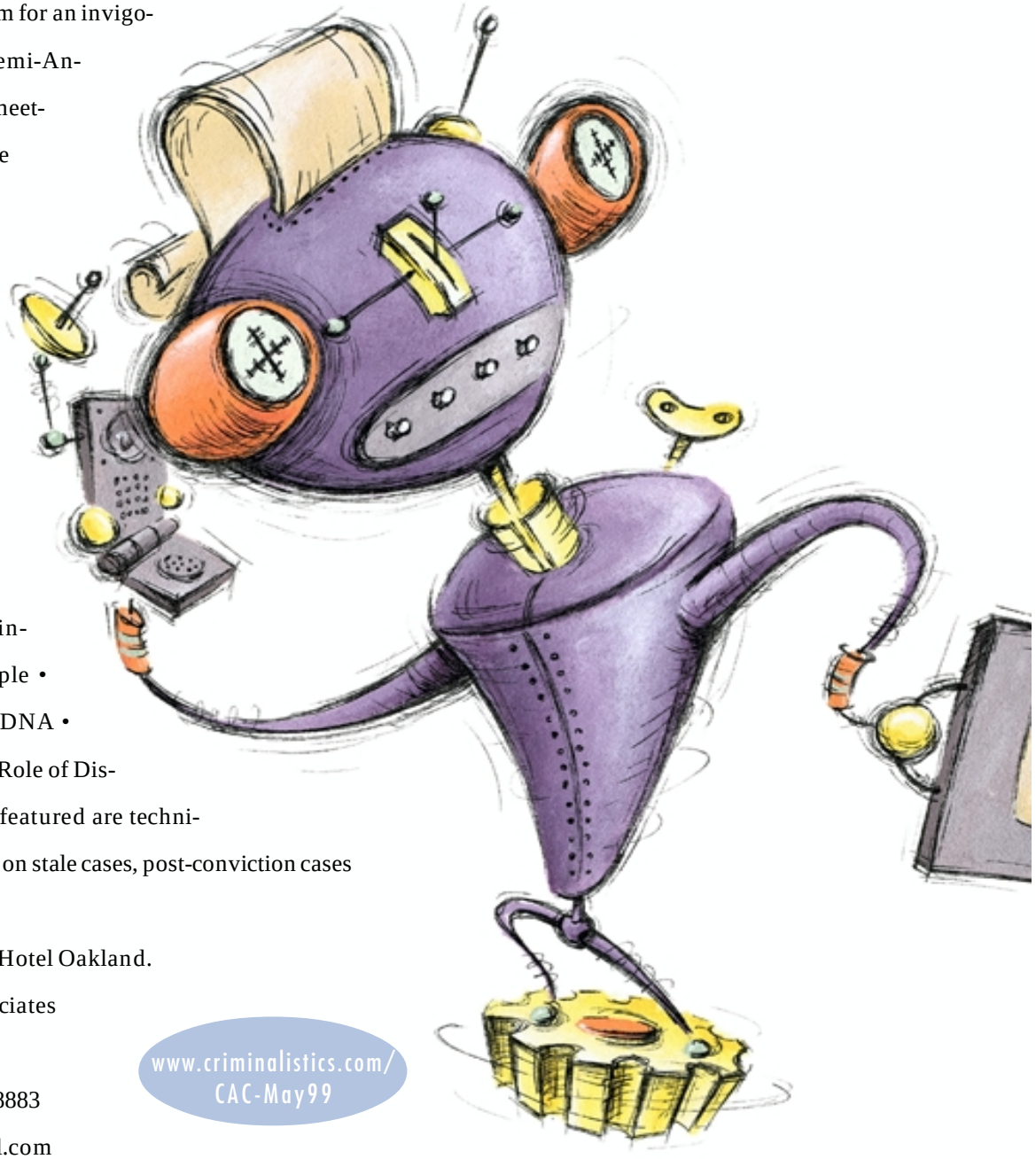
http://www.criminalistics.com/IAFS-1999/

DO YOU MANAGE DIFFICULT PEOPLE?

STEP OFF THE TREADMILL

on the eve of the new millennium for an invigorating discussion at our 93rd Semi-Annual Seminar. The theme of the meeting, "Quality Assurance—The Role of Disclosure and Peer Review," will bring forth indepth and constructive participation. Together we will explore the critical issues of ethics and professionalism as we strive to improve our standards in our labs and work environment.

Scheduled workshops include: Managing Difficult People • QA in Forensic Investigations • DNA • Panel Discussion on QA—The Role of Disclosure and Peer Review. Also featured are technical presentations with emphasis on stale cases, post-conviction cases and complex cases.



Location: Marriott City Center Hotel Oakland.

Contact: Forensic Science Associates
3053 Research Drive
Richmond, CA 94806 510.222.8883
510-222.8887 FAX pbarnett@crl.com

www.criminalistics.com/CAC-May99

93rd CAC Semiannual Seminar

May 12-15

OAKLAND, 1999