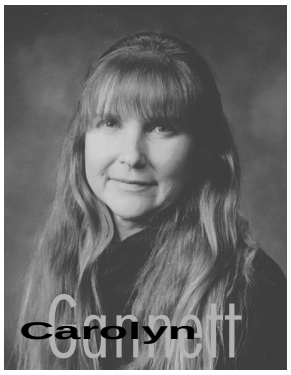
The CAC News

News of the California Association of Criminalists • Winter 1997

The President's Desk

Quality Assurance and Leadership



This issue and the next of the *CACNews* herald the beginning of two new series. The first will address topics in Quality Assurance. It will feature responses from several experts in the field and representative viewpoints will be compiled and presented by John Simms.

The second new series is on leadership. **Ron Nichols** will address various aspects of leadership and characteristics of a good leader.

Although not planned, the start of both these new series at nearly the same time is most appropriate. Quality Assurance cannot exist without good leadership. It requires policies and protocols to be implemented and enforced throughout the laboratory, something that can only be achieved with effective management. In turn, leaders in our profession understand the vital importance of Quality Assurance, realize the necessary role management must play, and are proactive in achieving and maintaining a Quality Assurance program

Why care about Quality Assurance? Because it is the single most important factor in our daily work. The Crime Laboratory's primary reason for existence is to analyze evidence, report results, and testify to those results. Unlike many professions, the quality of these work products may have a direct and profound impact on people's lives. Incompetent technique unfounded conclusions, or unclear testimony has the potential to harm so many lives: the lives of the innocent who are unjustly accused or found guilty, and that innocent's loved ones, the lives of the victims whose assailant may go unapprehended or be unjustly declared innocent, and that victim's loved ones; the lives of future victims of an assailant who goes unapprehended or has been unjustly set free, and the families of all those victims. In consideration of these people's lives, Quality Assurance is paramount in our profession.

How can it be achieved? Volumes have been written on this. But one thing is mandatory: a proper mindset. Quality Assurance in any context requires a mindset always open to hearing about potential areas of weakness and willing to continually solicit such from all personnel. In the crime laboratory setting it requires a sincere desire on the part of management to remedy any areas of weakness. Resolution of a problem necessitates a comprehensive understanding of it. You cannot fix something you do not understand. Finally, it takes leadership to successfully implement and enforce measures that will rectify a weakness and prevent it from occurring again.

An effective Quality Assurance program requires a commitment of manpower. All but the tiniest labs require a full-time Quality Assurance Analyst. Not someone who is assigned to an area of specialty and is nominally the Quality Assurance Analyst in their "spare time," but someone whose sole job assignment is Quality Assurance. Anything less sends the message that productivity is more important than quality and that management does not even care enough about Quality Assurance to realize that a full-time QA Analyst is a necessity.

Recognition of quality people is another aspect of a quality lab. The CAC recently requested nominations for the Paul Kirk Award. This award was established to recognize members new to Criminalistics who have demonstrated exceptional promise. No nominations were received.

Reasons for this could include that no one took notice of a deserving analyst in their midst, or that no members deserved consideration. Both reasons are unfortunate and avoidable.

If there are deserving members, it is important that they be recognized. Doing so states the critical message to the Forensic Science community and to employees in one's own laboratory that excellence is valued and encouraged.

The CAC has over 450 members. If out of this many individuals there truly is no one deserving of the Paul Kirk Award perhaps those in supervision, management, and at the bench level could be more proactive in encouraging facilitating, and developing new talent.

Communication about quality assurance topics is another factor in maintaining quality in the laboratory. To facilitate this, Larry Presley is exploring the possibility of starting a QA web site. Mr. Presley serves as the President of the Mid-Atlantic Association of Forensic Scientists and is the FBI's Quality Assurance manager. At the next Board meeting the CAC will be discussing our participation in this project.

In this article I have touched upon only a few aspects of quality in the forensic laboratory. Given the importance of these topics, I am eager to see what impact these two new series of articles and Mr. Presley's web site have on the forensic science community.

Carolyn

Important Notice:

The use of the California Association of Criminalists logo and name shall be restricted to official CAC business and shall not be used for awards, certificates or other documents that are not a part of the official CAC policy and procedure.

Please send changes of address to the CAC Membership Secretary.

Winter 1997

C O N T E N T S

The CACNews

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On the cover...

The Olympus booth was a favorite stop for attendees of the Fall 1997 Seminar in Irvine, hosted by the Orange County Sheriff's Lab. *Above:* Another exhibit at the seminar, more pictures inside.

The CACNews is published four times a year (January, April, July, and October) by the California Association of Criminalists, a private foundation dedicated to the furtherance of forensic science in both the public and private sectors. Please direct editorial correspondence to the Editorial Secretary.

Northern Section Activities

The Santa Clara Co. Crime Lab. hosted a dinner meeting in San Jose on August 21 with approximately 30 individuals in attendance. The guest speaker for the meeting was Joseph McNamara of the Hoover Institute at Stanford Univ. who spoke on the historical aspects of controlled substances. Two study groups met prior to the dinner meeting. Co-chairpersons, **Jean Arase** and **Mary Trudell** had a very successful drug study group meeting. The guest speakers were Officer Mattocks and Officer Wall with their German Shepherd dogs Officer Siro and Officer Lucky from the K-9 Unit. Officers Mattock and Wall discussed the drug training procedures for the dogs. Lucky and Siro demonstrated their ability to find heroin and marijuana hidden in the garage of the Lab.

The DNA Study Group was chaired by **T. Winder** with 25 persons in attendance. The topic of discussion was on substrate controls in PCR-based DNA analysis with specific reference to the *Forensic Science International,* 85: 105-110, "The Utility of Substrate Controls in Relation to Contamination."

The DOJ DNA Lab in Berkeley hosted a DNA Study Group meeting on September 25. Dr. Jeffrey Morris from Long Beach Genetics discussed parentage testing and its role in criminal cases.

The most recent dinner meeting was hosted by the San Mateo County Sheriff's Office Forensic Lab. on October 23. The dinner was held with Mr. Lee S. Cole presenting a lecture on "Trends in Vehicle Fire Investigations." Approximately 34 individuals from various laboratories attended this dinner meeting.

Prior to the dinner meeting three study groups convened at the Coyote Point Museum. **Robert Thompson**, Chairperson, moderated the Firearms Study Group meeting. Eighteen examiners attended the meeting and presentations were given by **John Murdock**, **Richard Grzybowski**, **Bruce Moran** and **Robert Thompson**. Presentations by **Lisa Calandro** about the recent Promega meeting and the CAC Semi-Annual Seminar DNA Workshop by Paul Holes were highlighted in the DNA Study Group meeting. Dr. Alexander Shulgin lectured on psilocybin mushrooms at the Drug Study Group meeting. After the study group meetings, there was a "Forensic Evidence Dog Demonstration" presented by the Institute for Canine Forensics. These dogs are trained for live and dead body recovery and they were involved in the Oklahoma bombing scene.

A Trace Evidence Study Group meeting was held in conjunction with the San Francisco Microscopical Society on October 30 in Berkeley. The meeting featured a presentation on Anthony vonLeeuwenhoek and single lens microscopy by Prof. Brian J. Ford of Cardiff University. The meeting was well attended.

—Pam Sartori

Southern Section Report

A dinner meeting is scheduled for December 21, 1997, to be hosted by the San Diego Sheriff's Laboratory. Alan Bercovitz, Ph.D., a renowned professional speaker, will be presenting a talk entitled "Professionalism for Criminalists." Our President, **Carolyn Gannett**, is coordinating this meeting (as if she doesn't have enough to do already!) Study groups that are scheduled to meet are: drugs, forensic biology, and trace evidence. **Dawn Sorenson** of the Naval Criminal Investigative Service is hosting an arson analyst study group on the same day as the dinner meeting. This will be the third meeting of these Southern California arson experts—call Dawn at (619) 556-1389 for more information.

The 90th CAC Seminar held in Irvine this past October was very successful. The quality of the workshops and presentations was first-rate, and a handsome profit was made too. These profits will, of course, benefit the membership by helping to support future educational and training events. The outstanding effort of **Margaret Kuo**, **Elizabeth Thompson**, **Kenny Wong**, and the staff of the Orange County Sheriff-Coroner's Laboratory are very much appreciated.

—Joe Hourigan

Ed Jones' Face Game

The Kirk Award

Ans. in back.

Jobs • Meetings • Courses

Supervising Criminalist

$5157—6230/mo

San Diego City Police Department announces an opening for supervising criminalist. A bachelor's degree in criminalistics, forensic science or a chemical or biological science is required along with three years of full-time professional criminalistics experience performing chemical, biological or physical analysis on physical evidence in a crime laboratory. A master's degree in criminalistics or forensic science may be substituted for one year of the required experience.

Supervising criminalists coordinate and supervise the physical and chemical analysis and evaluation of evidence in a crime laboratory; train, rate and evaluate the work performance of subordinates; evaluate new technical procedures; review analytical reports; prepare budget estimates and justifications; schedule, prioritize and assign work projects; function as a liaison with prosecuting agencies and other units of the police department; may testify in court; prepare reports and correspondence.

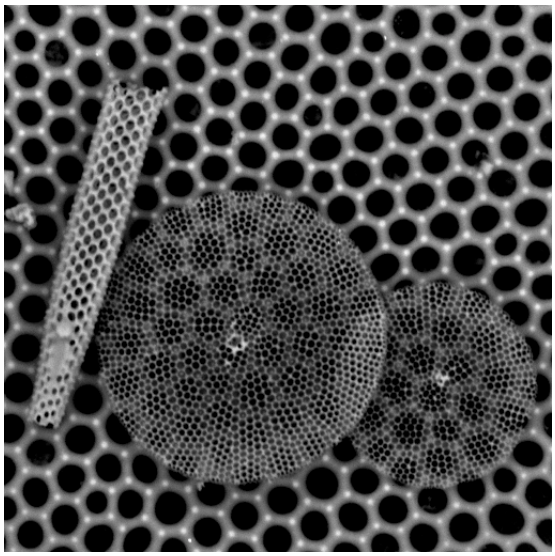
For information, contact Jim Miller, Crime Lab Manager, (619) 531-2579. For an application, contact Jeannette Lapota, personnel Analyst (619) 236-6964.

Detection Dogs Featured

Check out the area labeled "Hot Topics" for a discussion on dogs with noses that *know*.

CHEMICAL & ENGINEERING NEWS
The Newsmagazine of the Chemical World

http://acsinfo.acs.org/cen/



Hi-res

An SEM of a sample distributed by Jim Soliday at a Los Angeles Microscopical Society function about 5 years ago. It is labeled: "Fossil—New Zealand Jackson Heavy-1953." Contributed by Jim Roberts and Ed Jones of Ventura.

FTIR Specialist Wanted

The U.S. Food and Drug Administration is seeking an FTIR specialist for its Forensic Chemistry Center in Cincinnati, OH. This is a unique opportunity to join a multi-disciplinary forensic team in a new state-of-the-art laboratory. The ideal candidate will have a Ph.D. degree and a strong background in problem-solving using infrared spectroscopy and ancillary techniques, particularly FTIR-microscopy. The work will involve a wide variety of challenging forensic problems related to food and drug issues, i.e. methods development research, analysis of forensic samples and report writing. The candidate will also serve as a mentor for a small FTIR team. The salary is competitive, and commensurate with qualifications and experience. Please send resume and/or Application for Federal Employment (SF 171) to: R. Duane Satzger, U.S. Food and Drug Administration, 1141 Central Parkway, Cincinnati, OH 45202. (513) 684-3501. FDA is an equal opportunity employer. U.S. citizenship is a requirement for employment. *(Web postings not verified by CACNews)*

Intro to Forensics Offered

Several analysts from the Broward Sheriff's Office Crime Lab will be teaching an introduction to forensics course at Florida International University (FIU) beginning in January. This course is open to all students interested in the forensics field and is also recommended for police personnel who would like to have a better understanding of this discipline. Topics: DNA Analysis, Drug Analysis, Trace Evidence (Arson, Fibers, Paints etc.), Crime Scene, Firearms, Toolmarks, Questioned Documents, Hair Comparisons. For more information contact the Florida International University (FIU)registrar and /or Chemistry Department. *(Web postings not verified by CACNews)*

Supervising Criminalist (2)

(Alcohol/Drugs) and (Serology/DNA)

Salary Range:$3820-$5360

Ventura County Sheriff's Department has two openings for supervisor, application deadline is December 19, 1997. Contact Ventura County Sheriff's Personnel, 800 So. Victoria Avenue, Ventura CA 93009. Or call 805-654-2375, or see www.ventura.org/personnel/perweb1.htm.

Manager - Forensic Science Services

Salary Range:$3820-$5360

Ventura County Sheriff's Department has an opening for forensic services manager. Application deadline is December 19, 1997. Contact Ventura County Sheriff's Personnel, 800 So. Victoria Avenue, Ventura CA 93009. Call 805-654-2375 or see www.ventura.org/personnel/perweb1.htm

Criminalist I/II/III

Salary Range:I:$2126-$2973;II:$2660-3721;III:$3298-$4622

Ventura County Sheriff's Department has openings for criminalists. Application deadline is continuous. Contact Ventura County Sheriff's Personnel, 800 So. Victoria Avenue, Ventura, CA 93009. Call 805-654-2375, or see www.ventura.org/personnel/perweb1.htm.

Raymond Davis

The Twilight Zone

There are some things in life so important to us that we would crawl over broken glass for. Visualize 100 feet of razor sharp pieces of glass that you would gladly crawl over to get what you want most in life. I mean you want it so much that you wouldn't even see let alone feel the glass beneath you for that thing which drives you relentlessly towards it. I would crawl over broken glass for justice. That is, to see that justice done. Justice for me is conformity to the truth. Saying and doing what is just and right So now, here's my story from the Twilight Zone.

I was recently asked to assist an attorney who specializes in military matters to help his client, seaman S.W., who had given a random urine sample when it came back positive for morphine. The morphine concentration was well above the Navy's screening threshold (cutoff) value. He was given a Captain's Mast and found guilty. His punishment was a two-grade reduction in rank with forfeiture of 45 days pay. I was called in to prevent his discharge from the Navy. I provided the attorneys with recent, learned treatises on the effects of poppy seed muffins causing high morphine levels in unsuspecting people required to give urine specimens. I also reviewed the background information on the sailor indicating that there was no history of drug abuse, either past or present. In fact, everyone agreed including the Navy that S.W. had no drug abuse history or current problem. He neither drank alcohol nor smoked cigarettes. His job was on the flight deck, the most labor intensive job on an aircraft carrier. It requires 16-18 hours of continuous activity while at sea. Everyone agreed including S.W.'s three immediate supervisors that he never missed a day of work or was disoriented or confused. He worked hard and all three supervisors stated that they would continue to work with him on the flight deck despite his urine sample result. There was not one piece on information that would indicate that this sailor was a drug abuser. And the Navy agreed. But they proceeded with the discharge hearing in any event.

The attorney had S.W.'s original urine sample reanalyzed by a Navy approved independent laboratory in Seattle with a result slightly less than the Navy's value. The result was within acceptable limits for a retest. I didn't believe that trashing the laboratory collection and testing would be a viable defense even without the retest result. I'm convinced that the Navy collected and analyzed the sample in a scientific fashion. Therefore, I believed that providing the Navy with these studies on the effect of poppy seed ingestion a more viable explanation for the presence of morphine.

> The laboratory chief said they did analyze for 6-MAM but because it was not present they didn't think it was necessary to report it!

One interesting fact in this case is that S.W. has medically verified allergic reaction to opiates especially codeine. He recently learned this by accidentally taking what he thought was his friend's Tylenol tablets for a headache. Instead, these tablets contained codeine. He later broke out in a rash and his eyes became watery and puffy. I don't believe these tablets could produce the high levels found in his urine sample.

Now there are three aspects to this case that do not add up to drug abuse: 1) No history of drug abuse, 2) Allergic reaction to opiates and 3) An exemplary work record. I also told the attorney that in my 25 year forensic career, I never saw nor analyzed a single submission for morphine analysis. Opium yes, codeine yes, Demerol yes by not morphine. Morphine has not been a drug commonly found in illicit sales. Generally, whenever a person has morphine available to them they will usually convert it to heroin to bring a greater financial return. This makes four things going for S.W.

I was still concerned about relying on the scientific studies alone without knowing how poppy seed ingestion would affect S.W. I suggested that we conduct an experiment by having the sailor ingest 3 poppy seed muffins and seeing what effect that would have on him. The experiment was conducted at the Navy approved drug testing lab and the sailor provided urine specimens prior to the ingestion of the muffins and then 8, 12 and 24 hours after. I chose three muffins because I was unsure of the quantity and quality of the poppy seeds on and in the muffins. I don't think there is a great deal of quality control on poppy seeds. We only had a few days to do our work and so could not do sequential studies with increasing amounts.

I was astounded at the results. S.W's morphine level 8 hours after ingestion was approximately 3 times the Navy's threshold level and was still near this level 12 hours after ingestion. The level at 24 hours dropped significantly, falling below the threshold level. I now believed that we had five compelling factors that would lead any sane, rational person to the only conclusion: That given this sailors reputation, work history, no history of drug abuse, an allergic reaction to opiates, rarity of illicit morphine use and *proof* that three poppy seed muffins would produce extremely high morphine levels on this sailor. We even provided the Navy with excerpts from the *Medical Review Officer's Guide to Drug Testing* that stated without verification of drug abuse and the potential impact of poppy seeds on urine analysis that a morphine result cannot be sustained. These are the kinds of cases I enjoy working on.

We had our discharge hearing on board the *USS Carl Vinson* berthed in Bremerton, WA. The hearing was conducted by three members of the ship's staff and the prosecutor was also a member of the ship's staff. These charges were brought by the Captain of the ship. I knew we would have to have compelling evidence for the panel to find on behalf of S.W. and in the process rebuke the Captain for bringing the charges.

After the defense rested, the pros-

ecution reopened their case by contacting the head of the Navy lab in San Diego. There were several items that I testified to that prompted the prosecuting attorney to contact the lab. A telephone call was placed from ship-to-shore and the prosecutor asked the laboratory chief whether S.W.'s urine sample was tested for 6-monoacetylmorphine (6 MAM). In cases where morphine levels exceed the threshold value for morphine the sample is also tested for 6-MAM. The laboratory chief said they did analyze for 6-MAM but because it was not present they didn't think it was necessary to report it! *He said it wasn't important to report negative results!* The chief was also asked if they checked for thebaine which can be found in urine samples as a result of poppy seed ingestion but not in morphine or heroin ingestion. Thebaine is not a constituent of commercial and illicit drug preparations such as heroin, morphine or codeine. He said they didn't look for thebaine and do not check for it. I told the members of the panel to alert the ship's cook before he prepares poppy seed muffins. They might end up with a huge problem with 5,000 crew members loaded on morphine!

We had our hearing and despite all of the overwhelming evidence in favor of S.W. they found him guilty of using morphine or heroin and promptly dismissed him from the Navy. Although the independent test was conducted at a Navy approved laboratory they dismissed the results as being too high, even suggesting that the results had to have been manipulated. It was quite obvious that these facts were insufficient in light of their strong belief that any positive drug result can only be due to illegal drug consumption. This is the Twilight Zone.

S.W. must leave the ship that has been his primary duty station during his brief naval career. He takes his wife, now eight months pregnant and his one year-old daughter and leaves the service with a general discharge. The Navy has a zero tolerance drug policy. And so it seems, they also have a zero truth policy. The one lesson I have learned from this ordeal is that scientific truth and personal beliefs can and do collide. Make sure that your beliefs or opinions don't get in the way of the truth. Good night Rod Serling wherever you are.

Raymond

Report—

Hello From Harrogate

After attending the first Joint Meeting of the CAC and the Forensic Science Society (FSS) in Pasadena in 1994, I was excited to be able to visit Harrogate for the Second Joint Meeting. I would like to thank the California Association of Criminalists for the Ed Rhodes Memorial Scholarship award, which enabled me to attend this meeting.

Brooke Carpenter

The meeting began on Tuesday with a welcome reception at the Royal Pump Room Museum in the center of Harrogate. Old acquaintances said hello to each other, while newcomers introduced themselves. We were welcomed, wine was served, and we even had a birthday cake for the wife of a member of the FSS. Free to roam about the museum, I took in the exhibits and learned a little about the history of Harrogate.

The scientific session of the meeting was officially opened on Wednesday by the Mayor of Harrogate. In the morning session, presentations were given on a wide range of topics from the value of forensic science to databasing to spectroscopy. In the afternoon, attendees could choose to hear about crime scene reconstruction or DNA techniques, including fluorescent technology, STR analysis, capillary electrophoresis, and mitochondrial DNA. After lunch on Wednesday, I walked to Bette's, the famous teahouse in Harrogate. There, I enjoyed Bette's tea and teacakes. I also couldn't pass up the chance to buy some treats to take home to my friends and family. That evening, there was a Casino night, with money being donated to charity. The meeting attendees gathered in the hotel pub to drink pints of beer and take a chance with Lady Luck.

Thursday, attendees were offered the option of either trace/ footwear marks workshops or DNA statistics workshops. That evening, there was an American BBQ complete with BBQ ribs, garlic bread, and potato salad. The Tom Roberts Jazz Band provided entertainment, while we ate at small tables with red and white checkered table cloths.

Friday morning there were lectures about shoemarks, the O.J. Simpson case, anthropology, explosives, fire, and ballistics. In the afternoon, attendees chose between fingerprints and fire/explosive investigation. Friday evening was the Banquet where I was honored to sit at the head table with the presidents of the CAC and the FSS. The Bradford/Leeds Chorus performed a very entertaining show. They sang as a group and in small barber shop quartets. Not only were they wonderful singers, but they were also talented comedians. Both presidents gave speeches, and Pete Barnett presented Robert Lees, FSS President, with a replica of Sherlock Holmes' Office. (See *CACNews,* July 97.) Robert Lees presented Pete Barnett, CAC President, with an engraved wooden gavel.

Saturday was the last day of the meeting. Some of the Californians gave presentations on methamphetamine. This drug makes up a large percentage of the controlled substance case load of the state's crime labs. We also listened to presentations on hair drug testing, the Lindbergh kidnaping, and to conclude a reflection entitled, "What is Science?"

After a few days at the conference, some notable differences between the U.K. and U.S. surfaced. On the lighter side, one speaker shared a list of laboratory terms in U.K. English "translated" into U.S. English. For example, a "line-up parade" in the U.K. is a police line-up in the U.S., a "teat" is a Pasteur pipet bulb, and a "rubber" is a pencil eraser. The U.K. seemed to be very interested in databasing as many different areas of evidence as possible. They had a DNA database, a fingerprint database (AFR), and even a shoeprint impression database (SICAR). An obvious difference is the emphasis placed on firearms. Most homicides and crimes of violence in the U.S. involve firearms. That is why we developed databases such as IBIS and DRUGFIRE. In the U.K. the use of firearms is nearly non-existent, therefore such databases are not necessary. Second, the various laboratories in the U.K. system are connected. Work may be divided between the labs, being that some are more specialized in one particular area. This contrasts to the U.S., where most labs are not connected. For example, in Cali-

Please turn to page 21

Brooke is from the Santa Clara Co. Crime Lab

Quality Assured

Welcome to Q.A.— no, not Q & A, but Q.A.—Quality Assurance. Q.A. is how we strive to provide the most accurate, most reliable work product that we can provide. It should be of primary importance to any lab regardless of whether or not the lab is accredited. Stop and think about this: everything that we do in forensics has the potential for impacting a person's life. Our work product may sway the judgment of the judicial system and someone will go free from custody, go to prison, or go to death row. It is no exaggeration that we are charged with an awesome responsibility and it is our duty to discharge that responsibility with the utmost care and concern.

In this new column, we will explore Quality Assurance issues and the impact they are having on forensic procedures. We will address your questions and pose new ones for your consideration. You can bring your concerns or problems to this forum for discussion and analysis. We will try to examine where Q.A. works and, if possible, why it sometimes fails.

Q.A. vs. Q.C. (Don Jones, San Bernardino)

Our first discussion looks at the difference between Quality Assurance and Quality Control. Quality Assurance is a documented system of activities that provide effective monitoring and verification of the quality of the work product. These activities address personnel training, education, and certification. System evaluation activities include:

Specification and calibration of equipment and reagents, Documentation and validation of analytical methods, Sample handling, Standards/Controls, Proficiency testing, Interpretation and reporting, Internal/external audits of all of the above[1]

How does this differ from Quality Control? QC is monitoring the operation of the test and whether or not the specified controls are being incorporated into the method in the manner specified.[2]

In short, Q.A. is an overall lab process that touches many different areas. QC is a process specific to that method and the method controls and standards.

Sources

1. "DNA Technology in Forensic Science," *National Research Council*, 1992, Section 4.2 "Defining the Principles of Quality Assurance."

2. "Report of a Symposium on the Practice of Forensic Serology 1987," UNISYS, California Association of Criminalists, and Bureau of Forensic Sciences, Section IV "The Quality Assurance Program."

The overall importance of Q.A.

(Bennie Del Rey, Santa Clara)

The future success of crime labs may well depend on their ability to improve. Crime labs that are having problems with quality will not go unnoticed as in the past. Who is responsible for a lab's problems with Quality Assurance? Because improving Q.A. requires reshaping attitudes throughout the organization, everyone has to take the initiative. Q.A. must be first in importance in all activities and decisions. Quality is more important than high numbers in volume of production.

Management must provide leadership if quality improvement is to become the guiding strategy for crime laboratories. Management must know it, understand it, and be personally involved with it. Without an active role by management, then most Q.A. problems will not be solved. There needs to be widespread education and training for middle managers, supervisors and bench workers.

How important is Quality Assurance in your Lab?

Send questions, comments, or topics for discussion to John Simms Q.A. Manager, SDPD, 619-531-2576 or fax to 619-531-2950, email: dracula@tns.net

Thank you to the primary contributors: Bennie Del Rey, Lab Director, Q.A. Manager, Santa Clara CO. Don Jones, Crim II, San Bernardino Co. SO.

Earthquake Safety in a Crime Laboratory

We all know that, in the Western States, being prepared for an earthquake is a GOOD THING. We in California live in earthquake country. We like it here and we don't plan to move. However there are many public buildings, homes and utilities built on or across the major fault lines that occur in the East Bay and along the San Francisco peninsula.

Linda Wraxall

A look at a geologic map of California will show that most of the major population centers of the state are not far from an active fault. The chance of a sizable earthquake occurring in the next twenty years is excellent for the San Francisco Bay area and people must be prepared to survive on their own for at least 72 hours.

The most well-known, and very active, San Andreas fault zone lies 19 miles from Santa Rosa, 9 miles from downtown San Francisco and 15 miles from Oakland across the Bay waters. It crosses the suburbs of Daly City and the other growing cities on the peninsula, running just west of San Jose and on down to San Bernardino and northeastern Los Angeles.

The Hayward and Calaveras faults run through the hills of the East Bay down to the east side of San Jose. Down south, Santa Barbara is right on top of the Santa Ynez fault zone with its subsidiary faults, and parts of the Imperial Valley and the lower part of southern California are split by the Imperial fault line.

Eureka, the Sacramento valley and Bakersfield are also affected by active faults.

The CAL-DNA Lab is situated close to the San Francisco Bay between a lagoon known as Aquatic Park and the main Union-Pacific railroad tracks. We occupy two buildings which are single-story wood frame structures. The larger one (23,000 sq.ft.) is an L-shaped main building and houses both labs and offices; the other is home to the robots of the 290.2 databank program.

Both of these facilities contain two "items" which need protection from the effects of an major earthquake: equipment (both scientific and computer) and people. We currently employ 48 staff who are divided between office staff and criminalists of one sort or another.

As safety officer for the Lab, my first concern is for the staff so I made arrangements for someone from the City of Berkeley's Emergency Planning Office to give a talk on Earthquake Preparedness. The City of Berkeley has gone a long way towards helping the community be self-sufficient in the event of a major disaster. This is because they realize that, in such an event, police, fire and other public safety officers will be placed where they are most needed and would not be available to respond to every call for assistance (even supposing the phone lines are working!). CPR and First Aid classes were also held during work time so that wherever they are, these qualified people will be useful.

A procedure for emergency evacuation had already been arranged and sets of three plastic wall frames have been put at various strategic points containing instructions on what to do in the case of fire or earthquake, as well as a building plan showing exit routes and where first aid kits are located.

Gas pipes may break, electric lines or water mains may be fractured - all of which can cause major problems. Gas, water and electricity sources should therefore be turned off. Our gas line is equipped with a turnoff tool bought at the local hardware store and chained to the utilities meter station outside for immediate availability. The water should be turned off also, not only because a broken pipe could cause water damage but if a water line elsewhere is broken, it can drain water from the water heater and cause a fire. Or incoming water could be contaminated and ruin your existing "in-house" water supply in the water heater and toilet tank. It is important that people know where the electrical power is located within the building (i.e. the circuit breakers) and which ones should remain on. We have an emergency generator for each building that is automatically tested every week and monitored by contractors throughout the year so that they are ready to operate at any time. They proved their usefulness during the Western States blackout last July.

Jim and I added "Earthquake Stations" for those involved in a search of the building after a disaster has occurred. They are set up in the corridors and consist of 3 hard hats, 2 Maglite flashlights and 2 CPR units. As it is recommended that one should plan to be self-sufficient for at least 3 days, we are in the process of obtaining emergency supplies in the form of individual plastic food boxes which contain water, food bars, a light stick, a space blanket, and various washing-up and first aid supplies. The water and food have a shelf-life of 5 years and the light sticks provide light for up to 6 hours, once activated. Extra supplies will be placed in a large container and kept in a central location. Besides food, water and first aid, it will include port-a-potties and a tent, a radio and maybe clothes.

As far as the workplace environment is concerned, the cost of doing nothing is not just in replacing equipment that has been jarred off a shelf or bench and smashed onto the floor. There is also the emotional cost of clearing up a mess like this:

Securing tall bookcases and heavy filing cabinets to the walls is probably the most important task so that they do not fall either on people or across exits. This means fastening metal angle brackets with lag bolts to the wall studs or the floor. If a stud is not within convenient reach (or the wall studs are metal as in present-day construction, not wood), then a 1x4 piece of wood must be secured between two studs and the shelf unit or cabinet is bolted to that.

Being a State agency, most of our bookcases came from Prison Industries and arrived complete with detailed instructions for seismic anchoring to the floor and the wall. This becomes a problem if the room has to be repainted or recarpeted! However, it is not an insoluble one and is a far better alternative to preserving life than the potential hazard.

Presented at the May 1997 CAC Seminar

The next requirement is to secure equipment from falling over or falling off the benchtops. Desk top computers, fax machines, microscopes, files, boxes, pipet stands can make quite a mess when they crash to the floor, besides possibly causing harm to nearby workers. Boxes can fall off shelves and send other things off the counter below them; glassware can tip over and break; pictures and clocks can be shaken off walls.

To avoid this scenario, I did some research on sources of earthquake emergency supplies and ways of securing equipment and glassware. One place was a local store called The Earthquake Outlet which not only sells such items but will assemble custom-made containers. They also sell systems like this one (S.E.E.) for emergency lighting - no batteries needed!

Quake Wax can be placed under individual items so that they do not tip over, or motion-resistant mats can be cut to fit the shelves. There are door locks for cabinets to stop the doors swinging open and letting everything inside fall out, shock cords to keep binders and books in place on their shelves, and special wall hooks for pictures.

There are straps for water coolers and water heaters and, best of all, there are *Thumb Lock Safety Fasteners*. These are patented polyurethane bonded nylon straps with a thumb lock fastener at each end and are designed to hold computer equipment and laboratory apparatus in place. The fasteners, which have a quick release, can be moved and locked in either direction on the strap which bend easily around corners and edges to conform to equipment shapes. The fasteners have a replaceable adhesive pad base which is pressure-sensitive and bonds up to 100 lbs/sq.inch and yet is completely removable from desks and furniture if the equipment needs to be moved.

The adhesive has dynamic strength (i.e. it is designed for holding during movement) and has a fastening strength to 400 lbs so they are also good for holding filing cabinets to each other or to walls, floors or partitions. The breaking strength is 750 lbs. I plan to use thumb lock fasteners, not only on computer equipment but on water baths, centrifuges, MP4 setups, microscopes etc.

There are also hidden administrative responsibilities to keeping the workplace safe, like arranging priority status for phone lines and organizing a temporary office somewhere else so that business can continue. Even having maps of where chemicals are stored in the building need to be available for outside emergency personnel.

Just in case the BIG ONE arrives this week, read on:

1) Leaving a building can be risky because falling debris, trees etc. account for many injuries.
2) Don't try to hold things up—move away before they get you.
3) Glass will shatter—get under a sturdy object like a table or bench, a desk, even a chair, for protection.
4) Always protect your head and neck.
5) If you choose to stand in a doorway, be sure there isn't a door that will slam shut.
6) If you are at home in bed, stay in bed and cover your head. Have boots and flashlight close to hand.
7) If you are out in the open, drop, cover and hold. Get under a picnic table or a bus bench.

Avoid brick walls, chimneys, trees, power lines.

8) If you are driving on the freeway, get over to the shoulder as soon as you can and stop.

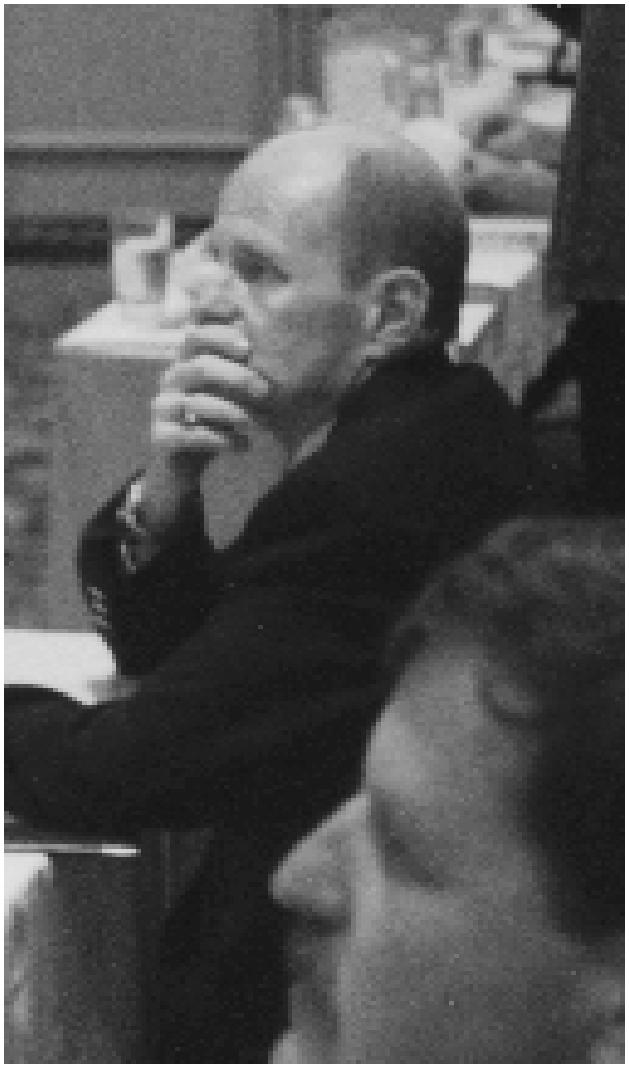
If you are in a vehicle in front of an overpass, move away from it and be aware of vehicles behind you - give them room to get out also.

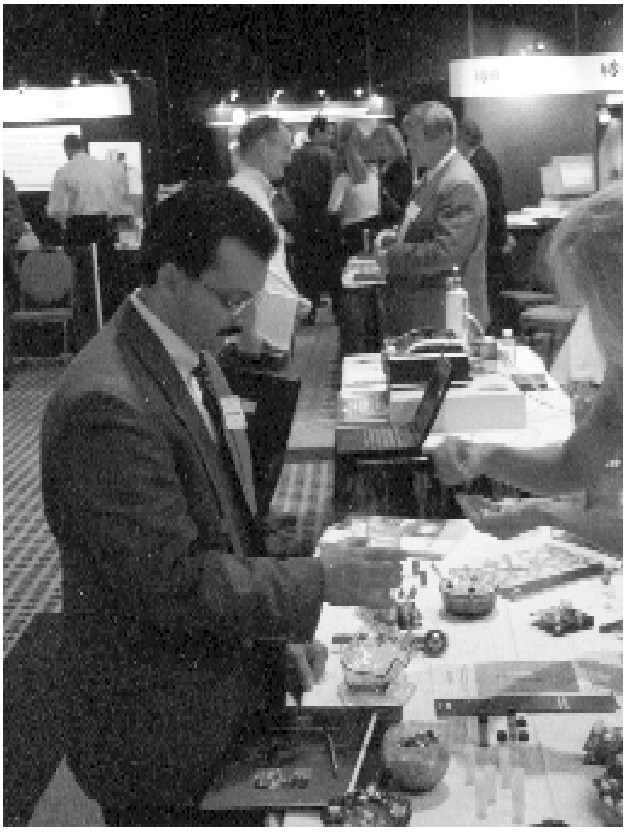
9) Immediately after a quake, check for injuries to yourself first and then to others. Administer first aid as necessary.
10) Use a battery operated radio or a car radio to listen for emergency bulletins.
11) Check for fires - put out small ones.
12) Never use a match or turn on an electric light switch. Keep a flashlight handy.

I hope this paper has raised your consciousness about organizing your facility's earthquake preparedness because, if one thing is sure in California (and not much is!), it *will* happen and it will be *sooner* than we expect or hope.

Face Off

Members of the audience (r) line up awaiting their turn to quiz the panel: *at left*, (l-r) Robert Blaiser, Ed Blake, Henry Lee, Barry Fisher, Greg Matheson, Peter DeForest and George "Woody" Clarke. More scenes from the Fall 1997 CAC Seminar at Irvine follow.

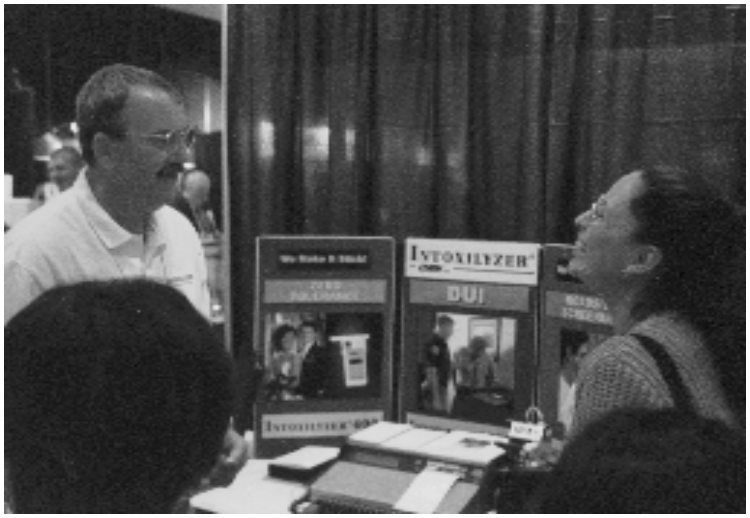


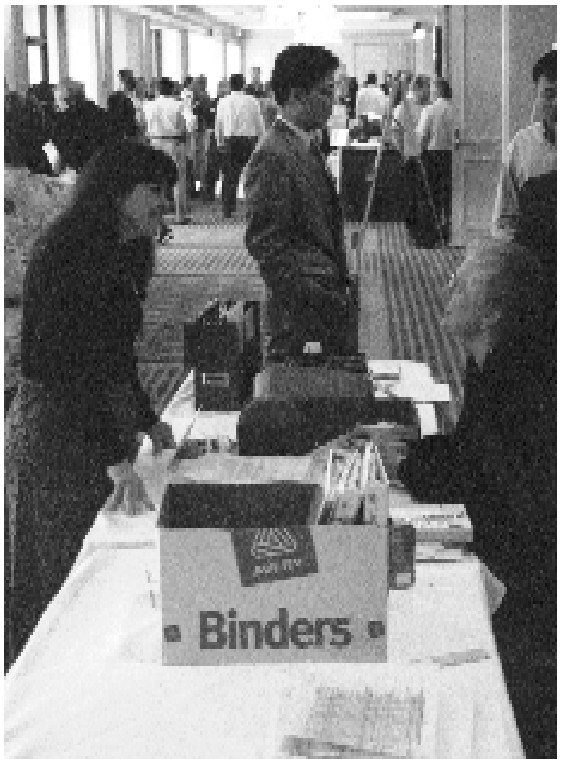


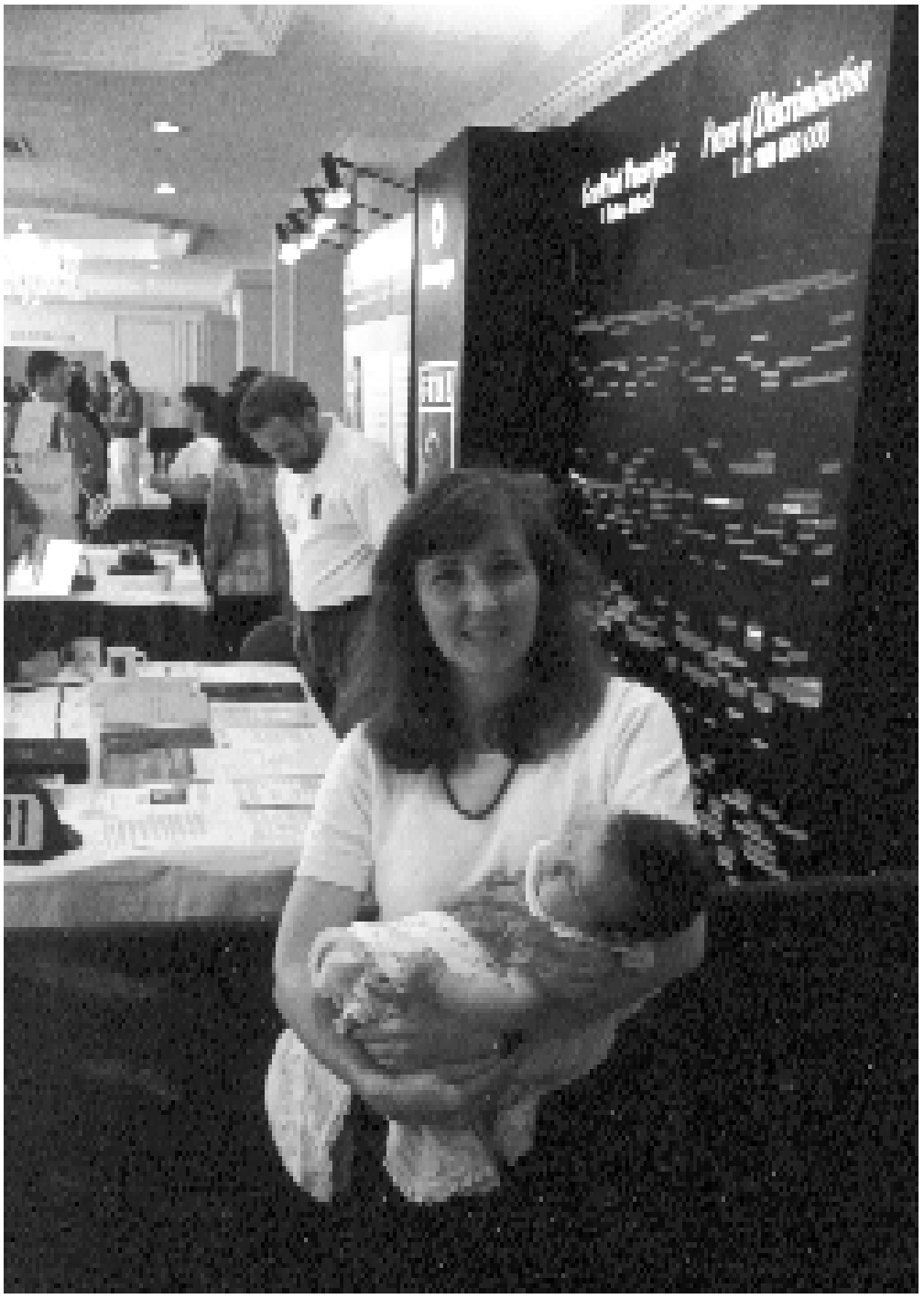
Clockwise from top left: Pete Barnett makes a point with Peter DeForest while Jeff and Greg listen; attorney Robert Blaiser ponders a speaker's views; Dean evaluates new equipment at the vendor's area; John DeHaan (r) presents a plaque to Peter DeForest following his Founder's Lecture.

Fall Seminar '97

Interact







"Interact" was the best word to use in describing the seminar at Irvine. *Both pages, clockwise from upper left:* Wayne Moorehead and John DeHaan interacting; CAC President Carol Gannett's attention is held by a speaker; digital microscope imagery is featured heavily as a tool of the nineties; Jennifer Mihalovich shows off her newly minted daughter, Sabine; more interaction at the registration table and at the Intoxilyzer display; the remains of the day.

Weasel Words

The controversial subject of which words to use in a report provoked responses from all over the globe. Forensic scientists gave their thoughts on this recent web discussion from Australia, Scotland, several US states, New Zealand, Canada, Switzerland, Israel and Finland.*

Take a red fiber found on the victim. Compared to fibers from a shirt from the suspect. Both have the same color, microscopic characteristics, and IR spectra. Did the fiber come from the suspect's shirt, or anyone of a dozen shirts just like it that were made from the same bolt of fabric. Less a physical match of the end of the fiber from the victim to a portion of the shirt from the suspect, the examiner is going out on a limb if he says the victim fiber cam from the suspect shirt and only the suspect shirt. Consistent with is the *only* true response to the question at hand.

The problem with the term "consistent with" is that the conclusions remain the same if one, the red fibres are made of cotton (discard the IR spectra), and two, the red fibres are the red dyed acrylonitrile/vinyl acetate copolymer produced by Bayer (see the paper by Brüschweiler and Grieve, *Science and Justice* 1997: 85-89).

Nevertheless, it is the expert's duty to assess the differences between the evidential value in case one and in case two.

***

I work in an FTIR lab, and we normally use "consistent with" as our strongest association between two spectra, e.g. "The infrared absorbance spectrum of the white tablet from the suspect sample is consistent with the spectrum of compound X." I'd be interested in the opinions of others regarding this, including what other terms are used.

The interpretation of Infrared spectra provides a positive identification of an organic compound such as a drug of abuse. Identical absorption (or lack of it) at thousands of frequencies for two spectra (one for the standard and one for the unknown compound) can only mean that these two spectra result from the same compound. In fact, organic chemists like to borrow the term "fingerprint" to describe the region in IR absorption that is particularly unique to each individual compound. It is not uncommon, and entirely appropriate, for forensic scientists to testify that "IR spectra are like a fingerprint" for organic compounds. This communicates to the jury that IR spectra are unique to individual compounds. Actually, IR is better than fingerprints because the interpretation of the unknown spectra can lead to describing the compound and its parts.

The major problem with the term "consistent with," by itself, is that it does not address the relevance of the evidence. If one were to testify that, "these IR spectra are consistent with each other AND that means that they are were produced by the same compound because...." That would be fine and more relevant than "the unknown powder is white in color and is consistent with the standard because it is also white in color." There is background information that should be communicated to the jury, when it is available.

As someone pointed out, "The problem with the term 'consistent with' is that neither the legal professionals nor the jurors that we tested had a common understanding of the order of certainty associated with this phrase."

As we, forensic scientists provide an opinion as to the value of the evidence, we should include our assessment of the relevancy and strength of the evidence (or "order of certainty," as they put it).

The order of certainty that we can express varies with the type of evidence and the background information that is available to assess the value of the evidence. But we should always include our interpretation of the background information.

I'm not surprised by court rulings disallowing the use of the words "consistent with," "match" and "could have originated." The courts expect a more complete statement that addresses relevancy.

As Robertson and Vignaux point out in their excellent book "Interpreting Evidence," the first requirement that evidence should satisfy is relevancy.

Rule 401 of the US Federal Rules of Evidence define relevancy as :

'Relevant evidence' means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.

I agree the strength of the association in Example 2 is greater than in 1 because these authors conclude that finding these fibers at random (1 single fiber was found on each of 2 of 435 garments searched in this study) is very rare.

I also agree that the expert's role is to assist the trier of fact on deciding the ultimate issue (guilt or innocence) but that we shouldn't offer odds on that issue. Rather, as Rule 401 requires, we should offer opinion on how, for example, the evidence is relevant to the issues of contact between a person or place and a material (fibers, paint, glass, hair, blood, fingerprints...).

The major problem with "consistent with" is that it does not address the relevance of the evidence

In an ideal world, we would all use the same criteria and framework for this evaluation so that we would all arrive at the same opinion, and use the same, clear terminology, consistently.

Two situations come to mind at the FDA, for example:

1. If the comparison is being performed on a mixture of excipients and active ingredient(s) characteristic of a pharmaceutical tablet or capsule of known provenance and a mixture of unknown source, the positive association between the two samples may be logically termed "consistent with" one another if:

a. there are no unexplained differences between the spectra, and

b. the question being asked relates

*Comments edited for publication.

to the characterization of the mixture, not of individual components therein.

As example of such testing and results/conclusions would involve the comparison of a repackaged/substituted pharmaceutical product (perhaps an inexpensive generic used to replace more expensive name-brand medication in the name-brand package) with the authentic product.

On the other hand,

2. If the goal of the analyses is to identify the active ingredient in a pharmaceutical product, it would seem unwise to stop after FTIR and make any report. The FTIR cannot spectrally resolve absorbing species in a mixed sample (although it would be great if the only infrared-absorbing species in the mixture was the active component, this is extremely unlikely!) Some chromatographic or other chemical separation technique should proceed the FTIR. Once resolved from excipients and/or impurities in the mixture, spectra for the active ingredients can be used in conjunction with other data (retention time, previously-accomplished colorimetric or microcrystalline tests or alternative spectral data) to *identify* the active ingredients.

Online and offline methods of separation can both provide for the same types of FTIR identifications thereafter. To use the FTIR alone in the case of questioned content/active ingredient identification does not allow the laboratory to assist investigators to the fullest extent, and may even be misleading. In the worst case, it may provide the wrong answer entirely. The simple fact is we have no significance or probability data to apply to most of our comparison conclusions. Until the day comes that we're willing to test our tests and develop probability data, any old group of words will probably do for our conclusion.

***

Although a strong effort is still needed, one cannot say that no probability or significance data exist. Numerous studies involving almost any type of evidence (glass, fibres, paints, DNA, even handwriting, etc.) have been carried out and published these last 5 years. Some data are available and may bring highly significant information in some cases. If you stay stuck to "consistent with," by definition these data are not taken into account. Why shouldn't we use these data if they are relevant to the case under investigation? How can you expect lay persons (the jury) to be able to decide the ultimate issue if the experts do not present relevant information peculiar to their expertise and prefer to give a "neutral" or "blurred" opinion for quality assurance purposes?

Any fool can see that this is not individualizing evidence. Rather, this is class evidence.

I think that "consistent with" is worse than assessing the strength of evidence using existing reliable data, provided that the validity and the limitations of these data are clearly explained.

***

The Germans have data on the relative abundance of fibers that were sold in their country over a narrow period of time. It is a very valid piece of work, for Germany. I wouldn't presume to apply their results to fibers found here in Arizona. Will it be of any use to the Germans two years from now? I doubt it.

Other individuals have data on other types of materials. Can that data be applied to evidence found in your local? In general, I doubt it. This fact is exemplified by DNA studies that must necessarily consider the demographics of the populations their statistics are derived from. A similar situation is evident in microscopical hair comparisons. The diet, age, environmental conditions, employment, ethnicity and race of each donor of each hair sample must be considered in any statistical study. Has it been done? No. Could it be done? Yes. Will it be time consuming and expensive? No doubt.

Willy-nilly applying the results of limited or regional statistical studies to evidence from other locals is worse than applying no studies at all. It doesn't matter wether we're considering glass, paint, hair dyes, blood types, fibers, duct tape or types of explosives. The prevalence of all these materials are altered by economic, social, ethnic and regional conditions. Some work over the last few years has tried to tie the identification of nonoxanol surfactant to the use of condoms in sexual assaults. The fact that this compound and a wide array of silicones are common components of hair preparations used by members of our negroid communities was apparently missed by the researcher. Could that fact be a significant issue in a sexual assault investigation? You bet.

Let's start fighting for the resources we all need in order to put together statistically valid studies in each of our areas of work. We can do it if we freely admit the common need.

Picking comfortable words and nebulous disclaimers will not cover the ground. Is a red acrylic copolymer fiber, traceable to Bayer, more unique in my region of the country than a similarly dyed cotton fiber? No doubt. Have I done any studies to prove it? No. Could I? Not on my current budget. There's the rub.

***

I wonder whether some aren't confusing the 'match assessment' process with the process of 'assessing the weight of the evidence.' Terms like 'consistent with' generally relate to some form of 'matching' process. There is actually no assessment of the weight of this evidence in such a statement—which is probably what most people have a problem with. There is nothing wrong in my opinion with saying that something is consistent with something. The problem is if the weight to be attached to this evidence is not clearly conveyed.

Much of forensic testing is a two stage process;

1. Decide whether or not they 'match' or are in some way 'similar,' then

2. Assess some weight to be attached to this evidence. There is a difference here depending on whether or not the evidence is somehow associative (e.g. the fibres transferred in an assault) or a straight identification (e.g. the powder is cocaine).

The decision that something is 'consistent with' something else is only part one in my opinion. Even a comment like 'the fibres are consistent with coming from the suspect's jersey' really relates to the matching process, but some may (wrongly) infer that some weight was attached to this evidence.

The original thread of this discussion was a comment on a phrase which was something like "I am 100% certain...." This may imply that one can be 50% certain—which is at the very least demeaning to the term 'certain.'

***

Everybody admits the common need for extensive studies in this field (or I hope so!). There is a lack of statistical data, yes. Let's take the example of the red acrylic copolymer Bayer fibre. If you want to obtain an accurate statistical figure of the prevalence of this fibre type in your region (an perhaps more accurately on the relevant recipient), you should carry out in you region a target fibre study involving this fibre and this type of recipient. Could you do it? Could you repeat this study for another case involving other fibres and other recipients? The answers are probably no. As was said, everything is related to the budget. We have to live with it! So the only possibility is to use existing data as a guide providing conservative estimates. I do not want to make simplistic generalizations, but if your problem is to say that the frequency of this fibre type is less than 1%, or 1-5%, or 5-10%, or 10-20%, or 20-50%, the existing data bring useful information. Of course, it's another story if you want to be able to say that the frequency of this fibre type is 0.88% or 0.97%. We could discuss this example with almost any other type of evidence.

I would not be reluctant to use "consistent with" when it means "not differentiable from" or something alike *and* that the weight to be attached to the evidence is clearly conveyed. However, if for whatever reason the second stage of the process is not completed, some people will try to infer some weight to "consistent with." And in this case it seems to me that a phrase such as "the fibres are consistent with coming from the suspect's jersey" has a stronger connotation than "the fibres are not differentiable from those of the suspect's jersey."

I use the term "consistent with" only in those cases before me where I am asked for a "match assessment." For example, I was recently asked to assess the skeletal remains of a victim of a bear attack. The police had her car in a remote area, her shredded clothing, her wallet, and not the slightest evidence of a homicide (perhaps another debate on whether a bear can commit homicide?).

To make a rather long story short, her skeletal remains consisted of two fragmented thigh bones. I could only say that the age at death, race, sex, and stature were consistent with the presumed victim.

This is obviously a match assessment. Any fool can see that this is not individualizing evidence. Rather, this is class evidence. The bony remains are from a white adult female, and this is consistent with Mary Smith. (I don't think I need to point out that there may be others who fit this "class".)

The police, in turn, now have consistency among the clothing, artifacts, vehicle, bones, and interviews with local people. No evidence of foul play —perhaps of ursine play?

***

Apparently, there are many who can't see, or who insist that some type of probability be assigned to every assessment.

Class evidence is a concept which seems to have gotten lost in this discussion. I think the DNA tail is wagging the dog again.

"Consistent with" is a perfectly good phrase, understandable even to nonscientists with a decent grasp of English.

"Consistent with" is a perfectly good phrase, understandable even to nonscientists with a decent grasp of English. Fibers that "could have had a common origin" with the suspect's jersey that are found on the victim constitute reasonable evidence for the trier of fact to consider, along with all of the other evidence that is presented. The forensic scientist's concern should not be how many mauve acrylic jerseys exist within 100 miles. Rather, the scientist should be concerned that he or she has done everything possible to determine whether the fibers are capable of being distinguished from each other.

To suggest that a database of every possible type of forensic analysis should be compiled is both impractical and a waste of resources. To suggest that the lack of such a database detracts from the value of class evidence completely misses the point.

***

In my opinion, it is all too common to see a string of alkanes in a fire debris chromatogram labeled as "consistent with the presence of kerosene." While this call may be "correct" in a very limited context, it can lead a jury to believe an accelerant was used in the milk jug factory fire. Of course, it can be argued that it is the province of the opposing attorney to show that the consistency is meaningless, but not every litigant is blessed with an attorney who can put the expression in perspective. "Consistent with" can be mighty handy for winning cases but it is often a phrase that misleads without actually lying.

One of my favorites is the statement that, "The smoke patterns, the low burn and the fast, hot, smoky fire were consistent with the presence of gasoline." That's what they said when the Styrofoam plant burned down.

I'm not saying the phrase must be completely avoided, but it should be followed by a second phrase beginning with "however." It is not merely the formal definitions of words that are important but also the connotations engendered in the minds of those triers of fact who may not excel at semantic analysis.

***

I have seen facts, which while being of questionable value, still exist. The alkanes example is just one. Yes, they could be from those milk jugs, and maybe they are from kerosene.

An example from fibers. The victim of a hit and run accident was wearing a white cotton T-shirt. On the suspect's car are found white cotton fibers.

Those are facts. I feel that I cannot throw those facts away, anymore than I can use it as a proof that car hit that person or kerosene was used to start the fire. They must be presented.

Sometimes in spite of a lot of hard work, we come up with facts about which we rightfully have to say—maybe yes and maybe not. I don't feel we can err on the side of the prosecution, nor can we err on the side of the defense and say, "Hey, this is just background when we can't prove that." Uncomfortable as it is, we sometimes have to say, "Here is a fact, and quite frankly it could be this, or it could be that."

***

I am tempted to say that sometimes the evidence "match" and is far (very far) from consistent with the offense! That's why I am so reluctant to use "consistent with" without a clear explanation of the hypothesis in presence.

Say a suspect is apprehended 5 minutes after the breaking of 7 windows by shoulder charging. An eyewitness sees the offence but cannot identify the person. The suspect is wearing a highly retentive woolen jersey. One glass fragment is found and match a window. The conclusion could be a match assessment: "the glass fragment recovered is consistent with the window pane." But it is really misleading because I contend that this evidence is very strongly supportive of the suggestion that the suspect is not the man who shoulder charged the window. This is because I really did expect much more glass under these circumstances!

To be a little bit more polemist, note that you do not need at all the frequency of the glass characteristics to reasonably make this inference! The frequency of the characteristics is only part of the relevant information needed to assess the value of transfer evidence. Questions on transfer, persistence and recovery are essential but systematically discarded. Consequently, I agree that only broad assessments like: less than 1%, or 1-5%, or 5-10%, or 10-20%, or 20-50% are necessary. To obtain these estimates, I think that a moderate (acceptable for the budget) but adequate survey (perhaps even based on past cases) is more valuable than so-called experienced guesses made by examiners.

***

A probability should be assigned to every assessment. Of course, many evidence types will require a subjective assessment, based on experience. What is required is that the basis of the assessment is stated explicitly so that the jury can properly assess the credibility of the evidence.

To take a balanced view you must consider the alternative that the evidence did not originate from the control sample, but actually from some other source. If purple acrylic jerseys are very common —or very rare—even if only in your limited experience, you should say so in your evidence.

You may carry out many tests in an attempt to distinguish between recovered and control fibres: comparison microscopy, microspectrophotometry, FTIR whatever, and fail to find any differences. But if those fibres are colorless polyesters, also matching your laboratory coat, do you think it is ethical to merely report the detailed "agreement", whilst failing to point out the very plausible alternative source? I do not!

At its mildest, inappropriate use of the phrase "consistent with" is caused by laziness, and I've been guilty of such laziness. At worst, in my opinion, it is diagnostic of a view of forensic science which Holmes cautions against.

("Circumstantial evidence is a very tricky thing. It may seem to point very straight to one thing, but if you shift your own point of view a little, you may find it pointing in an equally uncompromising manner to something entirely different"— Sherlock Holmes)

An investigation exclusively directed at using a battery of tests demonstrating identity between the crime sample and the source which is put to you, whilst deliberately avoiding that "shift of your own view point" which directs you to proper consideration of all the alternatives, cannot be the right approach.

***

In the opposite way, consider a famous case from Minnesota. State statute prevented the prosecution from saying much more than "consistent with" for DNA evidence that was actually overwhelming. The jury apparently inferred that the match could plausibly be explained by coincidence. So "consistent with" can be, is, misinterpreted in both directions.

(That seems rational of juries—realizing that the phrase could thrown at them in situations where the likelihood ratio is anywhere from one up to millions, a sensible adaptive organism might reasonably guess at the meaning as somewhere in the broad range in between.)

I propose the phrase "characteristic of." I realize that it may be subject to some of the same abuses as "consistent with." But it has several advantages.

It has a distinctly positive ring to it. An investigator may be able to say "consistent with," when the evidence is neutral, without being worse than bureaucratic. But to say "characteristic of" in such a case is clearly dishonest. "Characteristic of" means something, at least something.

For the same reason, it has a narrower range of possible meanings than does "consistent with," so is somewhat less likely to be misinterpreted by so much.

It can be quantified. "The DNA evidence is 100 times as characteristic of father-child pairs, as of unrelated man and child," is a reasonable plain-English way to say the likelihood ratio is 100. I hope that most people, most jurors, would hear this sentence and interpret it about right.

***

Some have suggested that probabilities are unnecessary, when in fact they're unavoidable, if use of the phrase "consistent with" is not to be misleading. Consider as the "test" the hypothesis that the perpetrator has a head. The fact that he or she does is of no probative value, yet passes the "consistency" test.

Hence, to avoid being misleading, it's imperative that some measure of how difficult the test is be conveyed *at some stage*,

although perhaps not in the written report. Very rigorous tests, ones *likely* to refute a false hypothesis (high power), are the ones of real value. The problem is how to determine and convey the test's power. The test's power will be among other things, a function of the commonness of the material, be it a type of fiber, alkane chain, or DNA type.

The comments above on glass are interesting in that they point out that care must be taken in assessing the situation, which in this case would be the probability of observing not just matching glass but it's quantity as well under the two hypotheses. One would need to know not just the commonness of the glass but also the retentiveness of the clothing. Under classical hypothesis testing, the glass comparison and clothing retention would be separate and unrelated hypotheses, while Bayesians would examine each one sequentially. (One could also throw in the likelihood of a lab error or outright fraud.)

Although matching tests sound like purely logical classification tests, in fact almost always, they'll involve at least tail probability assessments, since measurement error distribution and the distribution of the class characteristic make the actual test one of the degree of overlap of the two distributions.

I'm still puzzled over continued confusion between the scientists burden of proof and that of the trier-of-fact. They're just not the same.

How should findings be reported in the written report versus testimony? It's my position that the report should either restrict its conclusions to those that can be formed based solely on scientific information, and not at all on the particular facts of the case, since these are subject to being disputed. Alternatively, one could go further, but explicitly state the factual assumptions. The former approach would often entail limiting the written report conclusion to phrases such as "consistent with", since the case facts needed to assess the probabilistic weight wouldn't be allowed at the written report stage. In court, the attorneys can provide explicit hypotheticals of the facts, which can then be used to make a probabilistic assessment.

However, in certain cases, scientific knowledge alone would suffice to enable a probabilistic statement to be made in the written report. This occurs where the likelihood ratio is so large relative to any plausible scenario, that the facts of the case become irrelevant. Thus, if one could obtain a DNA type of one in a zillion, the size of the suspect population is irrelevant; it becomes the same as the dactyl fingerprint situation. If one can identify a custom-made fiber, one used in only a limited number of items, one could make a probabilistic statement in the written report without recourse to the facts of the case.

In most "matching" situations, in order to report that a match is unlikely, and therefor of probative weight, it's necessary to assume that the evidence is what it is purported to be, i.e., as stated in the police report, and the item (blood sample, clothing, broken window) to be employed as the source or reference is also as it is claimed to be by the police. The scientist should demand proof of these facts before offering an opinion in a written report as to the probability of the questioned item's source, or be released from this burden via hypotheticals in court. Alternatively, the written report could briefly recapitulate the facts of the case assumed to be true by the criminalist. The conclusion could be followed by a disclaimer if the assumptions are not true.

The problem with issuing written conclusions, is that there's no guarantee of being able to straighten out any confusion in the reader's mind via subsequent testimony. "Consistent with" has been shown to be just such a confusing phrase.

***

Logically, DNA is no different than any other form of trace evidence. At best, the glass-individual distinction represents a conclusion that sufficient data and valid theory have shown that the (presumably) individuating evidence has a very low probability of not being individuating. (Sorry about the double negative.)

A forensic scientist also is responsible for assisting judges or juries in drawing correct inferences from the scientist's thorough examination or analysis. I emphasize *assisting*. It does not assist a judge to say that "I have been thorough in my study of class characteristics, but I cannot or will not explain how probative these class characteristics are." But if the scientist takes the necessary legal step of opining on probative value, then that scientist better have some scientifically verified data on which to base the opinion or characterization. At least, this is an argument most recently repeated in a new treatise for lawyers and judges, *Modern Scientific Evidence* (West Pub. Co. 1977.)

***

1. We have to emphasize that theory, methods and applications of statistics underlie scientific evidence. The trier of fact should use statistical reasoning and assessment to understand scientific evidence which is more often presented in a numerical way.

2. Forensic scientists should give the court an evaluation which illustrates the convincing force of their results, and such an evaluation is *inevitably* linked with probabilities as measures of uncertainty.

3. Unfortunately, in practice, the evaluation of evidence is limited (see as example: The expert testified that only one in 97 million African Americans possess the same genetic pattern identified in Taylor's DNA and matched with the DNA extracted from the specimens found on the victim.), simplistic (A "match" between two DNA patterns can be considered strong evidence that the two samples come from the same person.) and often inaccurate (the tool mark was "made by that particular tool.")

4. This is so even when the expert has a mission to enlighten the court with a technical appreciation on a specific point, and has the duty to furnish the judge or jury with the necessary scientific criteria for testing the accuracy of his conclusions. The expert has to enable the judge or jury to form their own independent judgement by the application of these criteria to the fact proven in evidence. It is questionable whether current approaches satisfy these points. In that, I completely agree that a forensic scientist is responsible for assisting judges or juries in drawing correct inferences from the scientist's analysis.

It seems important to point out that forensic evidence has, by its nature, a close link to statistical assessment. Therefore, appropriate interpretative procedures for the assistance of both jurists and scientists should be proposed and applied practically to ease communication between the forensic and judicial world and to aid in the correct interpretation of evidence.

In order to assess an issue (a fact), the court asks for the *help* and *advice* of forensic scientists who have a field of knowledge, more extensive than that of the court, in a specific scientific field. Unfortunately expert's statement at trial (see the examples quoted above), generally do not permit the court to evaluate correctly the strength of the link established by the analytical results and therefore to reach the correct assessment of the issue under discussion. I apologize to repeat again the same statement, but

the problem in all our discussion is hidden behind this simple situation: the problem arises because of the lack of a clear distinction between statements about the odds in favor of an issue and statements about the value of the evidence, as measured by a likelihood ratio, relating to an issue.

***

In regards to the scale to determine the order of certainty associated with each of the phrases, (Certainty; A is B, Probability; A probably is B, Possibility; A could be B), in Finland we use conclusions; the crime scene impression A *has been left* with the footwear B / the tool B, the crime scene impression A has *probably been left* with the footwear B / the tool B etc. in statements. We enclose a scale of conclusions with a statement. In this enclosure the meaning of the words identification (is), probably, possible, is explained. For instance "probable" means that in the crime scene impression there must be some unique, individual characteristics which correspond to the footwear / the tool in question. However, there is not the sufficient number of individual characteristics to draw the conclusion of a definite positive identification.

Our goal is that statements are easy to read, and they are understandable for lay members (jury). Examiners have to draw conclusions based on comparisons. There is no other way to obtain reference data than by experience.

In our examinations the main problem is what is the sufficient number of individual characteristics that is needed for the definite positive identification. Some crime scene impressions are weaker than the others, individual characteristics differ on individual shapes and positions between different cases. Similar cases with similar individual characteristics do not exist.

Experience and professional skills are needed for the assessment of individuality of characteristics. Also, continuous conversations, example cases etc. are needed while trying to keep the scale of conclusions at the same level among examiners. In Finland that task is relatively easy because all examiners are working in the same laboratory. But, how to control "the standardization" in the countries where giving statements has been decentralized? With tests, example cases, meetings? Determination of detailed standards for individual characteristics is impossible.

□

Q & A: "Is pollen a useful forensic tool?"

Adapted from **"Forensic Palynology: A New Way to Catch Crooks,"** by Vaughn M. Bryant, Jr.[1] and Dallas C. Mildenhall[2]

The term "forensic palynology" refers to the use of pollen and spore evidence in legal cases (Mildenhall, 1982). In its broader application, field of forensic palynology also includes legal information derived from the analysis of a broad range of organic-walled microscopic organisms such as dinoflagellates, acritarchs, and chitinozoans which can be found in both fresh and marine environments (Faegri et al., 1989). However, in most sampling situations forensic palynologists rarely encounter these Other types of organisms because most are restricted to fossil deposits.

It is difficult to establish precisely when the field of forensic palynology began. Attempts made prior to the 1950s, whether successful or not, probably did not gain much public attention and therefore were not reported. It is possible that if earlier attempts were made, the results may have been purposely hidden from the media in order not to alert criminals about the use of this new technique.

Two of the earliest reported cases using forensic palynology occurred in 1959—one in Sweden and the other in Austria (Erdtman, 1969). The case in Sweden revolved around a woman who was killed in May, while an a trip in central Sweden. During the court hearing, a number of experts, including a palynologist, were asked to examine soil attached to the woman's clothing. The objective of those studies was to determine whether or not the woman was killed where she was found, or if she had been killed elsewhere and then dumped at the site where her body was discovered. Preliminary studies of the pollen in soil samples taken from the woman's clothing suggested that she had been killed elsewhere because the dirt lacked pollen from plants common in the area where the body was found (i.e., *Plantago*, *Rumex*, and grasses). However, a later reinterpretation of the forensic pollen samples noted that the murder could have occurred in May because that was before the grasses and herbs in the region had pollinated. Bath opinions were bath entered as evidence in the court proceedings, but we do not know if the murder was ever solved. The importance of this case is that it is one of the earliest records in which pollen data were considered as important forensic evidence in a court case.

In the second case, which occurred in Austria, the discovery of the murdered victim's body, and the conviction of the criminal were based primarily on the evidence recovered from a pollen sample associated with the crime. During a vacation along the Danube River, a man disappeared near Vienna, but his body could not be found. The police soon found a suspect with a motive for killing the missing person, but had no evidence to link the person with the possible crime. Without a confession or a body, the prosecutor's case seemed hopeless.

As the investigation proceeded, a search of the suspect's room revealed a pair of boots with mud still attached to the soles. These were taken as evidence and given to Wilhelm Klaus, a geologist with the Austrian Geological Survey, for analysis. Dr. Klaus examined the mud and found that it contained modern spruce, willow, and alder pollen. In addition there was a special type of 20 million-year-old, Miocene-age fossil hickory pollen grain present in the mud.

Based on the pollen evidence, Dr. Klaus was able to pinpoint where the defendant must have walked while getting mud on his boots. Only one location, a small area 20 kilometers north of Vienna along the Danube Valley, had soils that contained the precise mixture of pollen found in the boots' mud. When confronted with the identity of this location, the shocked defendant confessed his crime and showed authorities where he had killed the victim and then burled the body, both of which occurred in the precise region pinpointed by Klaus.

In other early cases, during the 1960s and 1970s, Max Frei, a noted Swiss criminalist, often used pollen as a forensic tool to link suspects to events or to crime scenes (Palenik, 1982). Some of his most noted cases include one in which a suspect claimed that his pistol could not have been used to commit a recent murder because it had not been removed from its storage box in months. However, Dr. Frei proved the suspect was lying because grease on the pistol contained alder and birch pollen, both of which were pollinating when the murder occurred, not

when the suspect claimed he had last cleaned the pistol and put it away. In another case Dr. Frei showed that a document was a forgery because he found fall-pollinating cedar pollen stuck to the ink used to sign a document, which had a June date (Newman, 1984). Max Frei also gained fame for his pollen analysis of the Shroud of Turin, which revealed that the Shroud had probably been kept for sometime in Israel and Anatolia (Wilson, 1978).

There are four types of pollen dispersal methods: 1) pollen that is carried by water currents, 2) pollen that is carried by wind currents, 3) pollen that is transported by an insect or animal, and 4) pollen that never leaves the flower because it is used for self pollination.

Many aquatic angiosperms live completely submerged and release their pollen underwater, relying on water currents to transport the pollen from the male anther to the female stigma of a neighboring flower. This method of transport, like the wind, is a hit-or-miss method of pollination. For this reason these plants produce high levels of pollen within each anther. However, since these plants produce pollen types that consist only of a single-layered cellulose wall, the pollen is almost never preserved in sediments and generally oxidizes rapidly if removed from water. Because of these limitations, these types of pollen are of little potential value for forensic work.

Another small group of plants are called "autogamous" because they are self-pollinating and are so efficient that little pollen production is needed. Most plants in this category produce less than 100 pollen grains per anther. Pollen from these plants is rarely dispersed into the atmosphere even though their pollen preserves well and has a durable outer wall, called an "exine," made of a stable chemical compound called "sporopollenin." Like pollen produced by submerged plants, the pollen of autogamous plants is of little value in forensic work because it is dispersed in minimal numbers. In a larger group of plants, called zoogamous plants, pollination is dependent upon the transport of pollen by some type of insect (e.g., bee, wasp, beetle, moth, ant) or animal (e.g., hummingbirds, lizards, nectar-feeding marsupials and bats, or other small mammals). Because of the efficiency, pollen productivity is low, yet not as low as is found in autogamous plants. The potential value of zoogamous pollen in forensic work is excellent for two reasons. First, zoogamous pollen grains have some of the most durable exines. This means their pollen often will remain preserved in deposits for long periods of time and are generally less susceptible to destruction than pollen grains dispersed by other methods. Second, zoogamous pollen is produced in low amounts, thus is not nominally a potential contaminate found in the pollen rain of an area. This last point is both good and bad for forensic evidence. It is good because the pollen of a zoogamous plant found in a forensic sample has a high degree of confidence that the pollen belongs with the forensic sample and is not an atmospheric contaminate. It is detrimental because so little pollen is produced by each plant that the chances of its pollen getting into a forensic sample are reduced.

The last category is the wind-pollinated (anemophilous) types. This group includes a wide range of producers such as the gymnosperms and a significant number, but not a majority, of the angiosperms. Also included in this group are spore-producing plants such as fungi, ferns, and mosses. Because wind pollination is the most inefficient method of dispersion, anemophilous plants must produce vast quantities of lightweight grains that will travel easily in air currents. Some species of wind-pollinated plants, such as marijuana (*Cannabis*), produce as many as 70,000 pollen grains per anther (Faegri et al., 1989). When large fields of these anemophilous plants grow together, their flowers can produce billions of pollen grains that are dispersed daily during the flowering season. In many cases, this abundance becomes a disadvantage because often marijuana pollen occurs in trace amounts on the shoes of people connected with the drug trade. Nevertheless, when such evidence is found, a palynologist cannot state in court that, "Traces of *Cannabis* pollen could only have come from direct association with, or use of, the actual plant." Instead, if asked, a palynologist would have to admit that traces of marijuana pollen on a suspect's shoes could have come from almost anywhere as a result of "random air dispersal" of that plant's pollen. An example of this occurred during the summer of 1995 when European newspapers reported that "clouds" of *Cannabis* pollen were drifting across the Mediterranean from source areas in Morocco, where local farmers reported growing a bumper crop of marijuana.

Another important factor is the "sinking speed" or rate at which a pollen grain falls to earth. Marijuana, alder, juniper, and birch pollen are very small and very light. Their average fall rate is about 2 cm per second. On the other hand, maize plants and fir trees produce pollen that are large and heavy, and fall to earth at a rate 15 times faster than the lighter ones. Using just these two examples, one can see that the potential distribution area of maize and fir pollen grains will be smaller and more restricted than the dispersion area covered by the pollen from plants in the first category (Tauber, 1967). In forensic studies this means that when maize and similar types of large pollen grains are found in samples, small dispersion areas are indicated and greater precision in identifying the source region may be possible.

One final concern is the amount of material that will be collected for forensic analysis. In most cases very little dirt, mud, or other debris is available for collection and analysis. Therefore, most forensic palynologists face several immediate problems. First, they will generally not have enough sample to experiment with different extraction techniques to determine which works best. Second, they will often not have enough sample to conduct a second test if something goes wrong (e.g., a centrifuge tube breaks, a beaker spills, or a microscope slide breaks). Third, sample size may be further reduced when other potentially useful tests may need to be carried out first (e.g., soil testing, searches for fibers, sand grain analysis) before a destructive pollen analysis can be attempted.

Sediments—soil, dirt, and dust are common elements at almost every crime scene. As such, they should be collected carefully because often these elements contain abundant pollen and spores (Pain, 1993). Samples of dirt collected from the clothing, skin, hair, shoes, or the car of a victim might prove useful in linking the victim with the location where the crime occurred (Mildenhall, 1988). The same would be true of any suspects thought to be associated with a crime. Mud found on a stolen vehicle, or a vehicle used in a crime, could link the vehicle with the scene of a crime or link it to the place from which it was stolen. Dirt found associated with other objects or other types of conveyances (e.g., airplane, bicycle, motorcycle, boat, etc.) thought to be associated with a crime also might yield pollen evidence useful in linking those items with a specific crime or a specific geographical locale (Brawn and Llewellyn, 1991).

Hair and cloth. Woven cloth, woolen blankets, rapes, clothing and fur

all make excellent traps for pollen and spores. Woven materials and fur are made of tiny interwoven fibers. When air comes in contact with woven materials, the fibers become filters that retain solid particles, such as pollen and spores. Woolen garments, including blankets, skirts, suits, ties, and sweaters make the best pollen and spore traps. Woven caftan products, such as shirts, pants, socks, towels, and skirts are also excellent pollen traps. However, hair, whether human or animal, remains one of the very best pollen and spore traps.

When wind blows through hair, pollen in the wind becomes trapped in the open spaces between individual strands. In humans, the addition of various types of hair sprays, natural oils, and tonics makes heir surfaces sticky and provides an even better trap for pollen and spores. Hair from a victim, or suspect, can be sampled for its pollen by carefully washing it with detergents and warm, distilled water. This process will loosen trapped pollen and free it from sticky hair surfaces. Once collected, the wash water can be stored before analysis in a sterile container that is tightly closed and frozen, or a small amount of alcohol can be added to the sample to retard microbe growth.

Hair sampling need not be restricted to humans. Fur rugs found at a crime scene might have been used for wiping shoes and thus may be rich in pollen and spores. Domestic pets, sheep, cattle, horses, or other fur-bearing animals that might be associated with a crime scene or might be stolen or lost may be traced to their original owner through the analysis of pollen and spores attached to their hair. Hair on fur coats, felt hats, or sheep skins sometimes used as car seat covers are also excellent pollen traps and should be considered for their paternal use as forensic samples.

Illegal Drugs. Marijuana plants come in two sexes. Some plants are male and some are female. Only the male ones produce pollen. Because of the plant's archaic and inefficient method of wind-pollination, the males are among the most prolific pollen producers in nature. Because growing, harvesting, and packaging marijuana often occur in the open, marijuana pollen, as well as pollen from other local plants, will be included with any of the locally-harvested marijuana. Nevertheless, in some illegally grown stands of marijuana, male plants are weeded out because pollination and seed production are not needed. In such cases, sampling would reveal very little *Cannabis* pollen a factor that might be used in court to argue that even trace amounts of marijuana pollen should be considered as being significant evidence.

Forensic palynology is in its infancy. It remains untried in many regions of the world, is seldom used in other regions, and is not yet accepted nor recognized as being valuable evidence in most court systems. There are still misconceptions about what types of information forensic pollen samples can provide. Often police and other investigators regard forensic samples, and the testing results, only as tools that can be used to "convict" a suspect. Open, many types of forensic data, such as pollen results, do not actually "convict" a suspect. Instead, the samples are useful tools that can point investigators in the "right" direction, narrow the number of suspects, or perhaps even eliminate a person as a prime suspect. Nevertheless, even in this type of supporting role, forensic palynology can become a powerful tool of the forensic scientist.

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[1]Palynology Laboratory Texas A&M University College Station, TX 77843, [2]Inst. of Geological and Nuclear Sciences P.O. Box 30368 Lower Hutt, New Zealand. Full article is in press.

Harrogate, *cont'd from page 7*

fornia, some labs are on the IBIS system, while other labs are on the DRUGFIRE system. Currently the data put into one system cannot be shared with the other system. In addition various labs in the U.S. are using different sets of STR loci for DNA analysis. This results in labs not being able to share information with each other. Third, the police are more involved in the forensic science aspect of law enforcement in the U.K. There were many police officers attending the meeting in Harrogate. In the U.S., police officers rarely attend criminalistics meetings.

Even though there are some differences, the overall practice of criminalistics was essentially the same in the two countries. We both are developing certification programs for criminalists. We both have developed various training programs, and offer classes on a regular basis. We are both integrating technological advances into our labs, blending the old with the new.

It was refreshing to hear unique perspectives on topics from new people who I had not heard speak before. It was also eye-opening to see how others performed work on the same types of evidence. This meeting provided a forum for criminalists to discuss successes and failures, problems and solutions, while providing an opportunity for questions and input. I can't wait for the third Joint Meeting! □

Reduced Fee Offered to CAC Members Attending AAFS Annual Meeting

On behalf of the American Academy of Forensic Sciences, you are invited to attend the Academy's 50th Anniversary Meeting, ebruary 9-14, 1998, when more than 500 scientific papers, breakfast seminars, workshops and other special events will be presented. The meeting will be held at the San Francisco Hilton & Towers Hotel in San Francisco, CA. Below is a hotel registration form for your convenience.

Because this is a special celebration for the Academy, all regional forensic society members who are *not* yet Academy members are invited to register for the annual meeting at the AAFS member rate. A pre-registration form is included in this issue. Please complete the form and mail it to the Academy headquarters in Colorado Springs. Please contact the Academy office at (719) 636-1100 if you have not received a copy of the 50th Anniversary Advance Program and one will be mailed to you.

Plan to join your colleagues at the 50th anniversary celebration of the American Academy of Forensic Sciences in February!

SAN FRANCISCO HILTON & TOWERS FEBRUARY 9-14, 1998 HOTEL RESERVATION FORM
50TH ANNUAL MEETING OF THE AMERICAN ACADEMY OF FORENSIC SCIENCES

To guarantee accommodations, all reservation requests must be accompanied with first night's deposit or an accepted credit card number and signature and be received by **January 19, 1998**. Reservation requests received after this date will be confirmed on a space available basis. Cancellations must be received by the hotel at least three days prior to arrival for full refund of deposit. An additional 14% state tax is added to room rates.

Name _____
Name _____
Company Name _____
Address _____
City _____ State _____ Zip _____
Phone: Office _____ Home _____
Arrival Date _____ Time _____
Departure Date _____ Time _____
Name(s) and ages of persons sharing room with: _____
_____

❑ American Express ❑ Carte Blanche ❑ Discover
❑ Diners Club ❑ MasterCard ❑ VISA
Card No. _____ Exp. Date _____
Signature _____

Please hold my reservation (check):
❑ Guaranteed by first night's deposit (enclosed)
❑ Guaranteed by my credit card

There is a $25 charge for each additional person. Up to two children, under the age of 18, may stay free when occupying the same room as their parents.

Room Selection

ROOM TYPE	# OF BEDS	SMOKING/ NON SMOKING	# OF ROOMS
Single (1 Person)	1	_____	_____
Double (2 Persons)	1	_____	_____
Double (2 Persons)	2	_____	_____
Triple (3 Persons)	2	_____	_____
Quad (4 Persons)	2	_____	_____

Special Needs or Requests: _____
_____

Rates: *Single*: $152.00 *Double*: $174.00

Mail to:
San Francisco Hilton & Towers Hotel
333 O'Farrell Street
San Francisco, CA 94102

San Francisco Hilton Reservations: (415) 771-1400
Fax: (415) 923-5075

Please Note: Check in time is 2:00 p.m. Check out time is 12:00 p.m.

AMERICAN ACADEMY OF FORENSIC SCIENCES 50TH ANNUAL MEETING FEBRUARY 9-14, SAN FRANCISCO, CA

PRE-REGISTRATION FORM MUST BE RECEIVED BY JANUARY 14, 1998 RETAIN A COPY OF THIS FORM FOR YOUR RECORDS

1. REGISTRATION INFORMATION (Please affix label or print or type all information)

Name _____ Title _____

Agency _____

Address _____

City _____ State _____ Zip _____

Phone (____) _____ Fax (____) _____

AAFS Member No. _____ Social Security No.____ - ___ - ____

Will spouse attend? ❑ Yes ❑ No Will children attend? ❑ Yes ❑ No

Spouse Name _____ Hotel where staying _____

MAIL your completed form with payment or purchase order to:
American Academy of Forensic Sciences
Lock Box 2520
Colorado Springs, CO 80901-2520
(719) 636-1100

OVERNIGHT SERVICE ONLY:
American Academy of Forensic Sciences
410 North 21st Street, #203
Colorado Springs, CO 80904-2798

FAX your completed form to:
(719) 636-5245. Our fax line is open 24 hours a day.

Special Services: ❑ Please check here if you require special accommodations to fully participate. Attach a written description of your needs.

EXHIBITORS USE THIS FORM ONLY IF REGISTERING FOR SPECIAL FUNCTIONS (ITEM NO. 5 BELOW)

2. REGISTRATION FEES

*To be considered **pre-registered**, your registration, change, or replacement **must be received at AAFS by January 14, 1998.** After this date, all registrations will be processed as on-site registrations at the San Francisco Hilton & Towers Hotel at the AAFS Registration Desk. **The deadline is firm.***

All requests for cancellation must be made to the AAFS headquarters in writing via FAX or mail. Phone cancellations are not accepted. If registration is cancelled, fees will be refunded as follows: Prior to December 1 - full rebate less $25 admin. fee; December 1-31/75%; January 1-31/60%; February 1-3/50%. No refunds after February 3, 1998.

Check Fee Category	Prior to Jan. 14 Pre-Registration	On-Site
A. INCLUDES ONE TICKET FOR ANNIV. BANQUET		
❑ **1** AAFS Members	$195	$275
❑ **2** Applicants	$195	$275
❑ **3** Non-Members	$285	$375
Do you plan to attend the Friday Banquet? ❑ Yes ❑ No		
B. ADMISSION TO SCIENTIFIC SESSIONS ONLY		
(Banquet ticket not included, see Item C below for purchase)		
❑ **4** Trainee Affiliates	$125	$175
(Must be an AAFS Trainee Affiliate or provide letter from employer verifying trainee status)		
❑ **5** ***Retired*** AAFS Fellow	$ -0-	$ -0-
❑ **6** Full-Time Students	$ 50	$ 75
(must be full-time student/provide copy of Student ID)		
❑ **7** Daily Registrants	$105/day	$105/day
❑ WED ❑ THURS ❑ FRI ❑ SAT		
❑ **8** Workshops Only		

C. 50TH ANNIVERSARY BANQUET TICKET(S)

❑ **9** Tickets for Category B and Guest Attendees

Qty. _____ X $50 (by Jan. 14) = $_____

Qty. _____ X $60 (after Jan. 14) = $_____

Subtotal $ _____

3. CONTINUING EDUCATION Admin. Fee $35

❑ **1** AMA Category 1, CME ☑ Check One

❑ **2** CLE (Colorado, Wisconsin & California Only)

Please Note: An individual must be a registered attendee at the annual meeting to obtain continuing education credits.

Subtotal $ _____

4. PLEASE TELL US. . .

A. If you are not an AAFS member, please state your forensic specialty: _____

B. Is this your first meeting? ❑ Yes ❑ No

5. SPECIAL FUNCTIONS

Tickets available by ***pre-registration only***. The deadline for pre-registration is **January 14, 1998. The deadline is firm.** Pre-registration forms received after January 14, 1998, will be processed as on-site registrations, which will VOID your registration/attendance for all special functions. No on-site registration for Breakfasts, Luncheons, Special Sessions or Workshops.

EVENT	*CODE*	*PRICE*	*QTY.*	*TOTAL*
Breakfast Seminars—7:00 a.m. - 8:30 a.m.				
❑ TU Pre-Trial Discovery Considerations	B-1	$ 29	____	$ _____
❑ TU Tryptamines: Natural & Synthetic	B-2	$ 29	____	$ _____
❑ W Case Studies from *The X-Files*	B-3	$ 29	____	$ _____
❑ TH Mind!...Wooden Scientific Nickels	B-4	$ 29	____	$ _____
❑ TH The Computer Crime Initiative	B-5	$ 29	____	$ _____
❑ FR Courtroom Drama of the 1880s	B-6	$ 29	____	$ _____
❑ FR Bite Mark Breakfast	B-7	$ 29	____	$ _____
Luncheons				
❑ W Engineering Section Luncheon	L-1	$ 39	____	$ _____
❑ W General Section Luncheon	L-2	$ 39	____	$ _____
❑ W Jurisprudence Section Luncheon	L-3	$ 39	____	$ _____
❑ TH Academy-Wide Luncheon	L-4	$ 39	____	$ _____
❑ FR Academy-Wide Luncheon	L-5	$ 39	____	$ _____
Special Sessions				
❑ TU Multidisciplinary Symposium	S-1	$ 75	____	$ _____
❑ TU Building a Career in Forensic Science	S-2	$ 30	____	$ _____

Workshops		W/Meeting Registration	Workshop Only		
❑ M Trace Evidence	W-1	$ 75	$ 105	____	$ _____
❑ M Laboratory Accreditation	W-2	$ 75	$ 105	____	$ _____
❑ M Recovery, Exam. & Analysis	W-3	$ 75	$ 105	____	$ _____
❑ M Health & Safety	W-4	$ 165	$ 225	____	$ _____
❑ M Drugs & Athletes	W-5	$ 225	$ 275	____	$ _____
❑ M Sexual Assault Evidence	W-6	$ 165	$ 225	____	$ _____
❑ M Signature Killers	W-7	$ 165	$ 225	____	$ _____
❑ M Standardized Methods	W-8	$ 175	$ 250	____	$ _____
❑ M Clinical Medicine	W-9	$ 85	$ 115	____	$ _____
❑ M Expert Witness Testimony	W-10	$ 75	$ 105	____	$ _____
❑ M Aspects of Ethanol	W-11	$ 75	$ 105	____	$ _____
❑ M Head Trauma	W-12	$ 85	$ 115	____	$ _____
❑ TU Forensic Nursing	W-13	$ 85	$ 115	____	$ _____
❑ TU Abusive Head Trauma	W-14	$ 85	$ 115	____	$ _____
❑ TU Biochip Arrays & Human ID	W-15	$ 75	$ 105	____	$ _____
❑ TU Vehicular Injury Mechanisms	W-16	$ 165	$ 225	____	$ _____
❑ TU ID of John and Jane Does	W-17	$ 165	$ 225	____	$ _____
❑ TU Management Issues	W-18	$ 165	$ 225	____	$ _____
❑ TU Methamphetamine	W-19	$ 165	$ 225	____	$ _____
❑ TU Forensic STR Analysis	W-20	$ 175	$ 250	____	$ _____
❑ TU Harassment & Stalking	W-21	$ 165	$ 225	____	$ _____
❑ TU Diving Fatalities	W-22	$ 75	$ 105	____	$ _____
❑ TU Fluorescein & Latent Blood	W-23	$ 85	$ 115	____	$ _____
❑ TU Internet for Forensic Scientists	W-24	$ 75	$ 105	____	$ _____

Subtotal $ _____

6. PAYMENT PROCESSING ❑ Check Enclosed ❑ American Express ❑ MasterCard/Visa ❑ Purchase Order

AMOUNT $ _____ (Totals from No. 2, No. 3 and No. 5) NAME (as it appears on your card) _____

CARD NO. _____ EXP. DATE _____ SIGNATURE _____

Victor Reeve

CCI Director's Reflections

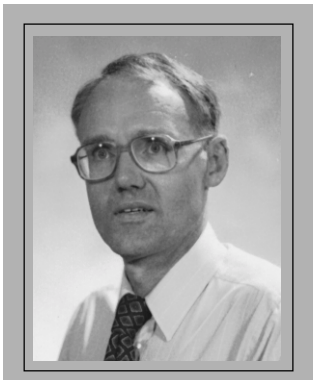
Well, here I am sitting in the director's chair at the California Criminalistics Institute (CCI). It's November, 1997, and I'm reflecting with a warm glow on our 96/97 fiscal year, which was a very good one. During that time,

CCI provided 25,000 student hours of Peace Officer Standards and Training certified quality forensic science instruction, delivered via 55 classes. This training influenced 828 forensic science students, predominately from California's 15 federal, state, and local crime laboratories. It also occurred to me that this is CCI's tenth year of operation, the last 6 years of which I have been fortunate enough to be here at the Institute.

How does this relate to the everyday needs of California's criminalists? It means that on the average, every criminalist has attended at least five CCI classes. It means that by the time of CCI's 10th anniversary, the institute had provided approximately 150,000 student instructional hours. This encompassed over 350 classes which were delivered to about 5,000 students. These courses were "hands on" training provided in the areas of criminalistics and toxicology, delivered through seven programs, biology, chemistry/toxicology, crime scene, impression evidence, microscopy, health and safety and quality assurance. They included such "heady" things as crime scene reconstruction, computer (CAD) crime scene sketching, STR, DNA typing, a CD-ROM computer interactive training package on bloodborne pathogens, and a computer interactive mass spectral analysis program on arson.

During this 10 year period, the national move to certification and accreditation has progressed. As a result, CCI initiated a dialogue with the University of California, Davis (UC Davis) to pilot a forensic science extension certificate program. Recent client surveys revealed this would have low enrollment. Additional planning also occurred with a faculty committee established to develop a UC Davis master's of forensic science degree program. Because this opportunity should be statewide, I have also started working with the California State University-Los Angeles master's of science criminalistics program to establish accreditation of CCI classes for university credit.

I see the Internet becoming a major player in the communication of information and training. CCI is just beginning to realize this potential. Although we have had web page for several years, I think we have just begun to scratch the surface. Networking of computers is also demonstrating considerable promise.)



For the first time, we have had direct input into the annual CAC training survey.

The upgrade of our instrumentation is occurring along with the rest of the Bureau of Forensic Services (BFS) Laboratory systems. Consequently, we are optimistic about bring able to maintain state-of-the-art equipment for the purpose of training the forensic community. With tighter budgets, reimbursement programs are playing an increasingly important part in our funding. We have initiated our first tuition increase from 100 to 120 dollars per day for non-public sector and out-of-state students. Over the years, we have all benefited from generous support from the California forensic community. The California Association of Crime Laboratory Directors, local and federal laboratories, and BFS. Professional organizations such as the California Association of Toxicologists, the Northwest Association of Forensic Science, and, particularly, the California Association of Criminalists, (CAC) have been increasingly important helping CCI provide a full venue of courses. Assistance with course funding and co-instruction with colleagues from other laboratories is much appreciated

For the first time, we have had direct input into the annual CAC training survey. This will provide us with an excellent opportunity for planning future courses. We need direction in order to hit the mark for our clients. Beyond our 10th anniversary and into the new millennium, we see a bright horizon for training and hope to affiliate with training centers statewide. We plan to provide this training efficiently and at a convenient location.

In closing, I ask a favor of all CAC members because we value your opinions. If you are interested in continuing your education and would like to have the option of advanced degree credits associated with selected CCI courses, then please fill out the enclosed survey document and return it to us. It will give us guidance on where to focus our efforts regarding Cal. State L.A. and the UC Davis programs. I am looking forward to hearing from you and to continue our partnership for the forensic service. □

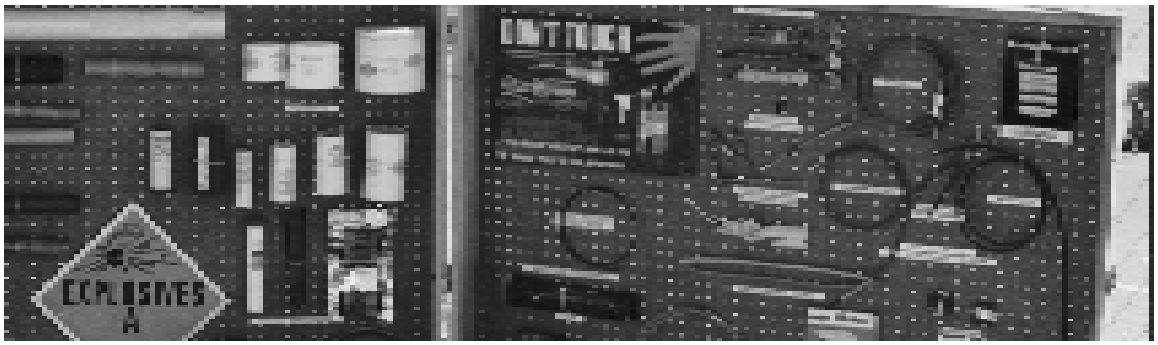
1997 Nor-Cal Explosives Seminar

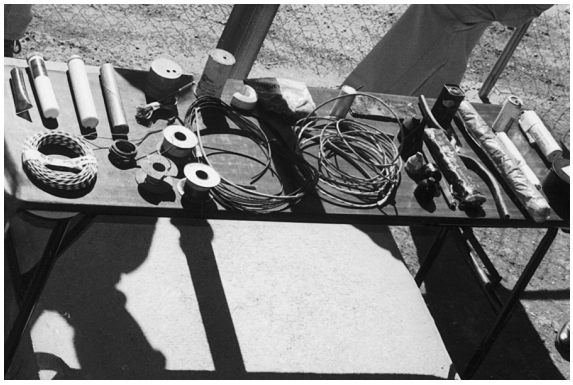
The first annual Nor-Cal Explosives Seminar met on Tuesday, October 14, 1997 in Sacramento. **Bradley Johnson** of Sacramento County Laboratory of Forensic Services hosted the meeting. Twenty-five criminalists, investigators and chemists representing twelve laboratories and agencies were in attendance.

Several presentations were given concerning a wide variety of interesting aspects of explosives analysis and investigation. Special thanks to Dr. **John DeHaan** for providing a video showing the explosive removal of an eight-ton beached whale carcass. A round-table discussion was followed by an informal catered luncheon.

The Greater Metropolitan Sacramento Explosives Ordinance Detail presented an excellent explosives lecture and demonstration in the afternoon. Captain Nick Concolino, Davis Police Department, and Officer Bob Koob, California Highway Patrol, led the lectures. The demonstration was highlighted by the detonation of two vehicles that were provided by Steve D'Annuzio of the National Insurance Crime Bureau.

Thanks to the CAC for cosponsoring this event and everyone else who helped make this inaugural event so successful.





Eugenio Edgardo

Richard J. Konieczka—

If You Think They Can, You're Right. If You Think They Can't, You're Right!

"What You See Is What You Get" or WYSIWYG applies to people as well as computers. A fifth grade teacher thought he was given all of the gifted children his first year at a new school and was apprehensive about keeping them challenged. At the end of the semester, the principal asked how he was able to get the students to do so well. He said the high IQ's made it easy. Asking what he meant, the teacher showed the principal their records with the IQ's written on the top. The principal said, " Those are not their IQ's, those are their locker numbers!" When expectations were high even the poor students performed.

A relocated manager in a software company asked the elderly janitor what kind of people they had in the branch. Asked what they were like in his former location, the displaced manager said the were cold and deceitful. "Well, you'll find that here too," the janitor replied. Another new manager asked him the same question and was met with an identical query. The second manager responded that the people in his former location were open and honest. "Well, you'll find that here too," the old timer stated. Both new managers came from the same location and both found the old man's prophecy to be true.

George Will said *the nice thing about being a pessimist is that you are constantly being either proven right or pleasantly surprised.* I have been leading a drive to institutionalize the language based Dvorak keyboard in schools because of its 20-50% greater speed efficiency. Consequently, I have become a student and a speaker of the process of change. We are all effecting change ourselves and in our work every day. It's amazing to observe some people's pessimism when they oppose an idea. Even more amazing is the degree to which they will embrace that same idea after they become converts.

Knowing that people can change and allowing them to be resistant has helped me improve relationships. I had the most resistant person in a seminar on sexual harassment become an ardent supporter once ideas had a chance to soak in. WYSIWYG.

—Sound Communication
(Richard is a facilitator at CCI)

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A Final Word

Coming in the Spring '98 issue:

Integrity — The Key to Leadership

by Ron Nichols

Forensic science has undergone a remarkable transformation over the decades especially in the short time that I have been a participant in the field. Dr. DeForest gave a wonderful talk at the recent CAC Semi-Annual seminar in Orange County in which he discussed all the changes that have come about, some of which have helped forensic science and others which have hampered the cause of forensic science. He addressed many issues which are confronting forensic science, internal and external. He expressed disappointment that as a whole forensic science has taken on a reactive rather than a proactive role in criminal investigation. Gone are the classic days of Kirk et al. Enter the days of fee for services public laboratories.

The media has heightened public awareness of forensics through Court TV and tabloid television. Local news outlets such as radio and newspapers seek out experts to help them with their feature articles. Ever wonder how these various media groups find their experts? Most of it is likely on name recognition. There are no doubt hundreds of qualified forensic scientists in this country and abroad who's names aren't anywhere to be found in the Who's Who of Media Appeal. Qualifications don't necessarily sell, but image does. Sadly, one can have image and absolutely no qualifications.

* * *

Face Game: *top (l-r) Elizabeth Thompson, 1992; Mary Murphy Hong, 1988; Dean Gialamas, 1994; bottom (l-r) Kenny Wong, 1989; Ron Nichols, 1993; John Davis, 1991.*

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

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

1. Contact the CAC Membership Secretary, Pennie Laferty (714)834-4510, to obtain an information packet and application.
2. Fill out and return the application to Penny along with your first year's dues & appl. fee.
3. Two of your listed references will be contacted.
4. Applicants are screened to ensure that they meet the requirements. (Outlined in Article 11 of the CAC Membership Handbook).
5. Your application will be presented to the Board of Directors at their next quarterly meeting. If approved, your application will be voted on by the membership at the next Seminar.

Thanks for the memories

The American Academy of Forensic Sciences is hosting its 50th Anniversary Meeting in San Francisco, February 9-14, 1998. Mary Gibbons is Program Chair for criminalistics and she promises a technical program worthy of this Golden Anniversary. I have been asked to put together a historical display for the reception area and I am asking your help. It would be fun to make "50 Years Ago—A Look Back" the theme of this exhibit. To that end I would like to have microscopes, spectrometers (all types) and other analytical equipment from the 1940-1955 period to display, as well as photographs, evidence exhibits, and other memorabilia. These need not be from California labs; photos, plans or displays from any forensic lab (toxicology, trace, firearms, fingerprints, and photography, too) will be welcome. Transportation (and even cleaning) can be provided. Security will be arranged (even if I have to sleep in the room—now there's a scary thought.

So, dust off those boxes, check the desk drawers way in back and dig in those old cabinets and help us appreciate how much progress we've made!

Contact John DeHaan at CCI (916) 227-3575 or fax (916) 454-5433.