

The CACNews

News of the California Association of Criminalists • 4th Quarter 2005



The President's Desk

QA / Q much?

I began writing my "President's Desk" article a few months ago. Then I read Keith and Nora's "Proceedings of Lunch: A Hitchhiker's Guide to Accreditation" in the last issue [CACNews 3rd Q 2005]. I found that I agreed with and have repeated, independently, a number of the issues they presented. So here is my view on the quality assurance (QA) process as well.

Before I launch into what I feel is wrong with the quality assurance process, I need to make it clear that I am a firm believer in ensuring the quality of work produced in the crime laboratory. What I disagree with are the requirements made by QA managers in the name of quality assurance that are being forced down our throats by an accrediting body that is apparently out of touch with the reality of work performance requirements in the crime laboratories. For instance, the new ISO 9000 guidelines are being mandated for lab certification in the future. Can someone please explain how these ISO guidelines will improve the quality of work in our crime laboratories?

Quality work is the responsibility of every single employee in the laboratory from the clerical staff to the management staff. There is no substitute for the proper supervision, review of reports, and review of work in the crime laboratory.

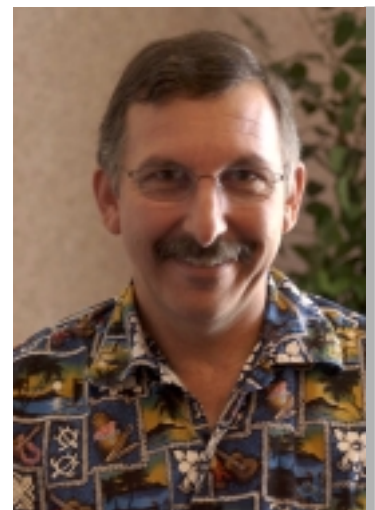
In the broadest sense quality assurance/control is the maintenance of the degree of excellence or superiority of your product or service. Controlling the quality of your product requires putting into place systems to achieve desired results. This concept is easier to understand when you are talking about producing a car or computer chip. Design, engineering, performance, specifications, and other measurable requirements must be met in order to produce the product. If any one of these processes fails, then the product fails, and profits are lost. The focus on the quality assurance processes in these types of industries must be *necessary* as opposed to *desired*. Successful companies don't waste time on desirable processes.

The implementation of quality assurance programs has made crime labs take a long look at their practices and procedures. Analytical methods must be validated, proper controls must be run, appropriate blanks must be run, work must be technically reviewed, and reports must be technically and administratively reviewed. In a nutshell, any process or analysis must be evaluated for the specific areas that could be affected by a variable. If the specific task does not require rigid specifications or guidelines, or isn't affected adversely by slight variations, then general good practice should prevail. For example, the verification of analytical or open pan balances that are used for the specific purpose of approximate weights of non-critical items or reagents; the verification of calipers and other measuring devices that are used for approximations of sizes or volumes; and other non-critical, non-instrumental laboratory processes do not require strict quality control and should not be instituted just because they can be.

The calibration of instrumentation that provides quantitative results is a crucial area and must meet strict requirements in order to maintain accurate results. In the case of instruments that are used qualitatively and not quantitatively, the requirements can be relaxed to documenting the operation of the instrument. The requirement of analyzing standards for an instrument of this type on some arbitrary time schedule does not improve the quality of the results for this instrument.

The technical review and administrative review of reports are good quality checks on the performance of an analyst to help ensure that the results reported are accurate. The practice of requiring second opinions (which aren't even an essential requirement in ASCLD), is also an extremely good way to find mistakes and ensure that the conclusion is defensible when an identification is made. Even the court testimony evaluations help make sure the laboratory is producing quality work. **These things go directly to the elimination of honest errors by an analyst and give us a chance to locate dishonest errors.**

New ISO 9000 guidelines are being mandated for lab certification in the future. Can someone please explain how these ISO guidelines will improve the quality of work in our crime laboratories?



Jim Stam
CAC President

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Fourth Quarter 2005

The
CACNews
www.cacnews.org



On the cover...
An HP autosampler shows how robotics finally came to the crime lab—in miniature.

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Members Ed Jones and Shanin Barrios were featured on A&E's series "Cold Case Files." The program included a look at the 1993 homicide of Norma Rodriguez which remained unsolved until 2003 when DNA technology had improved enough to analyze suspect cells left on duct tape used to bind the victim. The program aired on August 11.

Criminalist Openings in Kern Co.

The Kern County District Attorney Forensic Science Division has openings for position of Criminalist. Please visit our website at <http://www.co.kern.ca.us/da/forensic.asp> for more information. Applications can be completed online through the Kern County Personnel Dept.

ASCLD Accreditation Mentoring Workshop

ASCLD Accreditation Mentoring Committee is hosting a workshop for non-accredited laboratories interested in the Accreditation Mentoring Program. For more information, please visit the website:

<http://www.cacnews.org/wordfiles/ASCLD%20Mentoring%20Announcement%20071805.doc>

The second edition of John Houde's "CRIME LAB: A Guide for Nonscientists" has just been released. In addition to 70 new photos, the new edition features a completely updated section on DNA testing and firearms databases written with the assistance of Terry Spear and Ron Nichols, respectively.

International Association of Chemical Testing 19th Annual Conference

The International Association for Chemical Testing (IACT) is planning for their 19th annual conference to be held April 23rd - 27th, 2006 in Orange County, California. Please see the website for more information:

<http://www.cacnews.org/wordfiles/IACT%20californiaannouncement7-13-05.doc>

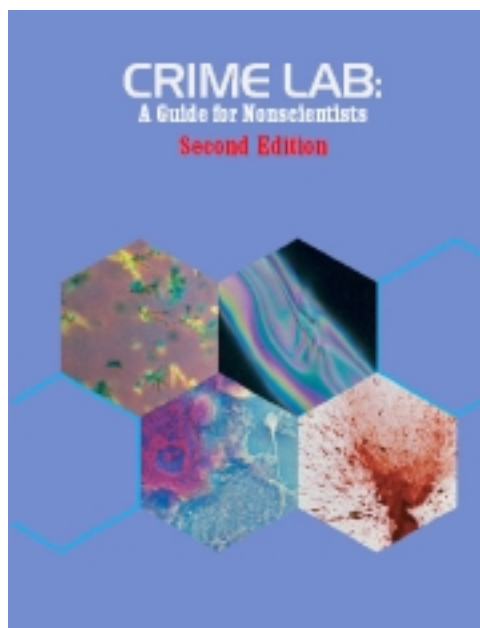
National Academy of Sciences— Sackler Forensic Science Colloquium 11/16-11/18/05

The National Academy of Sciences is featuring an Arthur M. Sackler Colloquium on *Forensic Science: The Nexus of Science and the Law* at the National Academies Building in Washington, D.C. on November 16-18, 2005.

From Program Administrator Alyssa Cruz: The Supreme Court's Daubert standard has reignited some old challenges to "forensic science" and to the experts that present it in legal settings. Questions continue to be raised regarding the scientific basis for traditional forensic methods, from fingerprints to trace evidence, as well as how the courts should respond to novel scientific evidence. This Colloquium will review the science in forensic science from multiple perspectives: the perspective of government forensic laboratories, the basic science underlying forensic technologies, and, of course, from the perspective of the courts, the ultimate judges of standards for expert scientific testimony. For more information or to register for the colloquium, please go to www.nas.edu/sackler/forensic or email us at sackler@nas.edu

UC Davis Extension Announces New Forensic Science Program for Fall 2005

UC Davis Extension announces a new open enrollment program in Forensic Science. Four new courses will be offered fall 2005, and four additional courses are scheduled for winter 2006. The program is designed to help identifica-



tion technicians, photographers and other crime-scene responders build on their existing skills and learn new ones. All courses are offered in Davis, CA and Post CPT credit for each course is currently pending.

Crime Scene Photography introduces the techniques used to photograph fingerprints, impressions, bloodstains and other evidence requiring close-up or copy photography. Saturday, October 15, 22, November 5 and Sunday, November 6, 2005

Bloodstain Pattern Analysis covers the reconstruction of a blood-stained crime scene. Topics include safety, physical properties of blood and mathematics, documentation of crime scenes, experiments and more. Monday-Friday, November 14-18, 2005

For more information or to enroll, call toll free (800) 752-0881, email forensic@unexmail.ucdavis.edu or visit www.extension.ucdavis.edu/forensicscience.

The President's Desk, cont'd

The KEY to quality assurance is that the analysts remain investigators of their cases and behave as scientists and not just technicians. An analyst needs to recognize errors in all of the processes and procedures he/she uses. Becoming cookbook so that everyone does everything the same does not enable the analyst to readily recognize these types of errors. Should we stop using crystal tests for narcotics and explosives analysis because we can't verify with a piece of printed paper that the crystals actually existed? A case can easily be reanalyzed if there is a question about a result, or a blind proficiency test can be made to check on an analyst's competence if it is in question.

When we get to the less analytical areas that don't really appear to need to be controlled, I start to have some problems. The initialing of cross-outs and interlineations, report formats, registered forms, check lists for reviews (for crying out loud), etc., etc., etc. is almost too much to bear. How does having a rigid requirement for those items increase the quality of our product? Would a real manufacturer waste time and money on those processes?

I believe the mission of laboratories, both private and public, is to serve their clients by actually **doing** the quality casework, not having so much paperwork and staff involved in the quality assurance program that we can't do the casework.

I have gone through two accreditation processes and there is always something else we need to do. I get the feeling that the inspectors give us a list of 10 things and they will concede 5 of those that we don't need to do. Then the next inspection finds 10 more items that need to be changed, including the 5 we did not need to do from before. Now they will concede that we don't need to do, let's say, 4 of the five new things but the five old ones need to be done. After all, they are conceding we don't have to do 40% of what they requested us to do. After awhile, my staff and I (and I suspect the same goes on in other labs) get worn down and just give up and do what the inspectors/quality assurance managers want even though we feel that what they are requesting does not improve the quality of our product and/or in many cases doesn't make sense.

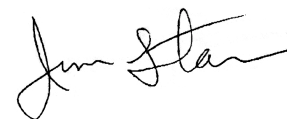
Today, as a supervisor, I will review all reports both technically and administratively even though the technical review has been done. I feel this is important and I am capable of catching technical errors as well as administrative errors. I feel that all supervisors should also be capable of noting when something is wrong, in general, with a case. This review actually improves quality. I know many supervisors that only administratively review reports because the technical review "isn't required by accreditation." I used to be able to review reports and notes with one pass. Today I have to review all note packages two times. I look carefully at case numbers, item numbers, and property tag numbers and make sure that these numbers are correct, that they correspond to the analyst's reported results, that the appropriate tests led to the appropriate results, and that the conclusions are supported by the notes. I will also see spelling errors during this stage. Then I do a second review to look for what I consider the superfluous busy work of QA such as: cross outs/write-overs are initialed; page numbers and initials are on each page, etc. As diligent as I am about taking time to do a review, I consistently catch myself rushing through a review and then I have to make myself go back and redo a review more thoroughly. What about those administrative and technical reviewers that do not do thorough reviews because they are rushed for time?

Are all of the things we are putting into place really making the crime laboratory better? Without question, the review of the work product and the reports is a quality improvement. Does the fact that notes have cross-outs initialed or that all documents are "registered", make the crime lab better? I submit they do not. Every quality assurance requirement needs to meet the criteria: **1. Will this make the work product more accurate? 2. Will it catch honest errors?** If **neither** of the answers is a **yes**, then this is an unnecessary dictate by the quality assurance program.

I do not care how many quality assurance rules we have in place, there is no substitute for honest, ethical, and hardworking employees and honest, ethical, hardworking supervisors and managers. If a person decides to fabricate work, no amount of quality assurance, beyond a review of work product, technical review, administrative review, vigilant co-workers, and good supervision will catch the problem.

I propose that ASCLD stick to their original guidelines, which were basically reasonable and definitely eliminate ISO as a "quality assurance tactic." ASCLD inspector's interpretations of the original ASCLD guidelines (not unlike the Department of Health's interpretation of Title 17 for those of us in California) have become very subjective, inconsistent, and in many cases unrealistic. I propose that the ASCLD guidelines be reviewed periodically by the criminalists doing the work and that these reviewers should suggest changes. The changes should not be made by the laboratory managers, who may or may not have ever done casework, or if they did, it probably was several years ago.

I am very concerned that the QA process has become a charging horse and the criminalists are in the way and about to be flattened by an overburdensome and unrealistic set of quality assurance guidelines. Completing casework will become secondary to the paranoia of meeting all of the quality assurance rules. To steal a line: "This is my opinion, what is yours?"



Perspective is Everything

Just a short note...

Sometimes it's good to shake things up a bit. When we need to stretch something to fit into a preset format, because that's the way it has always been done, that's a sure sign things need to be changed!

Choose a Honda for common maladies...

Having an argument with someone? Take a drive in a Honda Accord, because then you will be in one accord.

Feeling like you are outside your comfort zone? Hop into a Honda Element because then you will be, yes you guessed it, in your element.

Are you constantly confused? A Honda Insight may be just the thing you are looking for!

Need someone else to help direct and guide you, a mentor maybe? Then the Honda Pilot may be just right for you.

Perspective is everything...

During my recent trip to an unnamed country in Africa, a member of the U.S. Embassy was exiting the gate and was cut-off by a car blowing through a STOP sign. When this native driver was confronted with the question, "Didn't you see the STOP sign?" he replied "Yes." Of course, the reason he chose not to stop, even though he saw it, was because he understood it to mean that when he saw the sign, that meant cross-traffic was supposed to stop, not him.

Glass is half full...

The optimist – As of this writing the Giants are only 6-1/2 games out of first place, up from more than 10 just weeks ago.

Glass is half empty...

The pessimist – The first place Padres are at .500, hardly the makings of a good division leader.

Glass is twice as big as it needs to be...

The realist – The Giants are playing miserable ball this year, period.

Again, perspective is everything...

The Dodger-hater – So long as they finish ahead of the Dodgers none of the rest really matters.

Just a thought...

Death penalty cases are automatically appealed, at least in California. The purpose is to protect the accused from trial errors that may have had a negative impact on the outcome for the defendant. How about an automatic review by an independent team of experts of the work and testimony of all forensic scientists regarding the evidence in death penalty cases?

The danger of overestimating your importance...

ESPN, who will televise lumberjack competitions and poker, did not pick up the option for the National Hockey League after the lockout ended. Do you guys get the message yet?

A proverb a day...

Fire tests the purity of silver and gold, but a person is tested by being praised (27:21, NLT).

The tough question...

So, how did you fare in your last test? Speaking for myself, it can still be a struggle.

Get ready, get set...

Recently, there has been an article making its rounds through the firearms and tool mark discipline entitled, "A Systematic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification" (Dr. Adina Schwartz, published in *The Columbia Science and Technology Law Review*, www.stlr.org). As the title suggests, the author challenges what has been routinely admissible since the turn of the century. A colleague who specializes in the discipline of fingerprints suggests that it is now our (firearms and tool mark examiners) turn.

Interestingly, the website on which this article is found, refers to it as the "Notable Scholarship." I suggested to the editorial review committee that if notable scholarship is characterized by maintaining contextual context of direct quotations, accurate paraphrasing, use of primary sources rather than secondary review sources, and an unbiased perspective based on an adequate survey of the available literature, then Dr. Schwartz's article would fall short in each area. I mention this simply because I suspect that the great majority of firearm and tool mark examiners simply dismiss articles such as this as nothing more than rambling by another self-professed expert. Therefore, it is not worth the time to consider. I argue that such an approach does not benefit the individual or the discipline.

Let's think about it. If our experiences are at all similar, no matter the discipline, in about 90-95% of the cases in which we testify, the actual testimony does not significantly challenge our intellect or knowledge. Often times the attorneys do not even know the right questions to ask unless they are coached, and very few have the time or resources to be adequately coached. The questions often lack so much insight that very simple and basic answers generally suffice. The result of such routine testimony is that we can become complacent. Repetitive complacency then leads to laziness.

Laziness is something that we cannot afford. The reason is, when faced with an attorney who was coached well, things may not go well for us – not



Ron Nichols

CAC Editorial Secretary

because there is an inherent problem in the discipline but, because the individual providing the testimony was not prepared. Unfortunately, when case law is written, it is not the poorly prepared examiner who is found at fault, it is the discipline that is criticized and dismissed as inadmissible.

We need to be prepared, and one of the best ways to accomplish this is to examine the charges being leveled against the discipline, discuss them with our colleagues, and investigate the level of truth that they may have. Some are completely illegitimate and can be dismissed quite easily. However, if we allow ourselves the vulnerability to look critically at what we do, we might find that we are indeed lacking in something or that we could improve ourselves. We tend to get defensive because other individuals are bringing these charges. But frankly, if it were not for others bringing these issues to the forefront, would we be otherwise too complacent to actually ever look into them?

Early on I heard many complaints about accreditation including inspectors who, if we did not do things their way, were not going to give us a good grade. Okay, fine. Early on, I made many of these complaints! But, let's look at this. The first thing we have to avoid is getting overly defensive about our own position. Let's consider it an opportunity to look anew at what we do, and more importantly why we do it. There is always room for improvement and we should be receptive to that.

The second point is that we often get so inundated with our routine that we do not set regular time aside for introspection. Our backlog is too large. We don't have time for introspection! We can't afford the time away from all the other things we have to do, especially all the paper work caused by accreditation. We've all heard it before related to other things. We say we cannot afford the cost. But, in reality, we cannot afford not to. The soundness of our disciplines is the single most important thing upon which we have to build. We have to make time for regular inspections of the foundation.

The third point is that each of us needs to step up to the plate. I have heard far more complaints about problems than constructive ideas on how they can be solved. I have heard far more people gripe about something that was found in print, than individuals willing to take the time to actually write the rebuttal. The common refrains include: there is someone else who will do it, there is someone else with better writing abilities, there is someone else with more time, and there has to be someone else because I have already done my bit for king and country. Now, if we could just get someone else to do our case-work and testimony we would be all set! But, we can't.

Think of a baseball team. Sometimes the team can compensate for poor defense by shifting things around a bit and having one guy cover a bit more ground than normal. Sometimes the rest of the team hits so well that they can hide a poor hitter in the line-up. The team can make up for many shortcomings. However, there is no avoiding that each individual steps up to the plate. In the context of an overall season, it may be that only 10 to 15% of those plate appearances ever meant anything. But, at those points, they meant everything and no one else could do it. We have to be ready. We have to be ready to give the best we have each and every time. We cannot afford not to.

Hope you found something useful in that! Until next time, my best to you and your families.

Row

Abstracts

Have you noticed the fine job your CACNews is doing in publishing the abstracts from the CAC seminars? Considering that the membership is over 700 strong and only 100-150 can actually make the meeting, these abstracts could be an invaluable way to communicate what was presented at the meeting. Not only that, but with the placement of the CACNews on the Internet, they could be a valuable resource to our colleagues both nationally and internationally. The operative phrase here though is *could be*. They *could be* if they were written well. As it stands, a great number of the abstracts are not.

A well-written abstract includes an introduction, a summary of results and a conclusion. Statements such as "results to be presented" offer nothing to those who could not attend and that is the majority of the people we are trying to reach. Many have been left wondering what was discussed because an otherwise promising title left them wanting for more.

The time and thought into the careful preparation of the presentations is well apparent to those who attend. Often times we are dazzled by sounds, videos and items flying in from the right, left into our view. If we take a bit more care with our written abstracts, just a fraction of the time it takes to prepare those PowerPoint presentations, there will be a much more far reaching impact than you might have imagined otherwise.

A Postscript

Keep on eye out for those CCI classes! Your CAC regularly allocates funding from the A. Reed and Virginia McLaughlin Endowment so that the California Criminalistics Institute can put on courses of interest to our members. As part of the agreement with CCI, a set number of seats is reserved for CAC members wishing to attend the class. You are encouraged to apply as any seats not filled by CAC members are then released to non-CAC members. For more information on upcoming sponsored CCI courses visit the website www.cacnews.org and click on the "Training" link.



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FEEDBACK

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

Not Every Program

After reading the article published in *The CACNews*, 3rd Quarter, 2005, entitled “Proceedings of Lunch: A Hitchhiker’s Guide to Accreditation,” by Norah Rudin and Keith Inman, I feel obligated to respond to a quote on page 29 that refers to an abstract I had written. This abstract was published in the *AAFS Proceedings*, Volume 11, 2005 and is entitled “Education of the Forensic DNA Analyst in the 21st Century.” That quote, placed in the context of their article, grossly misrepresents the philosophy of the graduate program in Forensic Genetics at the University of North Texas Health Science Center. The goal of this program is to provide our graduates with the laboratory skills and in-depth knowledge of forensic DNA analysis that moves well beyond kit-based technology. Most importantly, it provides them with an understanding of the scientific method and critical thinking needed to be a DNA analyst working with the unique samples that are status quo in a forensic laboratory.

Dr. Rudin and Mr. Inman state “An excerpt from the abstract makes terrifyingly clear how even academic forensic programs are molding their curricula specifically to meet accreditation requirements.” If they mean that our curricula includes graduate level biochemistry, molecular biology, genetics, population genetics and biostatistics, all of which are required to qualify as a Technical Leader, then we will plead guilty (or maybe terrifyingly guilty) as charged. After all, the degree is an MS in Forensic Genetics.

The article further states, “How much of this is at the expense of fundamental scientific and critical thinking skills.” My answer is at no expense whatsoever. In fact, if one would look at the internship projects the students have completed, I would say that many, if not all, of them demonstrate the scientific skills they have attained in the short span of a two-year program. Some of these projects include: development of an automated system for separation of sperm and non-sperm cell DNA; designing a SNP panel for the HVI and HVII Control Region in the human mitochondrial genome; exploratory research into the forensic use of Whole Genome Amplification; forensic and developmental validation of Y-Chromosome STR kits; and Real-Time PCR.

The authors ask a question about our program “Will the graduates of such programs become the “grandchildren of accreditation,” whose scientific thinking becomes limited to approved protocols in procedures manual even before they enter working crime laboratories?” My response is they will not become “grandchildren of accreditation.” It is my intention and the intention of my fellow faculty members that our students will be able to write or re-write those manuals using the most up to date methods and techniques that have been validated using good science while at the same time adapting those protocols for the novel specimens found in forensic casework. It is my hope that graduates from our program take a reasonable approach towards accreditation and procedures, unlike those auditors that Dr. Rudin and Mr. Inman criticize.

Joseph E. Warren, Ph.D.

Assistant Professor/ Assistant Laboratory Director
University of North Texas Health Science Center

More Captions, Please

As each new issue of *The CAC News* arrives, I usually sit down the day I receive it to enjoy the contents within. As a former yearbook editor, though, I have a small request to make: Please, please, please put captions on the photos! Everyone enjoys photos and they do speak a thousand words, however, they’re not always the words we need to hear. One of the cardinal rules of publication that I was taught, albeit 10 years ago, was that no photo left for the printer without the Five Ws (who, what, when, where, and why) to accompany it. Just one sentence about each photo would help your readers on several fronts.

Oftentimes as I flip through the pages of *The CAC News*, I come away with more questions about the photographic contents than answers from the text. Who is that? What are they doing? What should this photo be telling me? As a fairly new member of the CAC, I’d greatly appreciate learning the names of the faces I see in the photos in *The CAC News*. For those who are unable to attend a CAC seminar, information from photo captions can help convey the spirit and energy of the meeting, which often does not come across in technical proceedings. Finally, our future historians will thank us as they turn the fragile pages of our publications. In fact, I’ve been lucky enough to be in one of the seminar photo spreads and have saved that issue for posterity (more than likely, the photo will make an appearance during my retirement dinner in the distant future) I hope that I will remember the details about that photo spread.

I know how hard it is to come out from behind the camera and chase down the subjects of the last photo to get all those names and details. However, I think the addition of those details will help make *The CAC News* even better than it already is! Thank you for your consideration.

Erin E. Gould

Corrected URL

“They Keep Putting Fingerprints in Print” by Steve Scarborough (*CAC News* 2nd Q. 2005) provoked me to go to the websites cited. I had trouble with www.cplex.com (bottom margin, p. 9), and finally after googling “Steve Scarborough,” I was directed to www.clpex.com.

Chris Breyer

Corrected Caption

The photo on page 5 of the Third Quarter 2005 issue of the *CAC News* is indeed a poster that Susanna Rudy presented at the 2005 AAFS annual meeting in New Orleans this past February. However, Susanna presented two posters at that meeting. The one pictured was presented in the General Section on Wednesday, and Criminalist David Flohr, of USACIL in Atlanta was a co-author. Lucien Haag and James Roberts were not involved in that poster.

On Friday, Susanna presented a poster in the Criminalistics Section (different picture). This poster involved the “one-way bullet proof glass” produced by Labock Technologies. Susanna (along with people from Labock) went to the Yuma Army Proving Ground in January where they met with all the other forensic science individuals who were conducting tests. This is where Susanna had very valuable assistance from Lucien Haag and James Roberts (I wasn’t there, but I did play a role in suggesting Susanna do this and in making suggestions for her poster).

Bob Blackledge

Don't Shoot the Messenger

by John Simms

Accreditation, according to the article by Norah Rudin and Keith Inman [*CACNews*, 3rd quarter 2005], has had far-reaching, unintended consequences. The article claims that accreditation has shut down, or stifled, fundamental scientific and critical thinking skills by locking us into *only* permitted protocols and procedures. The way that we got here, according to the article, is through inconsistent interpretation and unintelligent application of the accreditation requirements, drifting from documenting common protocols to the use of only permitted protocols, and in going overboard on self-regulation.

I am going to offer a different perspective on the world of accreditation and explain that rather than being stifling and prohibitive, accredited environments can offer the analyst just as much opportunity for flexibility and creativity as is needed for any situation.

Inconsistent, Unintelligent Application of Accreditation Criteria

I am sure that neither Keith nor Norah really intended their statement about unintelligent application of accreditation criteria as a direct insult to the trained volunteer inspectors and quality assurance managers working on the front lines. I do agree that there is some factual basis for this claim.

Through the years, I have heard the following complaint many times from various labs who had just gone through an inspection: what was acceptable in one lab with one inspection team was not acceptable for another lab with a different team. Why was this? In the old style accreditation process, inspections were conducted in the laboratory, and a report was written and submitted directly back to

the board via the executive director of ASCLDLAB. There was little to no review prior to the board receiving the report.

All inspectors have gone through training. As is to be expected in any human system, some inspectors and captains are better than others. Just based on the human factor alone, you have to expect variation in the interpretation of the standards.

As QA managers started networking, inconsistencies in the accreditation process became more apparent. ASCLDLAB listened to the complaints, and, as a result, restructured themselves and the inspection process.

The accreditation inspection process now includes permanent staff captains who were added specifically to improve consistency. An inspection report now goes through a review process by other staff captains before it goes to the board. Changes to the report may be directed by this panel of other staff captains before the board ever sees the report. Hence, auditors are now essentially audited as well. Remember that once



Simms, cont'd

the report reaches the board, the board itself can also direct changes to be made.

As before, there is an opportunity to provide feedback to ASCLDLAB about the inspection process and/or about a particular inspector if the laboratory feels it has issues that need to be addressed.

In my own personal opinion, these system improvements could be made even more effective if two additional things were to happen more frequently. 1) More appeals need to be made on findings that labs feel are not justified. Many times lab directors acquiesce to the findings of the inspection team when they should be fighting a bad call. These are missed opportunities by the lab directors to improve the process. Caving in to a bad interpretation of an inspection criterion is unfair to the labs yet to be inspected, as bad precedent is set. 2) Every inspected laboratory should take the time to provide real feedback (good or bad) to ASCLDLAB. If ASCLDLAB has an ineffective inspector in the field, they need to be told about it so they can either retrain or remove that inspector from service.

For those of us working on the front lines of accreditation, the Association of Forensic Quality Assurance Managers (AFQAM) has also helped keep us abreast of the latest inspection issues and interpretations. An email question on process or interpretation can go out across the country in an instant and responses from many different systems can come back just as quick. Essentially, we can get almost an instant picture of the industry standard without ever leaving our desk.

Dealing with Policy Handcuffs

The article goes on to state that the common methods have become the only permitted methods, that we are handcuffed by what is written in the methods manual, and that we have lost creativity and free thinking. They may be describing a few labs out there, but this hardly describes the system in general.

If a laboratory has self-imposed a restriction to the use of only its documented technical procedures, then that laboratory, not ASCLDLAB, applied the handcuffs. But ASCLDLAB must hold that laboratory accountable to the laboratory's own policy.

ASCLDLAB and experienced QA managers recognize a common trend among laboratories going for their first accreditation to create restrictive policies, thinking that this is expected. Chalk that up to inexperience. Once a laboratory has acquired accreditation experience and learned better, then many of the unnecessary policy requirements are either eliminated or relaxed.

Consider a Trace Evidence Unit. The Trace Evidence Unit's procedure manual cannot possibly have a method for every potential piece of evidence that it may examine. Does this mean that if the unit does not have a particular method for a particular piece of evidence, that they cannot provide the service? Of course not. Let me offer what we have found to be a realistic alternative to the "no service" approach. The unit creates a general analytical method that is broad in scope, requiring appropriate standards and controls fitting to the nature of the evidence, and providing a flowchart type of analytical approach. If the evidence is not a hair, fiber, or paint, but something more unusual like lipstick, the unit invokes the general method approach and documents all steps taken, standards and controls employed, and procedures used. This general method can be adapted for every unit, providing the flexibility and creativity needed for any type of evidence. If the analysis of a particular type of evidence starts to occur more frequently, then a

separate written method should be developed for the manual. The reliance on the general method would be left for unusual occurrences.

Perhaps Keith and Norah need to be reminded of a critical issue. While they complain about being stifled when something new or unusual comes along, should it not be an important premise that we don't want to rush into some new wild test that may yield an unproven answer? Accreditation makes certain that if we do have to use a new test not in our established protocol, we have carefully worked through those appropriate controls and standards to ensure that the new or unusual method is working properly, even before we test the evi-



If a laboratory environment truly prohibits its creativity and flexibility, it is the fault of the laboratory rather than ASCLDLAB or the process of accreditation.

dence. This is, in fact, the time to be even more careful because we are in new territory.

There is also the need to allow for variance in published procedures if dictated by the nature of a particular sample. If characteristics of the sample are such that the usual procedure cannot or should not be employed, and a modification of the procedure is necessary to yield results, then the modification can be noted and pursued. Every lab needs—in fact *must* have—a policy that allows variation from policy and procedure. Where did this requirement come from? This is an ASCLDLAB ACCREDITATION requirement. It is a policy that must be in all quality assurance manuals. The allowance of variation gives the analyst freedom to try something new or different when faced with the unusual situation. This policy not only gives you freedom within the analytical methods, but it also gives you freedom within the administrative policy area. Administrative policies cannot be written to fit every situation. Allowance of variation lets you fill in the gaps as they occur, with flexibility and creativity. For instance, in a two-man unit, a rush report is needed for court but the second examiner is gone and cannot provide a tech review on the report prior to its release. The supervisor, who is not qualified to do a tech review, can, under this unusual circumstance, do both the tech and admin review to get the report out of the lab and into the court's hands. You document that it happened and have the report tech reviewed a second time when the second examiner is back.

Fly, Norah and Keith, Fly!

As I read their article, I wondered in what accreditation environment did Keith and Norah work? If a laboratory environment truly prohibits creativity and flexibility, it is the fault of the laboratory rather than ASCLDLAB or the process of accreditation. Blame the architects of the policy manuals for writing restrictive requirements and not for including general methodology or the required allowance of variation. Appropriate freedom is critical not only to accreditation's long-term success, but also to a high quality of work in a laboratory.

Beware of following unnecessary rules that contribute nothing to the quality system and that hinder a work process. Everyone in the laboratory's quality system, from the manager, to supervisor, to QA manager, to bench criminalist, shares in the responsibility to make accreditation work well and appropriately. While it is true that the accreditation process can be a drain on resources in a laboratory, accreditation with a common sense approach helps to trim the drain on the resources. While paperwork requirements have certainly increased, consider this common statement that I have heard from different laboratories: *when I have to go to court on an old, pre-accreditation case, I just cringe*. Having additional documentation requirements has not been a bad thing. To help you keep balance in the process, I pass along these words from my boss: "salt the process of accreditation with common sense."

Many QA managers have made this observation: accreditation has not necessarily provided us with better or more accurate results. Although that may be true in some cases, it has provided us with a better foundation of support for the answer (clear protocols, better documentation, etc.).

Accreditation has taken us to a better place. It has not taken us to a perfect place. It is a system administered by humans and will be subject to human error. But creativity and flexibility can thrive under any good accreditation program.

As a reminder, accreditation is there because we have chosen to self regulate rather than relinquish control to an outside agency. Do any of us need to be reminded of our frustrations with the DOHS regulation of alcohol?

Fresh Eyes

I am reminded by a retired assistant director who was the quality assurance manager for his laboratory and, like me, is a trained ASCLDLAB inspector, that inspectors or auditors often find things that we ourselves overlook in our own policies. We overlook them because we are too close and some-

times read right over these items without seeing what is actually there. This happens when we write a policy and read it with intention. The written procedure does not match the practice. A good inspector will advise you to either fix your practice or fix your written policy. It is up to the laboratory on how to make the fix.

Fresh inspector eyes will catch these little hiccups that complicate, confuse, or inadvertently misrepresent a simple process. Our last inspection team found a few hiccups. When they read them to us, we could only slap ourselves on the forehead and laugh. We knew immediately that the policy, as written, was not what we intended in practice. But in numerous reviews/revisions, we kept reading our own policy with our intention filter. The inspectors helped us get it right.

What is Best?

What is it that Keith and Norah would recommend? Abandon accreditation in favor of certification? There are good things about certification as it addresses the individual skill level of the examiner but leaves out the system from which case results are born. Accreditation does address the issue of individual competence to a significant extent. It also focuses on the system as well.

One need only look at various headlines from across the country that it does not matter if you are accredited, not accredited, certified, or not certified. Bad things do happen in our labs if an individual is determined to work around the safeguards and subvert the system to his/her own will. I believe accreditation gives us the best chance to catch these irregularities because of its focus on the system and provisions for checks and reviews.

42?

All of this may take us to the answer of "42" as described by Keith and Norah's reference to the *Hitchhiker's Guide to the Galaxy*. But just look at the endless combinations we can take to get there! That is a good thing.

Appreciation

I want to express my appreciation for the help I received in writing this article as many quality assurance managers, both current and retired, were moved to respond to Keith and Norah's article. This response is a composite response of the many ideas that were provided to me to use as I saw fit. I hope I did the contributors justice.

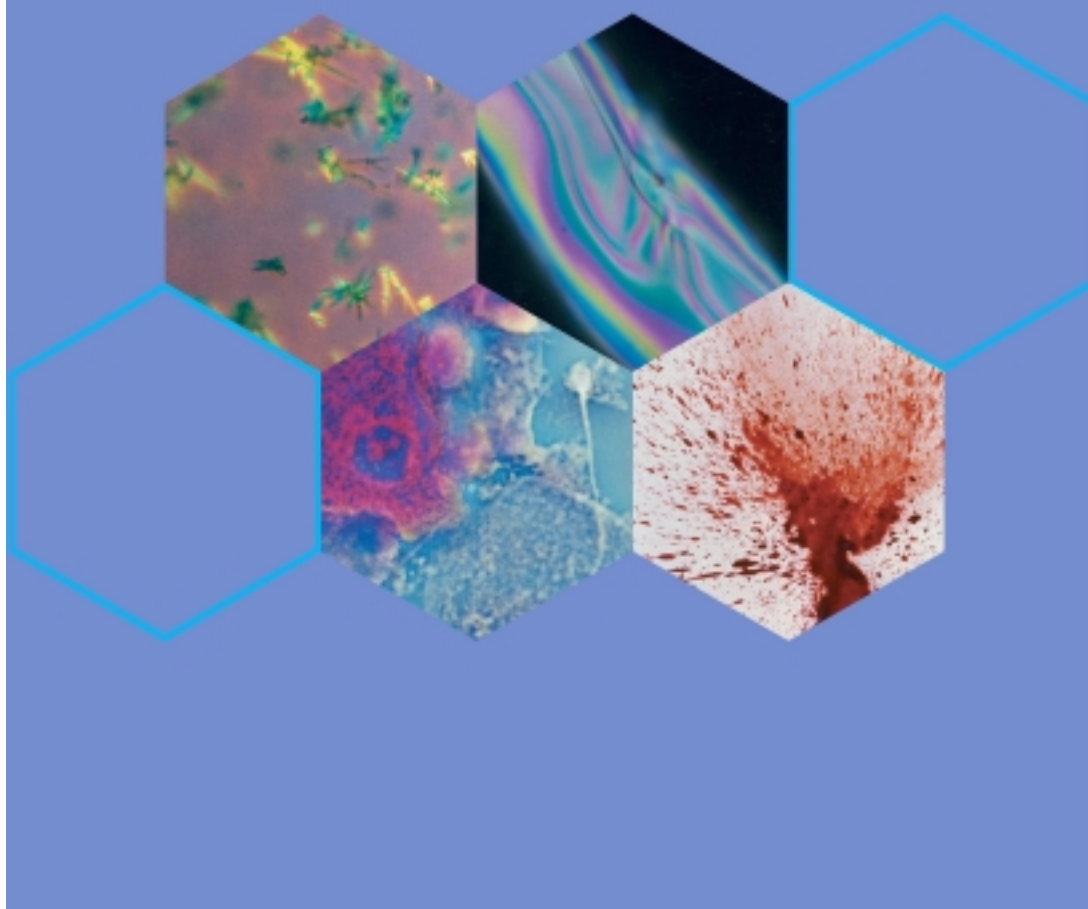
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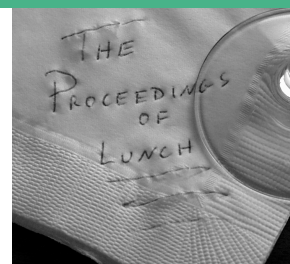


The Shifty Paradigm, Part I

Who Gets to Define the Practice of Forensic Science?

Skepticism is the chastity of the intellect, and it is shameful to surrender it too quickly or to the first comer: there is nobility in preserving it coolly and proudly through long youth, until at last, in the ripeness of instinct and discretion, it can be safely exchanged for fidelity and happiness.

—George Santayana
“Skepticism and Animal Faith, IX”



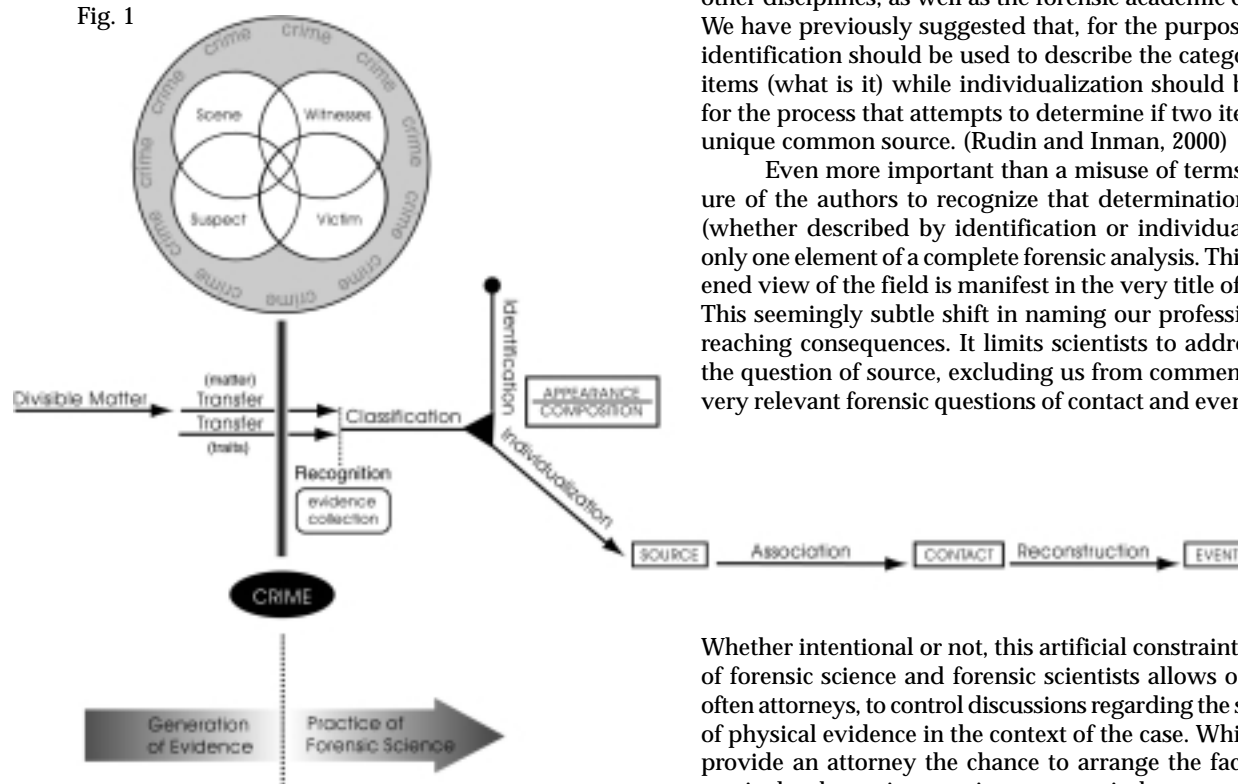
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We are ensconced in Jack's Bistro, our new “office” with a view of the Oakland waterfront. “Lunch” has become a euphemism, as we barely make the three PM cut-off for their mid-day meal service. Nevertheless, both the meal and the discussion are worth waiting for. Our discussion topic for today revolves around a topic both historical and very current: who gets to define the practice of forensic science? Being nestled (or perhaps more often wedged) between science and the law, each profession claims a piece of ours. It all too easy to allow ourselves to become fractured and unfocused by the forces pulling in different directions. Only when criminalists take both responsibility for, and control over, defining and directing the profession of forensic science will we achieve a degree of earned and respected autonomy. The following discussion is our reaction to the latest in a continuing series of commentaries on our profession by the consumers of our services.

The Coming Paradigm Shift in Forensic Identification Science (Saks and Koehler, 2005), a recent review article written by two long-time commentators on forensic science, has caught the attention of the forensic community. A red flag that the authors, Michael J. Saks (a law professor) and Jonathan J. Koehler (a professor of behavioral sciences) are observers rather than practitioners is the title itself. We typically refer to our profession as “forensic science” or “criminalistics.” Interestingly, “forensic identification science” is used interchangeably with “forensic individualization science” throughout the paper. An understanding of these terms as fundamental concepts in forensic science is key to a clear discussion of the issues outlined in the article. Although both identification and individualization are used in the forensic community to describe a conclusion of common unique source, the term identification has historically been used by fingerprint examiners (and some other pattern comparison disciplines), while individualization is used by most other disciplines, as well as the forensic academic community. We have previously suggested that, for the purpose of clarity, identification should be used to describe the categorization of items (what is it) while individualization should be reserved for the process that attempts to determine if two items share a unique common source. (Rudin and Inman, 2000)

Even more important than a misuse of terms is the failure of the authors to recognize that determination of source (whether described by identification or individualization) is only one element of a complete forensic analysis. This foreshortened view of the field is manifest in the very title of the article. This seemingly subtle shift in naming our profession has far-reaching consequences. It limits scientists to addressing only the question of source, excluding us from commenting on the very relevant forensic questions of contact and event ordering.

Fig. 1



Whether intentional or not, this artificial constraint on the role of forensic science and forensic scientists allows others, most often attorneys, to control discussions regarding the significance of physical evidence in the context of the case. While this may provide an attorney the chance to arrange the facts to suit a particular theory in some instant case, it does not serve justice well in the long run. This is exemplified no more clearly than

the proceedings of lunch

in the conclusions and recommendation of Saks and Koehler. Their circumscription of forensic science as a single-use tool, to answer only questions of source, limits their thinking about the issues they present and leads them to overly simplistic and poorly conceived solutions.

It will be useful to refer to our own previously published forensic science paradigm (Fig. 1, Rudin and Inman, 2000) throughout this discussion. Understanding forensic examination as a process, of which source determination is only one stop along the way, is key to a complete discussion of the topics presented in the *Science* paper. For clarity, we always use "identification" to describe the process of categorization (the physical nature of the evidence) and "individualization" to describe the process of source determination (the origin of the evidence).

The very first sentence in the *Science* paper alleges that examiners "intuit" pattern matches. While we are the first to argue that fundamental change is needed in the forensic discipline of pattern matching, criteria do exist for the comparison of dermal ridge prints (Stoney and Thornton, 1986a,b; Ashbaugh, 2000) tool marks (including firearms) (Bassotti, 1959; Murdok and Bassotti, 1997; Nichols, 1997; Tulleners and Giusto, 1998) shoeprints (Cassidy, 1980; Bodziak, 2000) and other visual comparisons. (Kirk, 1974; DeForest *et al.*, 1983; Thornton, 1986) Saks and Koehler undermine their own credibility by employing such unnecessarily inflammatory descriptions. They also state that "Scientists have begun to question the core assumptions of numerous forensic sciences" and provide references. A quick check reveals that most of the supporting references were written by attorneys, several by the authors themselves. Just what are these core assumptions that are allegedly being questioned? According to Saks and Koehler, the "*traditional forensic sciences rest on a central assumption: that two indistinguishable marks must have been produced by a single object.*" They introduce yet another new catchphrase, the "*assumption of discernible uniqueness.*"

A fundamental flaw in Saks and Koehler's central assumption is the reference to "uniqueness." We are surprised that the good editors at *Science* did not catch this blatant mischaracterization of the nature of physical objects. By definition, every object is unique in space and time; a discussion of uniqueness, *per se*, is simply irrelevant to answering the question of whether two items (e.g. evidence and reference) ever shared a common source. A forensic examination typically compares two items: a trace or mark recovered as evidence, and a trace or mark derived from a suspected reference object. For example, a cartridge casing recovered from the scene is compared to a cartridge casing produced by a firearm suspected of being the murder weapon. Even if the two casings were fired by the same gun, each is unique unto itself, and differences will invariably exist between them. The all-important QUESTION asks if they originated from a common source; in this case were they fired by the same gun. Precisely because each object is unique, even two items that in fact do share a common source will exhibit differences at some level of analysis. Thus Saks and Koehler's "*assumption of discernible uniqueness*" is actually a given, even for objects that share the same source; in fact it complicates every forensic comparison in a way that the authors apparently do not appreciate. The forensic examiner not only compares characteristics that look the same, but must actively search for differences. A critical aspect of the examination is to determine if the differences are explainable or not. Explainable differences lead the examiner toward a conclusion of common source, unexplainable differences suggest different

sources. The determination of whether a difference is explainable is anything but trivial; it leads to a long and complex discussion of the origin of evidence and the very nature of physical matter itself. The beginnings (but hardly the end) of such a discussion may be found in our previous writings. (Inman and Rudin, 2000, 2002)

Saks and Koehler further offer that "*Although lacking theoretical or empirical foundations, the assumption of discernible uniqueness (a notion they originated) offers important practical benefits to the traditional forensic sciences (another notion they originated). It enables forensic scientist to draw bold, definitive conclusions that can make or break cases. It excuses the forensic sciences from developing measures of object attributes, collecting population data on the frequencies of variations in those attributes, testing attribute independence, or calculating and explaining the probability that different objects share a common set of observable attributes. Without the discernible uniqueness assumption, far more scientific work would be needed and criminalists would need to offer more tempered opinions in court.*" Rather than introducing new buzzwords into a crowded lexicon that already suffers from poor definition, we suggest that it would be more profitable to explore the real existing scientific issues buried as a mere segue between the new-fangled jargon and the far too generalized dig at working forensic practitioners. Much of the rest of this commentary is devoted to just that.

However, before we launch into a technical discussion, we must question why the authors feel the need to commandeer and redefine Thomas Kuhn's notion of a paradigm shift (Kuhn, 1996) as some sort of metaphor for their own purposes. In fact, a very real paradigm shift has occurred in forensic science specifically due, as Saks and Koehler suggest, to the advent of DNA typing. We agree with their suggestions that the already well-developed science, the ease with which biological population databases can be constructed, and the scrutiny by a modern judicial system, has raised the standard for all forensic disciplines. In addition, a general forensic paradigm (independent of any shift) exists and had been clearly delineated by two groups of workers (Rudin and Inman, 2000, Cook *et al.*, 1998a,b). Because the paradigms were developed in parallel around the same time period, neither group was aware of the others' efforts. Despite the lack of any direct communication, it is striking that virtually identical frameworks have been constructed, albeit using different descriptors.

It is not possible to do justice to the scientific concepts casually referenced by Saks and Koehler in their diatribe within the space of this short article. Nevertheless, a discussion and clarification of a few salient points is in order. Measuring object attributes, dismissed as a seemingly trivial exercise by the authors, encompasses enormous challenges. In our forensic paradigm, understanding which attributes to measure begins with the division of matter. A key concept is that all matter changes continuously over time. A source object continually loses and acquires traits as do any fragments separated from it that might become evidence after being recognized as relevant to a crime event. After separation, the two objects experience different environments and forces, so that individualizing traits inevitably begin to diverge in random fashion. Our ability to determine that items once shared or were derived from a common source necessarily weakens over time. This unrecognized ambiguity most often results in a false exclusion or an inability to perform a comparison. Again, this is not bad or wrong; it is simply inherent in the nature of the material and the question being posed. In the case of pattern transfer, the method of trans-

By definition, every object is unique in space and time; a discussion of uniqueness, *per se*, is simply irrelevant to answering the question of whether two items (e.g. evidence and reference) ever shared a common source.

fer, the transfer medium, and the substrate upon which the pattern is deposited each introduce another element of potential ambiguity. These are difficult problems, both conceptually and practically, as they involve exploring and understanding the very nature of matter. Forensic science would profit by inviting academic researchers in material science to partner with us in defining the limitations involved in comparing both physical objects, and the patterns made from them, that have become separated in time and space. While much work remains to be done on the theoretical foundation of pattern comparison, the authors' claim that no empirical foundation exists is patently untrue. (see previous references)

Estimating the strength of an evidence-to-source connection is critical to a responsible communication of the results of any forensic examination. Saks and Koehler make the implicit assumption that this must necessarily be a quantitative estimate. While we agree that every attempt should be made to collect data to support quantitative estimates of the frequency of sets of traits, we must also recognize the possibility that, in the end, this may be neither realistic nor practical; in some cases it could be possibly more misleading than providing no estimate. Consequently, the utility of qualitative estimates should also be recognized and explored as an alternative way to convey the strength of an evidence-to-source connection. (Houck, 1999)

As we describe in *Principles and Practice of Criminalistics* (2000), constructing useful and relevant databases for non-biological evidence is appreciably more challenging than for biological evidence. Saks and Koehler appear to have an inkling of why this is so, but perhaps do not fully comprehend the problem. In order to understand the challenges involved in constructing forensically relevant databases, it is necessary to distinguish both between the kinds of populations and the traits that are ultimately compared. Both physiological materials and dermal ridge prints are biological evidence derived from human beings. That human populations are relatively stable compared to the interval between the creation and recognition of an item of potential forensic evidence confers a huge advantage in defining and constructing appropriate databases. For the purpose of estimating the frequencies of sets of characteristics, the human population looks much the same today as it did decades ago and is unlikely to change significantly for decades in the future. This has already been put to good use in quantifying the strength of physiological material, analyzed previously using conventional serology systems, and today by DNA typing. Significantly, while the distribution of traits is stable, the traits themselves may not be. However, especially for DNA, environmental degradation simply results in a continuing reduction of the number of traits that can be measured, rather than a random change in those traits. The likelihood of inferring a false positive connection between some DNA evidence and a possible source is extremely low; either the strength of the evidence is reduced because fewer traits are detectable or the evidence becomes forensically worthless at such point that no traits remain to compare. One of the reasons for this linear degradation of DNA evidence is its location on the extreme end of a digital – analog continuum. For the most part, DNA data can literally be described by 0's and 1's – either a band or peak is present or it is not. While we might argue

whether a peak is signal or noise, we don't argue whether it is a circle or a square. This greatly simplifies the description of DNA data.

Dermal ridge print characteristics exhibit the same stability in human populations as other physiological material, however, they pose a greater challenge in describing and comparing the patterns. Physiological fluids, even analyzed using conventional serology systems, and certainly by DNA typing, produce discrete data in a form that is simple and easy to describe. Consequently, the patterns are readily, even easily in many instances, compared. Dermal ridge print patterns are complex and more difficult to describe and compare. The characteristics exist at the analog end of the digital – analog continuum. It is this analog nature of dermal ridge prints that leads examiners to inadvertently and unsuspectingly fill in blanks in the overall pattern. While our ability to fill in the pattern of the tiger behind the grass has allowed us to survive as a species, it can get us into trouble when we are comparing amorphous patterns that are similar but not the same. While rarely articulated in this fashion, this difficulty in measuring and describing the traits themselves is one basis for the current challenge to fingerprint evidence. While these complex characteristics form the very foundation of the individualizing potential of fingerprints and other dermal ridge comparison systems, their nature has presented challenges to developing an objective comparison model. The large collections of prints now accumulated in national databases and the well-characterized understanding of the biological origin of friction ridge details, combined with the enormous computing power available today, should enable the development of solid mathematical models upon which dermal ridge print comparison can be based. Such models have been proposed literally since the recognition of fingerprints as a means of human identification (Galton, 1892, Stoney and Thornton, 1986a,b), but testing and the refining them for applied use has not yet been embraced by the fingerprint community. Clear definition and categorization of traits would also enable testing for independence between traits, and facilitate the construction of databases that could be used to assign a quantitative estimate of the strength of a fingerprint match. While it is neither simple nor easy, there is no reason, besides a decision to allocate resources, why this discipline cannot be elevated to rest on a defensible scientific model.

Saks and Koehler rather cavalierly suggest that the model for forensic DNA typing can and should be applied wholesale to non-biological evidence. To put it simply, this is naive. Non-biological evidence encompasses compositional and microscopic analyses of items such as paint, fibers (e.g. from clothing or carpeting), and particles (e.g. from manufactured materials) as well as prints and impressions from, for example, shoes and tools, including firearms. Fundamental differences exist in both the nature of the evidence and the dynamics of source populations that make it impossible to directly apply the DNA typing model.

The fundamental challenge in comparison of non-biological print and impression evidence is to determine which traits are relevant, and whether they are class traits, potentially individualizing traits, or even artifacts. This challenge is rarely encountered in DNA testing and even for dermal ridge prints,

the proceedings of lunch

the traits, although complex, are all of a similar nature. In neither case are traits typically acquired or changed, only lost until there is nothing to compare. For non-biological prints and impressions especially, the divergence of traits between evidence samples and their true source in the time period between division and comparison may result in the addition or change of traits, as well as their disappearance. This complicates the interpretation of any comparison.

Saks and Koehler also simplistically suggest that databases constructed for biological evidence, in particular DNA, should serve as a model for non-biological evidence databases. This is only one example of how their superficial understanding of the issues involved, indeed the science, leads them to an untenable, perhaps even dangerous conclusion. Because the underlying populations for non-biological evidence are more difficult to define, and vary at a rate much greater than human populations, the construction or even definition of relevant databases for non-biological evidence presents fundamental challenges. Typically, we are concerned with manufactured items such as tools, paints, and fabrics. What defines the relevant database? The basic determination of potential sources already necessitates a preliminary categorization and judgment call. When should the population be sampled? Is the make-up of the population of potential sources more relevant at the time the mark was made or the fiber separated? Or is the relevant database the population that existed at the time the evidence was collected, a potential source identified, or the two compared? How do we account for continuing changes to potential sources from the time the evidence was created (division of matter and transfer of either matter or traits) to the moment of comparison to the evidence (which has also diverged during that time period)? These are only a few of the decisions that must be made, any of which could completely confound the relevance of the database to the case at hand. Does a specific database need to be constructed for each question in every case? To put it succinctly, the nature of non-biological evidence complicates both the description and comparison of observed traits. Additionally, populations that shift within a time period equal to or smaller than that between division / transfer and comparison, as well as the inevitable changes continually occurring to both parent and progeny objects increase the difficulty of quantifying the uncertainty of any conclusion made from the comparison. Taken to a logical extreme, the forgoing discussion would seem to argue that non-biological is unsuitable for application to the law inasmuch as the uncertainty associated with such analyses would seem to be almost unquantifiable. However, in attempting to clarify the problem, we do not suggest that the work should not be done; we simply illustrate the depth and breath of the challenge.

As previously suggested for dermal ridge prints, we also need to enlist the assistance of the academic community to try to improve both the criteria for comparison and the models for estimating the strength of non-biological evidence. However, we must also question the underlying assumption that a probabilistic database will necessarily provide an optimal estimation of the frequency of some set of non-biological traits. It is possible that extensive research may show that the sampling error is larger than the estimate. In other words, a quantitative estimate might be mathematically worthless. In such a case, numerical estimates could mislead rather than illuminate; they risk inappropriately conferring the patina and credibility of science indiscriminately on the results of an analysis. Should this be the case, the judicial system, indeed society as a whole,

would need to confront the issue of presenting evidence for which no reliable probabilistic model is available to quantitatively describe the strength of the evidence. To be clear, we have intentionally pursued this line of thought to another logical extreme (and indeed an unlikely conclusion) to make the point that modeling non-biological forensic disciplines on the accepted standard for DNA typing is a non-trivial exercise. Just because some outside commentators opine that it should be done does not make it the appropriate solution.

As the restaurant begins to set up for dinner, and we have only made it through the first page of the article we realize that this discussion will be continued

References

- Ashbaugh, D. R., *Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology*, CRC Press, Boca Raton, FL, 2000.
- Biasotti, A., A statistical study of the individual characteristics of fired bullets. *J. Forensic Sci.*, 4(1), 133-40, 1959.
- Bodziak, W. J., *Footwear Impression Evidence*, Elsevier, New York, 1990, 2000.
- Cassidy, M. J., *Footwear Identification*, Canadian Government Printing Center, Quebec, 1980.
- Cook, R., et al., A hierarchy of propositions: deciding which level to address in casework. *Sci. Justice* 38(4), 231-239. 1998b.
- Cook, R., et al., A model for case assessment and interpretation. *Sci. Justice* 38(3), 151-156. 1998a.
- DeForest, P., Lee, H., Gaensslen, R., *Forensic Science: An Introduction to Criminalistics*, McGraw Hill, New York, 1983.
- Galton, F., *Finger Prints*, Macmillan, London, 1892.
- Houck, M., Statistics and Trace Evidence: The Tyranny of Numbers, *Forensic Science Communications*, Federal Bureau of Investigation, Virginia 1(3), 1999.
- Inman, K. and Rudin, N. The origin of evidence. *Forensic Science International*. 2002. **126** p. 11-16.
- Inman, K. and Rudin, N., *Principles and Practice of Criminalistics: The Profession of Forensic Science*, CRC Press, 2000.
- Kirk, P. L., *Crime Investigation*, 2nd ed., Thornton, J., Ed., Krieger Publishing Co. (by arrangement with John Wiley and Sons), Malabar FL, 1953, 1974.
- Kuhn, T., *The Structure of Scientific Revolutions*, University Of Chicago Press, 1962, 1970, 1996.
- Murdock, J. E. and Biasotti, A. A., The scientific basis of firearms and toolmark identification, in *Firearms and toolmark identification*, in *Modern Scientific Evidence*, Faigman, D. L., et al Eds., West Law, San Francisco, 1997.
- Nichols, R.G., Firearm and toolmark identification criteria: a review of the literature, *J. Forensic Sci.*, 42(3), 466-474, 1997.
- Saks, M.J. and Koehler, J.J., The coming paradigm shift in forensic identification science, *Science*, 309, pg. 892, 2005.
- Stoney, D. A. and Thornton, J. I., A Critical analysis of quantitative fingerprint individuality models, *J. Forensic Sci.*, 31(4), 1187-1216, 1986a.
- Stoney, D. A. and Thornton, J. I., A method for the description of minutia pairs in epidermal ridge patterns, *J. Forensic Sci.*, 31(4), 1217-1234, 1986b.
- Thornton, J. I., Ensembles of class characteristics in physical evidence examination, *J. Forensic Sci.*, 31 (2) 501-503, 1986.
- Tulleners, F. A. J., Giusto, M., Striae reproducibility on sectional cuts of one Thompson Contender barrel, *AFTE J.* 30(1) 62-81, 1998.

Determination of Elemental Homogeneity in Automotive Windshields by LA-ICP-MS

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Introduction

Glass fragments are a particularly valuable trace material—easily transferred from object to object, durable, and easily go unnoticed by a suspect bearing them¹. The most common technique for comparing reference and questioned items is by refractive index (RI) comparison²⁻⁴. Previously, RI had limited application for glass classification and was highly distinguishing. However, increases in manufacturing quality control have decreased the class variation in RI that was previously seen⁵. RI is now considered a poor technique for distinguishing between multiple fragments belonging to the same class of modern manufacture⁴.

Since the early '80s, elemental analysis has been deemed a highly discriminatory tool for forensic glass comparisons,⁶⁻⁸ especially when used in conjunction with RI data⁹. Previously, elemental data was used primarily as a classification tool⁷. However, recent research would suggest that elemental analysis by inductively coupled plasma mass spectrometry (ICP-MS) approaches individualization¹⁰.

ICP-MS¹¹ is a coupling of the high-energy argon plasma and a mass spectrometer. The argon plasma is ideally suited for atomic mass spectrometry, as it is able to decompose any sample matrix (gas, liquid or solid) and efficiently ionize over 75 elemental isotopes. The specificity offered by the mass spectrometer facilitates quantitation of these isotopes with approximately 1-amu mass resolution or better. Solid sampling by laser ablation (LA) facilitates rapid *in situ* analysis of glass and other solid materials by ICP-MS without the need for sample destruction by dissolution^{5, 12}.

The application of LA-ICP-MS to forensic casework enables analysts to target the trace elements, which are contaminants of the raw materials used in glass manufacture. Due to the superior sensitivity of this technique, LA-ICP-MS may enable caseworkers to identify glass manufactured from certain raw materials or manufacturing processes.

The individualizing capabilities of trace elemental analysis are investigated for automotive windshields. Windshield glass belongs to the class of float glass, manufactured using the tin-floatation method¹³. Float glass is commonly encountered in trace evidence.

It is the aim of this project to provide caseworkers with practical information as to the typical elemental variation within this class of glass. To do so, three phases of research are in various phases of completion: Determination of sample homogeneity, population variation, and batch variation. Preliminary results from the first phase of this research, determining sample homogeneity, are presented in this short article. Since windshields are comprised of two panes, sample homogeneity within a single pane and between two panes of a single windshield was investigated.

Instrumentation

A Perkin Elmer ICP-MS was used with a New Wave Research 213-nm laser ablation (LA) solid sampling unit (Figure 1). NIST SRMs 612 and 1831 were used for calibration and quality control, respectively. Spot ablations of 60 mm in diameter and 100 mm in depth were performed per replicate analysis (Figure 2). The laser was operated at 100% power and a 10-Hz pulse rate.

Samples analyzed

Ten windshields collected from Mygrant Glass Company (Sacramento, CA) were sampled in six locations, from both



Fig. 1. Perkin Elmer ELAN DRC II ICP-MS (a) and New Wave Research Nd:YAG LA ($\lambda = 213 \text{ nm}$) unit (b)

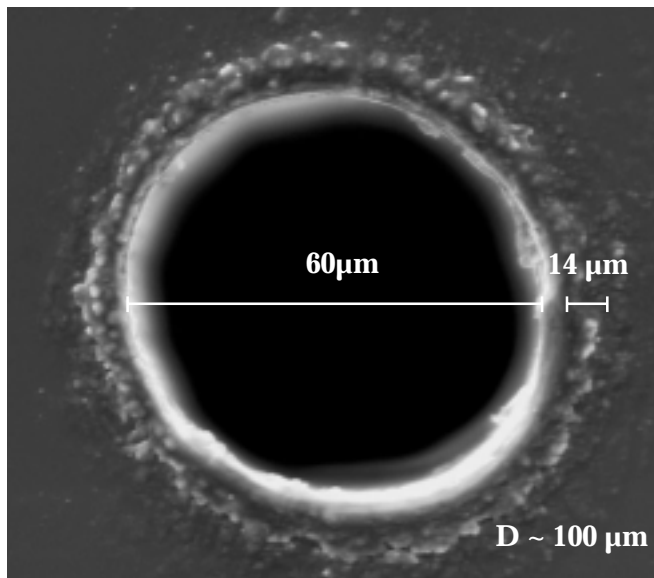


Fig. 2. Typical ablation crater visualized by SEM at 3000 X

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panes: top left, top center, top right, bottom left, bottom center and bottom right (Table 1). In total, 12 samples were collected from each windshield. Three of these windshields were obtained from the same manufacturer and were produced within a short time frame. Samples were acid washed, air-dried and analyzed in quadruplicate.

Table 1. Summary of Samples Collected

Manufacturer/ Brand	Location of Manufacture	No. of Windshields
Carlite	Mexico	3 (2 mfr'd consecutively)
Lamishield	China	1
Pilkington-LOF	USA	2 (mfr'd consecutively)
Sekurit	Mexico	2 (mfr'd consecutively)
Sicursiv	Italy	1
XYG (HK) Ltd.	China	1

Summary of Findings

Instrumental drift. Over the course of analysis, nonspecific trends in element detection were observed. Upon re-examining QC data, it was noted that significant instrumental drift had occurred over the course of a single day. While the analytical results were accurate within 15% of the true value, the quantitative results were significantly different at 95% confidence. Such variation has been documented by Trejos, Montero, and Almirall who proposed the use of elemental ratios to correct for intraday variation¹². Indeed, this approach adequately corrected the intraday variation observed in this study.

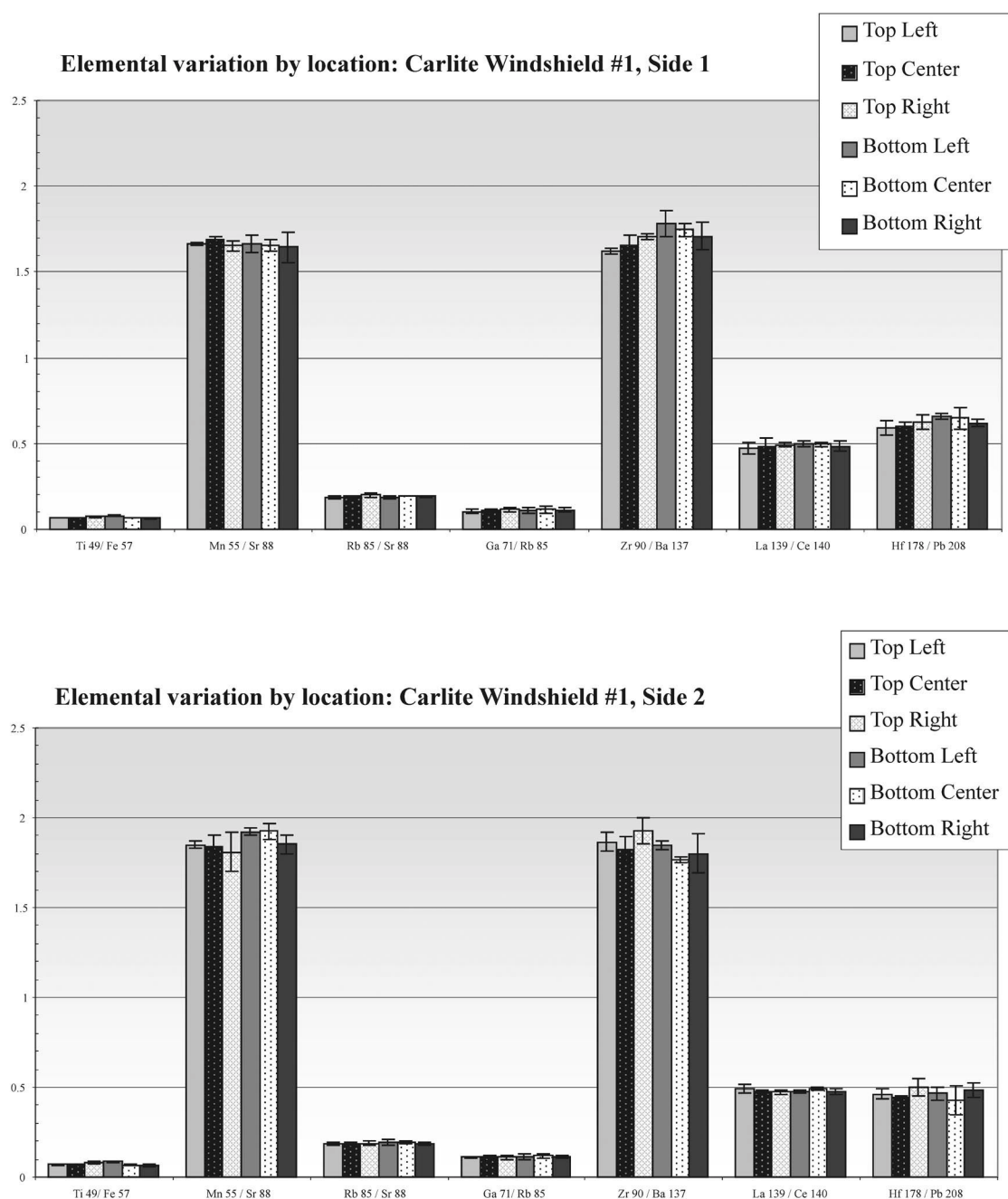


Figure 3. Within pane variation in Carlite Windshield

Within-pane homogeneity. The majority of the windshields examined showed some heterogeneity within a single pane of glass. These differences were significant at 95% confidence; some were also significant at 99% confidence (Figure 3).

These results do not support a recent report¹⁴ where two windshields were analyzed by LA-ICP-MS and each side was found to be homogeneous at 99% confidence.

It appeared that $^{49}\text{Ti}/^{57}\text{Fe}$, $^{90}\text{Zr}/^{137}\text{Ba}$, and $^{178}\text{Hf}/^{208}\text{Pb}$ were the element ratios that exhibited the greatest heterogeneity within a single pane of windshield glass, regardless of manufacturer. The question of whether this variation is related to the difficulty in quantifying these elements or is a result of genuine sample variation remains to be answered. It must be recognized that these differences may not be significant if multivariate statistics are used. In using confidence intervals as a point of comparison, it is assumed that there is no correlation between any two or more elements. Since any of the raw materials may be contributing trace elemental contamination, the possibility that two or more share a common origin cannot be discounted. The application of multivariate statistics to this research question is being pursued.

Windshield homogeneity. Of the ten windshields examined, eight exhibited marked differences in the elemental compositions between the two panes of glass (Figure 4). However, the two panes of both Pilkington-LOF windshields could not be distinguished (Figure 5).

The consequences of these results are two-fold. First, since some windshields exhibit heterogeneity between the two panes of glass, it is important to take exemplars from both sides of a reference windshield. Second, the elemental profile of a discrete glass sample is not unique.

Comparison of windshields from the same batch. Pairs of consecutive windshields from Carlite, Sekurit and Pilkington-LOF were analyzed to determine if elemental analysis could individualize these. Each pane of consecutive Carlite and Sekurit windshields could be distinguished. However, the two Pilkington-LOF windshields were not statistically different in any pane (Figure 6).

Conclusion

There is some heterogeneity in automotive windshield glass – both within-pane and between panes for some manufacturers. The heterogeneity within a single pane is small (<10% different) but significant at 95% confidence, assuming that the elements examined are independent variables. In contrast, the differences between the panes of glass are typically larger (as great as one order of magnitude). One windshield manufacturer stands out: Pilkington-LOF. There were no differences between the panes of two individual windshields, nor were there any differences between the four panes of the same windshields.

Since windshield glasses can be variable in composition, it is important to collect adequate exemplars. Both panes must be sampled. Further, it is important to acknowledge that the elemental profile of a particular glass is not unique. Nonetheless, elemental profiling can be highly individualizing.

Future work is aimed at determining the appropriate statistic for comparing multiple variables that may or may not be correlated, as well as analyzing a larger sample set of windshield glass to further assess the individualizing capabilities of trace elemental profiling.

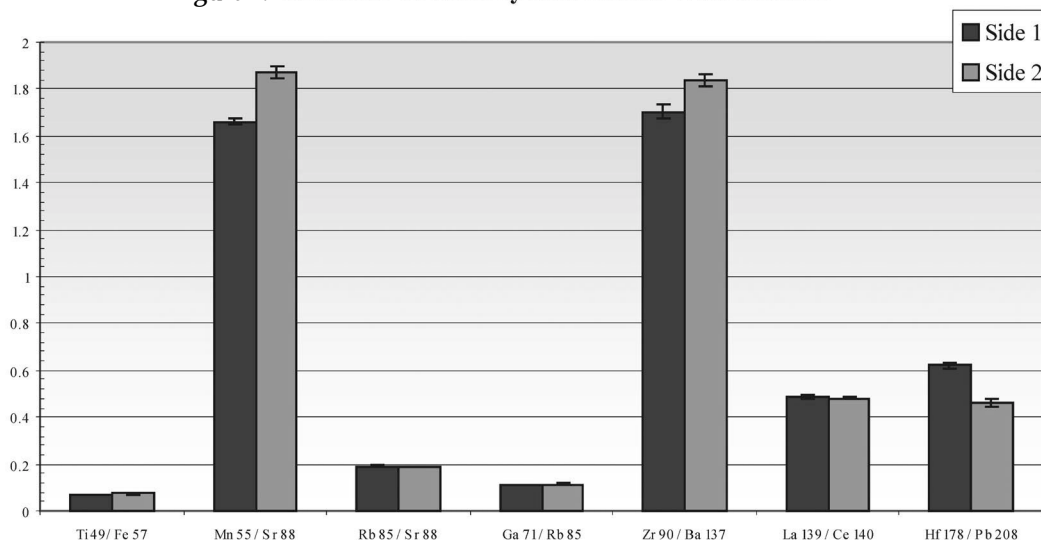
Acknowledgements

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References

1. Allen, TJ et al. The transfer of glass—parts 1 – 4. *For Sci Intl* 1998 (93) 167 – 208.
2. Locke J, Underhill M. Automatic refractive index measurement of glass particles. *For Sci Intl* 1985 (27) 247 – 260.

Figure 4. Elemental variation by side: Carlite Windshield #1



3. Locke J, et al. The evidential value of dispersion in the examination of glass. *For Sci Intl* 1986 (32) 219 – 227.
4. Hamer P. Microscopic techniques for glass examination, in *Forensic Examination of Paint and Glass*. B Caddy (Ed). New York; Taylor & Francis: 2001.
5. Neufeld L. Application of laser ablation ICP-MS to the analysis of forensic glass samples. *Spectroscopy Magazine* July 2005.
6. Catterick T, Hickman DA. The quantitative analysis of glass by inductively coupled plasma-atomic-emission spectrometry: A five element survey. *For Sci Intl* 1981 (17) 253 – 263.
7. Hickman DA, Harbottle G, Sayre EV. The selection of the best elemental variables for the classification of glass samples. *For Sci Intl* 1983 (23) 189 – 212.
8. Ryland SG. Sheet or container? – Forensic glass comparisons with an emphasis on source classification. *J For Sci* 1986 (31) 1314 – 1329.
9. Koons RD, Peters CA, Rebert PS. Comparison of refractive index, energy dispersive x-ray fluorescence and inductively coupled plasma atomic emission spectrometry for the forensic characterization of sheet glass fragments. *J Anal At Spectrom* 1991 (6) 451 – 456.
10. Duckworth, DC, et al. Analysis of variance in forensic glass analysis by ICP-MS: variance within the method. *J Anal At Spectrom* 2000 (15) 821 – 828.
11. Montaser, A (Ed). *Inductively coupled plasma mass spectrometry*. New York; Wiley: 1998.
12. Trejos T, Montero S, Almirall JR. Analysis and comparison of glass fragments by laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) and ICP-MS. *Anal Bioanal Chem* 2003 (376) 1255 – 1264.
13. Copley, G. The composition and manufacture of glass and its domestic and industrial applications, in *Forensic Examination of Paint and Glass*. B Caddy (Ed). New York; Taylor & Francis: 2001.
14. Trejos T, Almirall JR. Sampling strategies for the analysis of glass fragments by LA-ICP-MS part I. Microhomogeneity study of glass and its application to the interpretation of forensic evidence. *Talanta* 2005. [In press].

Figure 5.

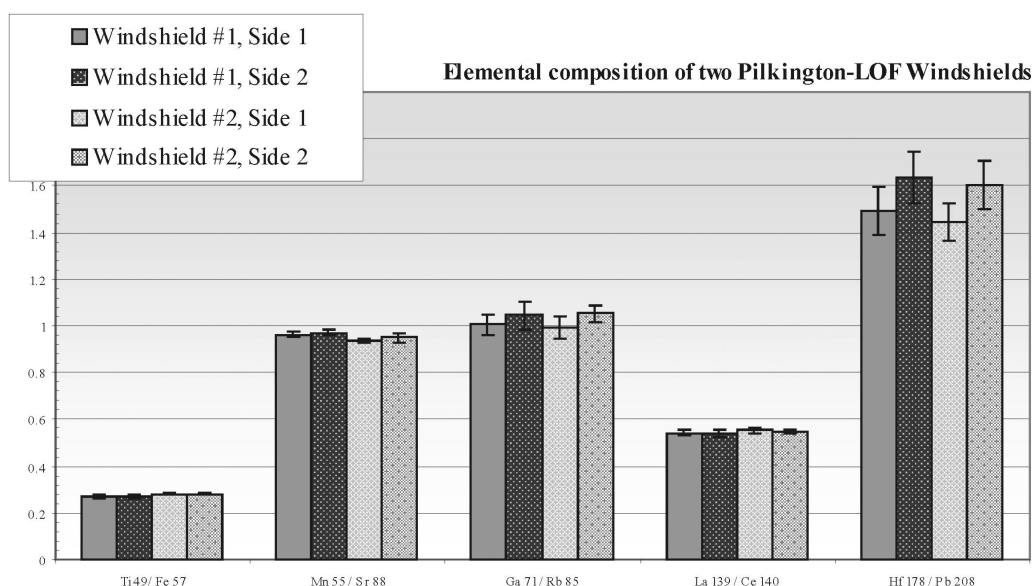
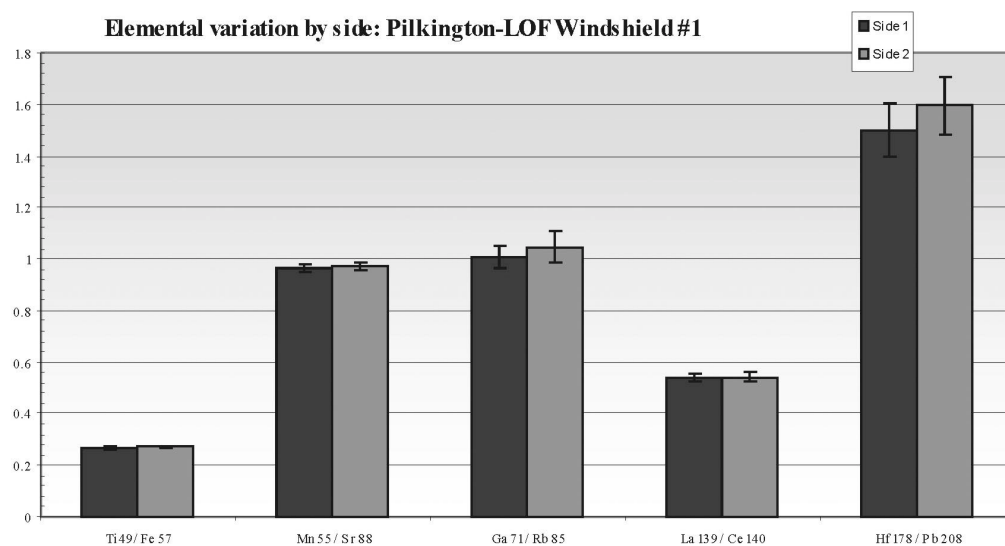


Figure 6. Indistinguishable panes of Pilkington-LOF glass

Sowing and Reaping Part 2: Words and Attitudes— The Choice Is Yours

By Ron Nichols

A few issues ago we looked at the concept of sowing and reaping.¹ In that article I discussed the idea of understanding and meeting needs and how each was essential to experience success as a team. In this article, I wish to address the topic of words and attitudes—the choice is yours.

In the first part of sowing and reaping I discussed how important it was for the farmer, if he wishes to be successful, to understand and know the soil into which he plants. Likewise, a leader, if he or she wishes to be successful, will make every effort towards understanding and meeting the needs of individual members of the team for which they are responsible.

In this second and final part, I wish to talk about the importance of good fertilizer if we wish to have an abundant crop. For a farmer, it is a matter of being diligent in feeding the crops the nutrients they need to produce the best

two reasons—the first of which is obvious. I also do not necessarily like cats. The second is much more applicable though to our current discussion—when we have a bad day we often take it out on someone. For some of us, when we have a bad minute – we take it out on someone.

No one is responsible for our words and actions other than us. While I can blame whomever I want, the ultimate responsibility for the words I use and the attitudes I display is mine. It matters little how much someone has infuriated me. I have no inherent right to lash back. To do so does not enrich or enhance the relationship. Rather, it simply serves to fill a selfish need for vengeance.

In addition to taking responsibility for our words and attitudes, it is important that we recognize the potential power they have. Let me relate a personal story for you as an example. When I was growing up, I tried many different sports. I was inept at some, but hours of slamming a tennis ball against a handball wall turned me into a pretty good tennis player (at least for a time). When my dad saw me play, his comment was, “That was pretty good, but, you’re no Bjorn Borg.” I know he meant the best. However, the general refrain for most everything I did was, “That was pretty good, but....” Little wonder I strived for perfection as an adult.



“You did a good job, but...” The “but” negates everything.

yield possible. For a leader, it is a matter of being diligent in our words and attitudes towards our team members no matter the circumstance, to provide the best opportunity for personal and team growth.

In this particular instance, I wish to extend this beyond just leaders, to all individuals. Our words and attitudes are not restricted to our workplaces. They permeate every relationship in which we are involved. While this article will focus on a leader-team concept, the principles are applicable to all types of relationships. In that, it is my hope that you find something of use.

“He made me do it!” “It was all her fault!” If any of you have children, as I do, or if any of you was at one point a child, as I was, then no doubt you have heard or spoken words similar to these. Often times, we make excuses for our words and attitudes. “I had a fight with my spouse (children, friends, pick one).” “If he would just do what I said.” “How many times do I have to repeat myself?”

I heard a comedian yesterday on a television show called *Bananas*. It was quite apparent that he did not like cats. One line that caught my attention was when he said that despite how he felt, he does feel cats have a useful place in the home. When you come home and have had a bad day you do not accidentally take it out on the dog. It caught my attention for

Now the astute reader will say, “Ron, you just said that you have to take responsibility for your own actions. You did not have to become a perfectionist just because of what your dad said.” I respond to that by saying, I was not that astute myself at 13! Secondly, I would say that just because I had a choice in how I responded to those constant statements, did not mean that my dad should necessarily have made them.

To claim that a person is solely responsible for how they respond to our words and attitudes does not excuse us, and allow us to use inappropriate words and have inappropriate attitudes! Let me give a clear example. I say that everyone is responsible for his or her own words and actions. I then use that rationale when someone, who I just gave a “good talkin’ to,” goes off the deep end and takes it out on the cat. He or she blames me for getting mad at the cat. I respond, “Take responsibility for your own actions.” However, one of the reasons this person got mad was because of my irresponsible use of words and attitude when I gave them that, “good talkin’ to.”

It is true. We are not responsible for how another person responds to our words and attitudes. However, that does not give us reason to be irresponsible. In fact, I think that you will discover that when you are responsible and respectful in your

words and attitudes you will pave the way for opportunities that would not have otherwise have existed.

I once attended a seminar on the topic of mentoring. The instructor posed a statement that admittedly he was still trying to get his head around. He posed the thought that we have coined the term “constructive criticism” to simply feel better about ourselves when we rail into someone for his or her poor performance. In fact, he felt the term “constructive criticism” was nothing more than an oxymoron and a justification for allowing us to say what we wanted to say no matter the impact. In fact, he offered the theory that all criticism is destructive.

I do not know if he has gotten his head around it yet. I have not seen anything recently published by him that would suggest he has. Nothing more than a thought in its fetal stage when he offered it, it has been juggling in my head ever since. It is a resident of one of those compartments that pops open every once in a while. I ponder it, and then when I still can't make sense of it, it gets put away again until another time.

Not today though. In one sense I think he was right. Much of the “constructive criticism” being offered is actually destructive because of the manner in which it is offered. Let's think about this a bit more and maybe we might understand why this is the case.

There are generally two reasons why we find ourselves in a position to offer a criticism of something. We might be paid to do so, like a movie or food critic. In these cases, the criticism is not necessarily always bad. Sometimes they actually encourage us consumers to try something! Other times they don't, and often the more pointed and controversial they are, the better they are paid. Its kind of like watching NASCAR. Many do not watch for the race, they watch for the crashes.

The other common reason is because we are being affected by something. It could be positively, in which case we offer praise (if anything at all). It could be negatively, in which case we offer criticism (seemingly much more readily than praise). An example would be an article that is written by someone that calls into question the reliability of our discipline. A response to that would be a criticism of the article. Another would be when a team member handles a matter in a manner that was inappropriate. Since this team member's handling of such a response can affect us individually as a leader (or co-worker), it is important for us to respond. When we do so, we are critical of the manner in which the matter was handled.

The key here is something that the reader may have glossed over. When a criticism is necessary, it is important that it be handled in a manner in which it is the event that is being criticized and not the individual person. For example, it is much more beneficial to approach a situation that was inappropriately handled by saying that the manner in which it was handled was not appropriate and here are the reasons. Communicating in that way is much more fruitful than suggesting to this person that it is just another example of how he or she cannot make appropriate decisions.

It is difficult, however, to steer away from this destructive language because we have been personally impacted by the event. Either as a co-worker or a leader, we have an investment in something that was impacted by the poor decision making of this individual. It is a natural reaction to want to respond in defense of yourself. However, when we do so, we are liable to attack if we do not take the time to assess before we respond.

A typical response is to offer “constructive criticism.” Remember my rambling about having no excuse to use inappropriate words and actions? The same reasoning is applied here. To offer something in the name of “constructive criticism”

does not give us the right to say it however we want with whatever attitude we feel appropriate.

Some might suggest that if “You don't have anything nice to say, then don't say anything.” While I would agree with the fact that oftentimes we speak far more than we should, losing sight of the fact that we have two ears and only one mouth, there are times when it is important to speak up and sometimes, the task is not necessarily going to be pleasant. So, rather than avoiding the issue all together I would like to offer the following as a measure of the words about to emanate from our mouths. I think the following two characteristics offer a good two-part litmus test for our words and actions.

First, will the words and attitudes be honest? We have to remember that unless we are being paid to offer a criticism, we are generally offering one because we have been in some way negatively impacted by an event. We have to be honest with ourselves that we may have a personal bias. This is not unexpected and it is not necessarily bad. However, it does mean that we need to be honest with ourselves and filter out those words and attitudes that are defending our position through a counter-attack.

We have to be honest with the other individual. This comes from a history of genuineness. As you know, if you have read previous articles I have written, this also includes vulnerability. Not only do we have to be honest, it is important that the other individual perceives that we are being honest. This is gathered only through the formation of a relationship.

Honest communication need not be harsh. One thing I would recommend though, is the avoidance of phrases such as, “You did a good job, but....” The “but” negates everything. It communicates that we are someone who simply cannot be pleased, always wanting more. I am in favor of offering praise even when something difficult that was handled inappropriately is about to be discussed. This helps to soften the blow if you will. However, rather than use the word but, the word “and” is helpful. Two things can be equally true. A good job was done *and* some kinks still need to be worked out.

So, will the communication be honest? That is the first characteristic to be assessed. The second is will the communication build the other individual up? Or, is it designed to defend our own position by tearing the other individual down?

Once again, being honest with ourselves and our own motives, plays a key role in our assessment of this second characteristic. When we are approaching someone with an issue of import that needs correction, we need to leave our own personal agendas at the door, being less selfish in our communication and more selfless. Our communication should leave the other person knowing that it is important that something change, while at the same time, leaving them with the confidence that such change is not only possible but, would be fruitful. Simply put, are they encouraged after we talk with them? Is there increased potential for growth?

There I go again! “Ron, you said earlier that I am not responsible for how they respond.” Well, my response and conclusion are simple. Two things can be equally true. We are not responsible for how others actually respond to our words and attitudes AND we have no excuse not to do our best to “speak the truth in love.”² I began this article with an analogy of a farmer and fertilizer. I know that in farming most fertilizers really stink, but that is where I would like the analogy to end. Our words and actions should not stink!

¹Ron Nichols, “Leadership 101: Sowing and Reaping Part 1 – Understanding and Meeting Needs.” CACNews, First Quarter 2005.

²Ephesians 4:15, NIV.

Call for Nominations

Two Awards Open October 1-December 1

American Board of Criminalistics Examination Award

The ABC has an award allowing each member organization to select one individual every year to take an ABC exam (GKE, Specialty, or Technical Specialist) without a sitting fee. The CAC requirements for receiving this award are:

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Ed Rhodes Memorial

Ed Rhodes was a long time criminalist nationally recognized for his trace evidence work, certification effort, and teaching ability. Wherever Ed went, teaching and training were not far behind. He thoroughly immersed himself in the education of forensic scientists, other criminal justice professionals, and students. His ultimate goal was competency in the criminalistics profession. This led to the CAC Certificate of Competency program and, subsequently a national certification program run through the American Board of Criminalistics. Ed believed in competency through knowledge, education, and training.

Towards this goal donations from friends and colleagues were made in Ed's memory and the CAC established the Edward F. Rhodes Memorial Award. The purpose of this award is to give a CAC member who is preparing for a career in criminalistics or is newly employed (less than three years) in the field of criminalistics the opportunity to attend a major forensic or scientific meeting of benefit to forensic practitioners. The award is intended to assist the recipient to pursue educational opportunities outside the normal training activities in which persons in the recipient's situation participate. Examples of forensic meetings can include, but are not limited to, CAC Semi-Annual Seminars, American Academy meetings, International Symposia, or other regional association meetings. Examples of significant scientific meetings are InterMicro and Promega. The award will cover travel, lodging, and registration expenses up to \$1000. This amount may be adjusted by the Board of Directors based on income of the fund and meeting costs.

In the spirit of professionalism as exemplified by Ed, an ideal candidate should be willing to give some of himself or herself to the requested event. In the case of attending a meeting, the effort may be in time or money, but an applicant who proposes to share ideas, or otherwise participate actively in the meeting or training would receive greater consideration. The

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All interested parties can go to the CAC website (<http://www.cacnews.org/archives.htm>) or contact Mey Tann meytann@doj.ca.gov

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Ethics in Forensic Firearms Investigation

By Sergeant Gerard Dutton

Abstract

Forensic firearms investigators and specialists from other forensic disciplines occasionally face ethical dilemmas during the course of their work. Due to the importance of forensic evidence in many judicial proceedings, the ethical standards of forensic practitioners must be extremely high and beyond reproach. Various ethical quandaries from the author's own experience and from other cases are discussed within the broader context of forensic science as a whole.

Introduction

What I wish to relate are some broad ethical considerations for forensic firearms investigators, illustrated with experiences from casework, including my own. Despite this paper being focused on forensic firearms, the ethics issues I'll relate are applicable to the whole sphere of forensic science—the specifics may vary but ethical concepts are universal. Although there are numerous separate but no less important ethical considerations for supervisors and managers within the forensic laboratory—I'm approaching this topic mainly from the stance of a forensic practitioner. For it is this grass roots level of forensic work that has the most impact: in the courtroom.

One definition of ethics is that it is the philosophical study of the moral value of human conduct and of the rules and principles that ought to govern it. This can be divided further into: 1) The moral fitness of a decision or course of action 2) A code of behaviour considered correct, especially that of a particular group, profession or individual, 3) Standards of what is right and wrong.

Ethics in forensic investigation is often a vast grey area as we try to balance the requirements of science and law. In science, the truth is sacrosanct but as the legal system in Australia is an adversarial one, the prosecution and defence teams often appear to have different versions of the "truth." Science and law are two very separate areas with specific goals. Sometimes these goals overlap but because they often don't, it's not easy to simply take a black and white approach to ethics matters—the range of variables are almost limitless and each situation has its own subtleties to consider. Whether it's a real or hypothetical case, there are always a number of possible choices, the merits of which could be argued endlessly. As many ethical situations are rarely so cut and dried, the decision to act in a certain fashion and choose a particular path of action then comes down to the conscience of the individual.

So for the forensic scientist, the differing needs of science and law often creates ethical dilemmas that can be quite chal-

lenging. However, the way in which we respond to them should never vary: that is, we should always approach any problem with honesty and integrity. And we must do that because as forensic practitioners, we will not be judged by our highest achievements, standards and intentions but by what are perceived as our failings. Integrity, so hard earned, can be lost in an instant and never regained.

Professor Edmond Locard said the following in relation to physical evidence:

"This is evidence that does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong; it cannot perjure itself; it cannot be wholly absent. Only its interpretation can err. Only human failure to find it, study and understand it can diminish its value."

What he said many decades ago is extremely valid especially with forensic evidence being placed under more and more scrutiny than ever before by the courts and other bodies. As practitioners in forensic science, we are expected to be honest, ethical and unbiased in our opinions. Decisions we make relating to forensic evidence should be formed only on the facts and they should not be tainted by any other considerations.

Most forensic specialists around the globe are employed by their respective governments, whether this be a local, state or federal authority. Although this means we then work for the prosecution "side" in the technical investigation of crime, it does not mean that the evidence we give should necessarily be weighted towards the prosecution case. Our testimony as expert witnesses must be absolutely impartial. If not, the expert is not only kidding him/herself, but they are doing their profession a great disservice. Let's not also forget the possible adverse ramifications to the accused in a judicial inquiry.

In my experience, forensic evidence usually assists the prosecution case but if it helps the accused and the defence "side," then so be it! It is not up to forensic experts or the police to decide the guilt or innocence of a person - that is the court's role, so we needn't concern ourselves with that aspect. I'll return to that concept later.

Case example

The following case highlighted this to me. A former colleague of mine, a very experienced ballistics expert, was responsible for examining and presenting all the firearm related evidence in an unusual case where a woman was either murdered or killed accidentally.

The case was brought to my notice by chance and it was this case in particular that first piqued my interest in the ethics of forensic investigation. I had stopped at the country home of a friend from my police academy days in NSW who was now a detective. During our conversation on police related topics he said: "One of you ballistics guys gave really bad evidence for us recently." Taken somewhat aback, I asked him to elaborate. My friend was not directly involved but worked at the same station as the detectives who investigated this incident. He told me that they had basically lost the case thanks to "poor" evidence given by the ballistics expert. The expert he was referring to, one of my former colleagues, was an extremely competent operator, very thorough and as straight as they come. I had the highest regard for his work and I was already keen to hear his side of the story.

Some days later my ballistics colleague gave me his version. It occurred one evening in a town in country New South

Ballistics Section, Tasmania Police, Hobart, Australia, gerard.dutton@police.tas.gov.au. Reprinted by permission from AFTE Journal, Vol.37 No. 2, Spr. 2005. This paper was delivered to the 2004 AFTE Training Seminar in Vancouver, Canada. The author has been a member of the AFTE Ethics Committee since 2001 and Chairman of this Committee for 2003/2004.

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Wales as a domestic argument between a defacto couple who had been drinking. The argument commenced inside the house and continued into the rear yard, where he alleges she produced a .22 calibre pump action Browning rifle and threatened him. A struggle ensued which resulted in the female sustaining a single fatal gunshot wound to the head. What occurred next was definitely most unusual and it was this bizarre behaviour that no doubt made detectives think they were investigating a murder. The alcohol affected male panicked and removed the deceased's clothing, wrapped the body in a sheet, tied her arms and legs with string and placed a plastic shopping bag over her head. She was then placed in a wheelbarrow and wheeled into a shed at the rear of the yard. He later stated he covered her this way because he didn't like seeing her bloody face and body. The following day the male, after thinking about his situation in a more sober frame of mind, rang the police and informed them of the incident.

Discussion—domestic dispute

It would be too time consuming to delve into the specifics of the various aspects of the physical evidence, suffice to say the results of the autopsy, the scene examination and the discovery of a fault in the rifle's mechanism, all supported the accused's version of the event.

At his committal hearing to decide if the accused should be committed for trial, the ballistics expert was quizzed on these points, especially by the Magistrate, who asked a series of questions to clear up points which had not been clarified by evidence-in-chief and cross-examination. At the conclusion of the committal hearing the Magistrate ruled in favour of the accused, ruling that on the evidence before him he was not satisfied that a jury would convict him. Accordingly, he was released from custody.

The behaviour of the accused after the shooting occurred was certainly very weird. But who knows what went through the mind of that individual after finding his partner was now dead after their drunken argument? The fact remains he voluntarily informed police of his actions, knowing full well that the circumstances of the shooting looked bad for him.

The bottom line is, we as forensic specialists can only interpret and report upon whatever evidence is present. In this case, the physical evidence supported what the accused said and there was nothing to suggest otherwise. We cannot manufacture or distort evidence to suit either side. If the accused did in fact murder his wife but insufficient evidence existed to convict him, then we as forensic investigators can do no more. It would not be the first time, nor the last, that a murderer walks free through insufficient evidence.

This case really showed the importance of remaining totally impartial and working ethically in our investigations and that nothing other than the available evidence should influence us. The firearms expert involved in this case did not give bad

evidence at all - he gave excellent unbiased testimony based only on the evidence before him. And although the Detectives were professionally and ethically bound to present their case in court, they definitely overstepped the mark by criticising the forensic firearms expert, just because he didn't help their case.

Greg Kelly

In a similar vein, I'll recount a short story from the book, “The Gun in the Case” by Greg Kelly. He was the first forensic ballistics officer for the New Zealand Police from the mid 1930's to early 1950's. In his book he recounts many of the experiences he had whilst working in an area which at that time was only gaining slow acceptance, not only from his police colleagues but from the judiciary and the general public.

He tells many fascinating stories about some of the shooting murders of his era, but what comes strongly through in his writing is his sincerity, his honesty and his integrity. He obviously had a very robust personal code of ethics and he was working decades before the term “Code of Ethics” was thought of.

In one of his cases he secures the acquittal of a man charged with attempted murder. The firearms evidence did not support the prosecution case and after the trial, the accused man thanked Kelly. Kelly replied there was simply no need for this. He said, “I had not been concerned to help either side, but simply to report my own observations and the deductions I thought could be drawn from them.” A police officer remarked to him afterwards, “You helped the accused more than you did our case.” To which Kelly quoted, “Let justice be done, though the ceilings fall.”

Suicide or murder

I once gave evidence in Coroner's Court where there was a big question mark as to whether the fatal wound was self inflicted or inflicted by a second party. Again, it was a domestic dispute where both parties had been drinking. The male said he was trying to stop his partner committing suicide. The physical evidence neither confirmed nor denied his story. The wounds to the deceased could have been caused in the manner he described but could also have been caused by murder. In court, I elaborated on the type of bullet wounds she sustained and using the pistol responsible, showed how the injury could have been occasioned either by her own hand or by another person. Ultimately, an open finding was reported by the Coroner as the evidence was inconclusive.

In cases such as this, there is opportunity to unethically weight the evidence to the Crown or defence side. I could have still answered questions truthfully but over or under emphasised certain aspects of the firearms evidence to indicate a suicide, or, a murder.

The man in this incident had a long and violent history including towards his partner. One could easily imagine he murdered her. But it would be extremely unethical to unfairly bias the evidence against him based on his past. What if investigators then discovered that the deceased female had attempted suicide on previous occasions? What if they later located a recent suicide note at another house? This is what occurred in this case. So how would this new information change your perception of the events? The important point here is that we are often only presented with partial information, therefore it would be wrong to colour our evidence on anything that is not directly related to our own involvement. We have to filter out unnecessary information and concentrate purely on that which is useful for testing the possible scenarios.

Perception

One ongoing challenge we face as forensic scientists and forensic investigators is perception. Whether we like it or not, our life experiences, our attitudes, our prejudices (and we all have prejudices, whether we like to admit it or not) - these things colour our view, our perception of the world. All people we come into contact with will therefore also have their own perceptions, attitudes and prejudices. Consciously and sub-consciously we are constantly applying this to new experiences and making judgments and assessments based on all previous experiences.

I think there is no doubt that many years of exposure to police work often gives the individual a very cynical, biased view of the world, despite best intentions. Those here who have ongoing contact with experienced detectives during the course of their forensic work will probably have experienced this. This long term exposure to the worst aspects of human nature can confirm in their minds a negative perception of the world and forensic specialists need to be aware of this in order to avoid bias.

During forensic investigations, especially in crime scene reconstruction, we need to know what is alleged to have occurred. We need to know what the suspect and any witnesses have claimed has happened in order to prove or disprove their story from the available physical evidence. Because we can't escape from the need to know this information, (for without it, it would be difficult if not impossible to carry out our role); in this respect it is essential to be on guard that negative, inappropriate or incorrect perceptions don't intrude into our work, thereby affecting our ability to work ethically and to be steadfastly impartial.

Whether the man in the previous case was guilty or innocent is not something I concerned myself with. There will always be cases where we are interested to know the outcome, especially those cases where a lot of hard work has been put in. I mentioned earlier the issue of being overly concerned with the outcome of court but I ask you, why do you wish to know the verdict? Is it because you expect the accused to be found guilty? Is it because you think the accused should be sentenced to at least x number of years in jail? If so, why do you care if you have carried out your role in the investigation in an unbiased manner? As I stated before, remaining impartial is a key principle in ethically carrying out our work.

In the various forensic professions, we are but one link in a long investigative chain. Sometimes we provide the key link, but nonetheless we are but one part of the whole and our role is to provide quality information to the courts so they can make informed decisions on the guilt or otherwise of the accused. This should always be kept in mind. I'm not saying we should never be concerned about the verdicts in investigations we are involved in, but I think there are interesting ethical issues in being overly concerned with the outcome of Court in cases where we have made a contribution.

Perception—case review

The issue of perception is also highly relevant to case review. In forensic firearms and toolmarks identification, it is standard, indeed essential that another expert check an identification on the comparison microscope. This usually involves sitting at the instrument with the exhibit and test already set up and checking the correspondence of microscopic information on both items. But if the expert doing the check only ever checks positive matches, then his perception will be that whenever he sits at the microscope to conduct a peer review of case-work, he will expect to see a positive match!

Easy, textbook identifications aren't the problem. The problem will be those difficult borderline cases where it is extremely hard to decide one way or another between an identification or not. Of course, if any doubt exists, one must always err on the side of caution and arrive at an inconclusive finding. But unless the peer reviewer is used to checking inconclusive results and also eliminations, with no prior knowledge of the case history, then unwanted bias may creep in, affecting what he perceives or expects or see through the microscope.

It is my belief that all peer review should therefore be conducted with no knowledge of the events which have led to the items being submitted to the laboratory. I mentioned previously that is difficult for the initial forensic investigator to carry out the role at a crime scene without knowing what is alleged to have occurred. But this need not apply to the case reviewer and it is preferable they conduct any checking "blind."

As an example, when another expert is required to check some comparison microscopy, instead of sitting at the microscope with the items already set up in the "matching" position, he/she should be handed two bags with the questioned items and asked to provide an opinion. One bag would contain the items from the crime scene or suspect (bullets or cartridge cases), whilst the other bag would contain either the firearm (or test cartridges/bullets already discharged in the firearm). The reviewer doesn't need to know, for example: that the firearm was taken from the suspect just after the shooting and that witnesses saw him shoot the victim (from whom a spent bullet may have been recovered). Providing this information immediately creates a belief in the reviewer's mind that the firearm taken from the suspect was definitely responsible and therefore before he/she even sits at the microscope, will expect to find a positive match!

Peer review conducted this way is more time consuming but necessary if unwanted perceptions and bias are to be removed from the decision making process. This issue is not limited to firearms and toolmarks; it would apply to many forensic disciplines where opinions are required, especially where some form of comparison is involved.

Legal Challenges—*Daubert*

We are currently faced with perhaps the biggest challenge facing the firearms discipline since it was firmly established in the 1920's. We are not alone in this respect as other identification sciences such as fingerprints, toolmarks, shoeprints and document examination are also under pressure. Many courts will no longer accept that bullet A was fired from firearm B purely on the say so of the expert without solid written and pictorial documentation to back it up. If our methodology is under scrutiny and attack from those outside our discipline, what are we doing as a community to meet these doubts and prove that what we do is based on sound scientific principles? We need to consider the way we carry out our role lest we be seen as indifferent to the discipline in which we work and ineffective as a forensic community to respond to our critics.

If we use the analogy that the forensic firearms discipline is a house, I firmly believe that we should welcome inside anyone who wants to come in and look around, not just inside to look at the furniture and trimmings, but to look up in the rafters and most especially to look underneath at the footings. Critics and doubters within the judicial system need to see for themselves that the foundations are strong and solid and that our house isn't shoddily constructed or riddled with rot and about to collapse. Only by being more open, honest and transparent to those outside the profession can we confidently face these new challenges.

How is this achieved? In my opinion, some of the most useful current developments in our discipline include the application of the objective conservative criteria for the identification of striated toolmarks in casework and the routine photographing of comparisons as a part of case notes. Adoption of both of these ideas is not meant to replace anything that isn't already being done but I think they do allow more transparency in our role. Important cases have been thrown out of court due to insufficient or no notes being taken during the examination. This is clearly unacceptable and the reasons for the courts taking this action must be addressed. I stress that the application of Consecutively Matching Striae (CMS) and routine photomicrography in casework is not a panacea for all our ills, but I believe it's a positive step forward.

What is heartening is that the research into the validity of CMS wasn't started purely as a result of Daubert type challenges. It was started in the 1950's by Al Biasotti who recognized utility in this more objective approach to the comparison of striations. CMS is not a new idea, but certainly validation studies have markedly increased, especially during the last decade in order to prove the effectiveness of this approach. For a forensic discipline to proactively consider other avenues to articulate our science when faced with a challenge, rather than

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only ever checks positive
matches, then his perception
will be that whenever he sits at
the microscope to conduct a
peer review of casework, he will
expect to see a positive match!**

having changes forced upon them by others outside the profession, definitely shows a great deal of maturity. Of course, if any firearm examiners do not embrace these approaches in their own work, this is their choice and it does not mean their conclusions cannot be relied upon. The crucial thing is being able to convince the court that our results are dependable, however we go about it.

My own belief is that focusing on the objective nature of the identification process and backing this up with better documentation in written and pictorial form of how the decision was made, makes the science more transparent. This also allows our conclusions to be more easily scrutinized at any time henceforth by any qualified independent examiner, especially if the actual exhibits are no longer available. I might also make mention of Bayesian theory to evaluate this type of evidence. I have not yet been convinced that it is appropriate for the firearm and toolmark discipline as I've yet to see it practically, and successfully, applied to an actual case. Individuals, however, are at least studying its applicability and keeping an open mind. This is essential in forensic science.

But how does this all relate to ethics? In forensic science, I consider it is a fundamental ethical principle to be totally candid in everything we do regardless of whatever methodology

we apply to our own work. We have no need to hide behind a cloak of secrecy, or to use technical jargon to confound outsiders. Being open and honest is definitely a keystone in the foundation of all ethical behaviour.

Admitting to errors

One way we can prove that we act ethically in our investigations is to admit to errors. The worst possible thing to do if an honest mistake has been made is to try and cover it up. If discovered, this will always appear as corruption, collusion, distortion, you name it. There may be nothing sinister to it, but the media will report it as such if there is any attempt to hide it. They don't want to report that a forensic scientist has admitted to an honest mistake. They want front page headlines which scream, "Police Cover-up" or "Perversion of Justice" and they'll write it that way to sensationalise the issue because that's what sells papers. This is a sarcastic view, but unfortunately also reality.

To make an error is human and of course in our role we work hard to minimize that possibility. But there is no shame admitting to an honest mistake. Several years ago I made a blunder. I'd not had it happen before, but as soon as I realised what I'd done, I put my hand up and admitted my error.

This wasn't in relation to an actual case, but to a CTS proficiency test. As part of quality control, we undergo regular independent proficiency testing and have done for many years despite the fact that the Tasmania Police forensic laboratory is not accredited. We always complete at least two CTS tests annually in firearms and toolmarks, often more. In my situation, I was in the process of completing a toolmark proficiency test. The test consisted of determining if a set of wire cutters was responsible for cutting two pieces of wire.

I was the only one in the office the day I attempted the test and I was being constantly interrupted by the phone and by people needing something from me. Consequently I was regularly required to leave the examination room to attend to various things. It was due to this constant stop-start situation that I made an error with my two pieces of wire. I always shorten them for ease of manipulation on the comparison microscope and it was as I was in the process of shortening and relabeling them that I was again interrupted and had to leave the room. When I returned I found I couldn't tell which piece of wire was item 1 and which was item 2. Mixing exhibits is definitely something which must be constantly guarded against in forensic investigation for if the integrity of the exhibit can't be proved in court, it is useless, no matter how important it may be to the case.

So now my test was null and void and it was useless to continue. The first thing I did was to inform the Inspector in charge of the forensic laboratory, then I wrote to the National Institute of Forensic Science who administer these tests nationally, explaining what had happened and that I now couldn't supply them with results from this test due to my mistake. I was definitely embarrassed to admit to this, but disguising or hiding my mistake wasn't an option.

I want to strongly point out that neither was the convenient cop out of reporting two inconclusive results. I could have simply reported "inconclusive" for both pieces of wire and no-one would have been the wiser. Reporting an inconclusive result is neither a correct or incorrect answer. It merely means that for whatever reason, a more definitive conclusion could not be determined. So I could have simply reported "inconclusive"—my error would have been disguised and no one would have known.

Ethics, cont'd

But to do that would be unethical. This was an honest oversight on my part and I had no difficulty taking full responsibility for it. The important lesson for me was to recognize the potential of similar situations occurring in the future and taking the necessary preventative steps. So admitting to honest mistakes and taking personal responsibility for everything we do is another essential aspect to behaving ethically in forensic science.

Intent/Competence

One point I must make is that in the field of forensic investigation, to act unethically usually means being dishonest and at the worst end of the scale includes conduct that is illegal. But firstly, for any act to be deemed unethical, first it must be shown that there is intent. Without intent being demonstrated, behaviour cannot be shown to be unethical.

The Codes of Ethics I've seen relate to behaviour and decisions that require awareness on behalf of the practitioner that what they were doing was wrong. In other words they consciously make dishonest decisions whilst being fully cognizant of their actions. In comparison, no intent can be shown in an incompetent practitioner because they may make choices based on ignorance. This raises whether incompetence should be considered an ethical issue. As usual there are arguments for and against. But if fallacious information is imparted in court innocently, the outcome can be just as damaging as if the facts were intentionally misstated.

I've worked with an incompetent practitioner. At a crime scene, a reconstruction of the event would be quickly made, followed by collecting only that evidence which supported the hastily contrived theory. Any evidence not supporting that theory was disregarded. I never witnessed any malicious intent and this incompetence didn't lead to any travesties of justice as far as I am aware but there was always potential for things to turn pear-shaped. Incidentally, that individual no longer works in the field.

Keith Simpson

I'll briefly recount a final story from a book by another forensic pioneer. The book is called "Forty Years of Murder" by Professor Keith Simpson. Simpson worked for forty years from the mid 1930's as a forensic pathologist in London and became the first Professor of forensic pathology at London University. He recounts a story of an English couple holidaying in Portugal in early 1959. They died in unusual circumstances in a hotel room and the Portuguese authorities decided it was food poisoning from eating tainted clams. There were disturbing anomalies in the Portuguese investigation, not the least being that everyone else who ate clams from the same batch that night were all in perfect health. Simpson became involved through an English reporter who traveled to Portugal, examined the scene and who was also dissatisfied with the findings.

When the bodies were returned to England for burial, Simpson examined them and discovered that both victims displayed classic signs of carbon monoxide poisoning which was confirmed by a number of tests. In England a mock-up of a bathroom the same size as in the hotel was constructed with minimal ventilation, fitted with the same type of flueless, butane fueled water heater. Carbon monoxide levels were shown to be lethal in thirty minutes.

The Portuguese authorities took severe affront when asked to consider this evidence and steadfastly refused to back down on their quite obviously incorrect claim that food poisoning was the cause of the deaths. Simpson was sternly lec-

tured to by a Foreign Office dignitary at Whitehall about 'disturbed relations' that had arisen between Portugal and England. It was strongly suggested he write a letter and apologise. The Foreign Office even offered to draft one for him to sign. Simpson refused and he states in his book: "I was disturbed by the incident, because there is no place for deception or dishonesty in a calling that is dedicated to the discovery of truth. Diplomatic or political considerations should never be allowed to impede or divert medico-legal experts from their duty to try and find out what really happened, no matter whose feelings or prestige may be hurt."

Like any other group of individuals in our society, I am sure that within the forensic community unethical behaviour sometimes occurs. We would be naïve to think that it never happens. But overall, I think that with all the checks and balances in place, I am confident forensic practitioners would display an extremely high level of ethical conduct when compared to other groups of professionals.

Conclusion

This brings me to my final point: Ethics is not only about being true to your profession, whatever that may be, but most of all it's about being true to yourself and upholding the principles of fairness and correctness without allowing selfish behaviour to intrude. We are in a privileged position and we have a responsibility, not only to the justice system, but to the whole of society. The experts I've referred to: New Zealand's Greg Kelly and England's Keith Simpson weren't taught how to act ethically, except perhaps by their parents. They didn't learn ethical behaviour by doing courses or workshops. Such a thing didn't exist then. It was ingrained in their character.

So to act unethically is a personal compromise, it is fooling yourself, but even worse, brings disrepute to those true to the profession. We seem to regularly hear about corrupt police, pedophilic priests or drug addicted doctors; all of whom drag their profession down. But ethics doesn't just relate to our profession. It also spills out into everything we do in our private life.

Ethics and ethical behaviour can be taught but ultimately it all boils down to the individual, the degree of moral fibre they possess and the personal principles they are prepared to uphold. I believe that any ethical standard must firstly be measured against the individual, then measured against the forensic practitioner. For without a strongly developed personal sense of morality, ethical conduct within the forensic professions is impossible.

This then, is the ongoing challenge for each and every one of us working in the forensic sciences and this concept will never change.

*A certain J. For. Sci. referee
Considers all papers with glee:
"What's new is not true,
And what's true is not new,
Unless it was written by me."*

Bob Blackledge

Tongue-in-Cheek Dept.

If Bud Abbott and Lou Costello were alive today, their infamous sketch, "Who's on first?" might have turned out something like this:

COSTELLO CALLS TO BUY A COMPUTER FROM ABBOTT...

ABBOTT: Super Duper Computer Store. Can I help you?

COSTELLO: Thanks. I'm setting up an office in my den and I'm thinking about buying a computer.

ABBOTT: Mac?

COSTELLO: No, the name's Lou.

ABBOTT: Your computer?

COSTELLO: I don't own a computer. I want to buy one.

ABBOTT: Mac?

COSTELLO: No, I told you, my name's Lou.

ABBOTT: What about Windows?

COSTELLO: Why? Will it get stuffy in here?

ABBOTT: Do you want a computer with Windows?

COSTELLO: I don't know. What will I see when I look at the windows?

ABBOTT: Wallpaper.

COSTELLO: Never mind the windows. I need a computer and software.

ABBOTT: Software for Windows?

COSTELLO: No! On the computer! I need something I can use to write proposals, track expenses, and run my business. What do you have?

ABBOTT: Office.

COSTELLO: Yeah, for my office! Can you recommend anything?

ABBOTT: I just did.

COSTELLO: You just did what?!?

ABBOTT: Recommend something.

COSTELLO: You recommended something?

ABBOTT: Yes.

COSTELLO: For my office?

ABBOTT: Yes.

COSTELLO: OK, what did you recommend for my office?

ABBOTT: Office.

COSTELLO: Yes, for my office!

ABBOTT: I recommend Office with Windows.

COSTELLO: I already have an office with windows! OK, let's just say I'm sitting at my computer and I want to type a proposal. What do I need?

ABBOTT: Word.

COSTELLO: What word?

ABBOTT: Word in Office.

COSTELLO: The only word in office is office.

ABBOTT: The Word in Office for Windows.

COSTELLO: Which word in office for windows?

ABBOTT: The Word you get when you click the blue "W".

COSTELLO: I'm going to click your blue "w" if you don't start with some straight answers! OK, forget that. Can I watch movies on the Internet?

ABBOTT: Yes, you want Real One.

COSTELLO: Maybe a real one, maybe a cartoon. What I watch is none of your business. Just tell me what I need!

ABBOTT: Real One.

COSTELLO: If it's a long movie, I also want to watch reels 2, 3 and 4. Can I watch them?

ABBOTT: Of course.

COSTELLO: Great! With what?

ABBOTT: Real One.

COSTELLO: OK, I'm at my computer and I want to watch a movie. What do I do?

ABBOTT: You click the blue "1".

COSTELLO: I click the blue one what?

ABBOTT: The blue "1".

COSTELLO: Is that different from the blue w?

ABBOTT: The blue "1" is Real One and the blue "W" is Word.

COSTELLO: What word?

ABBOTT: The Word in Office for Windows.

COSTELLO: But there are three words in "office for windows"!

ABBOTT: No, just one. But it's the most popular Word in the world.

COSTELLO: It is?

ABBOTT: Yes, but to be fair, there aren't many other Words left. It pretty much wiped out all the other Words out there.

COSTELLO: And that word is real one?

ABBOTT: Real One has nothing to do with Word. Real One isn't even part of Office.

COSTELLO: STOP! Don't start that again. What about financial bookkeeping? You have anything I can track my money with?

ABBOTT: Money.

COSTELLO: That's right. What do you have?

ABBOTT: Money.

COSTELLO: I need money to track my money?!

ABBOTT: It comes bundled with your computer.

COSTELLO: What's bundled with my computer?

ABBOTT: Money.

COSTELLO: Money comes with my computer?

ABBOTT: Yes. No extra charge.

COSTELLO: I get a bundle of money with my computer? How much?

ABBOTT: One copy.

COSTELLO: Isn't it illegal to copy money?

ABBOTT: Microsoft gave us a license to copy Money.

COSTELLO: They can give you a license to copy money?

ABBOTT: Why not? THEY OWN IT!

A few days later ...

ABBOTT: Super Duper Computer Store. Can I help you?

COSTELLO: How do I turn my computer off?

ABBOTT: Click on "START"...

Submitted by Raymond Davis



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UPCOMING MEETINGS

- | | |
|-------------|---|
| 2005 | Fall: Los Angeles PD |
| 2006 | Spring: Contra Costa Sheriff
Fall: DOJ Riverside |
| | (North-South Host Swap Occurs) |
| 2007 | Spring: Orange Co. Sheriff
Fall: Jan Bashinski Lab |
| 2008 | Spring: San Diego PD
Fall: Sacramento DA |
| 2009 | Spring: San Bernardino
Fall: Santa Clara Co. |

Can't Find It?

To reduce the costs of publication, the *CACNews* may place calls for nominations and other items that were previously found in the newsletter mailing as inserts or ON THE WEB. Visit www.cacnews.org to see what is offered. Content changes periodically, so visit often!

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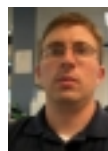
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California Association of Criminalists

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Reflections on Jack Cadman— Pioneer and Visionary

By Theron Johns

My association with Jack Cadman began in the late 1950's. In his capacity as head of the Orange County Crime Lab Jack had an unceasing desire to find, develop and adapt more sensitive and precise chemical and physical methods to improve the capability of the lab. I was an applications chemist at Beckman Instruments, with a special interest in developing methodology for the relatively new instrumental technique of gas chromatography.

Blood alcohol was one of the most time consuming determinations made by the lab. Jack wanted a more accurate and reliable method than the chemical technique in general use. He asked me if gas chromatography could be the answer. I knew that ethyl alcohol could easily be measured by gas chromatography, but the specificity and sample handling technology required for blood alcohol was unknown. This meant that much work on methodology needed to be done before the standards of perfection demanded by Jack were met.

We decided the only way to get a method was to develop it ourselves. Jack's days were already filled with his duties as head of the lab. I was busy working full-time at Beckman, so we decided to do the work at night. That was the beginning of many night hours of work at the lab, on the fourth floor of the old jail in Santa Ana, CA. We quickly found that alcohol could be extracted from blood with an organic solvent and a sample of the extract injected into a gas chromatograph to measure the alcohol. Then I discovered that our work was far from finished. Jack's standards for a method to be used in the lab were virtually 100% perfection.

After our quick feasibility study, we then spent weeks investigating different solvents, various techniques of extraction and a wide range of gas chromatographic operating conditions to make sure that the end result was a precise reproducible measurement of ethanol and only ethanol. Up to this point we used only blood alcohol samples that routinely came into the lab and were analyzed by the conventional method. Most were coroner samples because we wanted enough sample to repeat our test under many different conditions.

Finally, when Jack was satisfied, we set up a live test at Beckman, with four volunteers from the company. All were social drinkers but none was accustomed to drinking large amounts of alcohol. Each volunteer was given two three ounce drinks and urged to consume this within a one-hour period. After that, each volunteer was permitted to drink at will. Blood was drawn at one-half hour intervals and tested with our gas chromatographic method. During the four-hour test period,

only one of the volunteers actually reached a level as high as 0.15, which was the legal limit at that time. All were noticeably impaired. Each volunteer was driven home by a non-drinking member of the test team. The wife of one of the volunteers called the next day and said she heard her husband come home but she went back to sleep and then found him asleep the next morning on the bathroom floor.

During our development of the extraction method, which was ultimately used in the lab, we thought it would be much faster and simpler if we could use the equilibrated headspace of the blood sample for injection into the gas chromatograph. At that time, the thermal conductivity detector used in gas chromatography was not sensitive enough for the limited sample available with that technique. As a check on the gaseous method, we tried a breath sample. One night at the lab we had a volunteer who had been picked up on suspicion of intoxication. He walked up four flights of stairs with no problem, communicated coherently,

and followed all directions of expelling a breath sample into the gas chromatograph. The breath sample showed his alcohol level to be 0.26. This seemed so inconsistent with his behavior that we immediately thought that the breath sample did not work. However, a blood sample was taken and this later confirmed that his alcohol level was indeed 0.26. Later the invention of the flame ionization detector made the headspace method possible and it has become the preferred method because of simplicity and speed of running the test.

Jack was constantly trying to develop methods for the analysis of any material that could be used by law enforcement for the apprehension and conviction of suspects in virtually any type of crime. Another use he had for gas chromatography was the identification of the starter materials commonly used in arson cases. We were able to identify different starter materials using the "fingerprint" patterns obtained with the gas chromatograph. We could even distinguish between different brands of gasoline.

Early in this development, Jack was able to help the police in an investigative way. They had a suspect in an arson case and they had a can that was picked up near the burned building, with a small amount of liquid left in it. Jack was able to identify the liquid as Richfield gasoline. There was a Richfield station near the burned building. The attendant remembered filling a can

at about the time of the fire—did not "serve yourself" in those days. The attendant provided a general description of the person buying the gasoline. The description fit the suspect. With this information the police questioned their suspect and told him where and when he had purchased the gasoline to start the fire. The suspect was convinced the police knew all the details and confessed.

Jack was a pioneer and a visionary in his tireless efforts and contributions to the Orange County Crime Lab and the California Association of Criminalists. Anyone who knew him and had the opportunity to work with him was very fortunate.



Jack Cadman 1918-2003

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