The CACNews

News of the California Association of Criminalists • Fourth Quarter 2007

The President's Desk

Bills, Bills and More Bills

"I have come to the conclusion that politics are too serious a matter to be left to the politicians."
—Charles de Gaulle (1890-1970)

AB1079, AB1215, AB684 Bills, bills and more bills. I am used to the kind you pay with the electric company or that pesky credit card bill. Growing up, politician was not one of the jobs I ever considered. Not realizing as a kid that politics are everywhere from the little league teams to the dance studios and now even at the workplace. Whether it is the section that gets a new person or the size of an office, politics are with us everywhere. I wanted to take this opportunity to let you know about a few of the political items that are going on at the state and federal levels that affect us as Criminalists. I personally keep my head in the sand when it comes to politics, but there are some things that make me lift my head up and take notice.

For those that were not present at the May meeting in Orange County, the report from The California Commission on the Fair Administration of Justice (CCFAJ) was posted. What you ask is this CCFAJ? The Commission's purpose is to examine the causes of wrongful convictions, and to make recommendations and proposals to further ensure that the administration of criminal justice in California is just, fair, and accurate. The CCFAJ is looking at several different areas, use of jailhouse informants, false confessions, eyewitness identification, problems with scientific evidence and a few others. The CCFAJ held a public hearing regarding forensic science where they heard from twelve experts. The experts were sent questions to be addressed at this hearing. The topics covered were: (1) Accreditation of Laboratories and Certification of Forensic Experts; (2) The Need for Independent Investigation of Laboratory Errors; (3) The Need for Forensic Science Standards in California; and (4) The Need for Forensic Science Training for Prosecutors, Defense Lawyers and Judges. John Simms, our president at the time, responded to these questions and the response was printed in the Second Quarter issue of the *CAC-News* as well as submitted to the Commission. I would like to address the third point and I will try to keep it short. Under the discussion area the Commission points out that the State of Virginia appointed a Forensic Science Board that is "charged with the power and duty to ensure the development of long-range programs and plans for the incorporation of new technologies as they become available." There is also a Scientific Advisory Committee that is in charge of reviewing laboratory operations, timeliness of service to user agencies, and reviewing and making recommendations concerning new scientific programs, protocols and methods of testing. If you thought the Department of Health Services (DOHS) for alcohol was bad, this could be worse. The State of Virginia is what they are holding up as the example. Their recommendation is to "consider the creation or designation of a governmental agency or commission with the power and duty to formulate and apply standards to define who is qualified to perform analysis of evidence in any particular scientific discipline on a statewide basis…" The new agency would also be in charge of "rigorous written exams, proficiency testing, continuing education, recertification procedures, an ethical code, and effective disciplinary procedures as well as promulgating standards for scientific testing, report writing, and the parameters of appropriate expert testimony…"

It sounds like they want control over every step we make. They are planning to hear from the Forensic Science community regarding how the Commission's goals can be met and that is why AB1079 was created. There were other very important topics touched on but I think if this portion of the recommendations is taken up we will have a situation similar to the Alcohol Section's situation with the DOHS. If you want to see the full Commission report please see www.ccfaj.gov.

AB1079 was an Assembly bill submitted to the legislature by Assembly member Richardson. AB1079 is attempting to set up a task force that will have the Department of Justice (DOJ) conduct a review of California's crime laboratory system. This task force would be made up of representatives from our association as well as law enforcement agencies that have crime labs, ASCLD, CACLD, IAI, representatives from the Public Defenders Association and private criminal defense attorney organizations, CHP, Judicial Council, Office of the Speaker of the Assembly and Office of the President pro Tempore of the Senate. These representatives will be looking at

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My thoughts have always been leave the politics to the politicians and let me get my work done.

Julie Leon
CAC President

The CACNews
www.cacnews.org

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

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

On the cover...
Several postmortem specimens await toxicological testing at a coroner's laboratory. See a related story by Bob Blackledge in this issue.

INSIDE

CAC*Bits*

CAC member Bill Lewellen explains toolmarks on a recently aired episode of LA Forensics, "Chain of Custody," on Court TV. The episode aired on June 12.

CAC

Fall Seminar 2007—Jan Bashinski Lab, DOJ/BFS/DNA, October 15th - 19th, 2007, DoubleTree Hotel, Berkeley. Contact: Michelle Halsing: Michelle.Halsing@doj.ca.gov or Eric Halsing: Eric.Halsing@doj.ca.gov

SOFT

Fall Meeting: Oct 3-7, Austin, TX, http://www.soft-tox.org/?pn=meeting_information

Promega

Meeting: Oct. 9-12 Nashville, TN, www.promega.com/applications/hmnid/worformeetings/

ASCLD

The American Society of Crime Laboratory Directors
35th Annual Workshop and Symposium
Forensic Science: Ensuring a Future of Excellence
October 1-4, Wyndham Orlando Resort, Orlando, Florida.
www.ilj.org/ascld/

Looking For a Criminalist Job?

Please visit www.cacnews.org for more information including links to these agencies. Often, you can apply online.

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Forensic Analytical *Supervising Criminalist, Firearms*

Ventura *Forensic Tech*

Santa Clara *Supervising Criminalist Criminalist I/II/III*

Orange County *FS I/II FS III*

Promega *Forensic Account, Manager Scientist*

San Diego County *Criminalist I*

LAPD *Firearms*

Long Beach PD *Criminalist*

Washoe County, NV *Criminalist Trainee*

Crime Scene Technologies *DNA Lab Manager*

City of Fresno *Criminalist*

Phoenix *DNA*

Wisconsin DNA *Analyst, Sr. Analyst*

Wyoming: DNA *Forensic Analyst, Forensic Chemist Director*

Human Identification Technologies, Inc. *DNA*

Oregon *FS Entry FS1*

California Department of Justice

Forensic Shooting Scene Reconstruction Course . . .

at the world famous GUNSITE Training facility north of Prescott, Arizona. October 29th to November 2nd 2007. (Registration is not through GUNSITE.) $1550.00 tuition. Contact Michael Haag at: Michael.Haag@comcast.net or shootingscene@gmail.com or (505) 401-6225.

Class size is limited to 24 students; group hotel rates are available at the historic Hassayampa Inn in Prescott, Arizona.

For course content, registration forms, additional information, and course reviews, visit: www.forensicfirearms.com

A Forensic Journey

Brian Wraxall

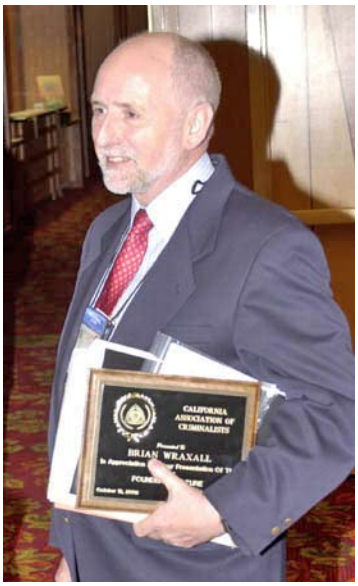
Good morning. First let me say how honored I am to be asked to give this Founders Lecture. I am not a founder of the CAC because as a colleague noted "you are not old enough to be a founder" I believe that was a compliment. I think! However as I'd been in this profession for more than 40 years I thought it would be interesting to present an historical timeline of the development and introduction of forensic serology and DNA testing. So let us begin.

My journey began in ***1963*** when I went to work for the Metropolitan Police Forensic Science Laboratory. The lab was located at New Scotland Yard in a Norman Shaw building on the Embankment in London. The original Scotland Yard was located at # 4 Whitehall Place and got its name from the Scotland Yard Mews which was used as a back entrance. The lab itself was situated on the top two floors of an annex that overlooked the River Thames. The laboratory consisted of four main divisions: Chemistry which did blood-alcohol, drugs and toxicology, paint and trace. Biology analyzed body fluids, hairs, fibers, plant material and cannabis. (As part of the testing for cannabis involved a microscopic examination of the structure of the plant it was analyzed in Biology!). The other two smaller sections where Documents and Firearms. I interviewed for and was assigned to the Chemistry division where I lasted all about five minutes! I was being given a tour of the laboratory when I was introduced to a man named Bryan Culliford. While chatting with him he asked me what my interests were and I told him that I was far more interested in biology. He rushed off to see the director and came back and said to me "congratulations you are now a biologist." Bryan was to have a profound effect on my career.

1964: this was the year that electrophoresis was introduced into forensic science. Bryan had figured out that we could increase the sensitivity of the species identification process by forcing the antigen and anybody together using electrophoresis. At that time the species identification used small tubes to layer the stain extract on top of the anti-serum. The main problem with the procedure is that both liquids had to be very clear or it would be difficult to see the precipitin line at the interface. The problem we had with using electrophoresis is that we had no equipment! Commercial equipment was either too large and/or too expensive. Bryan decided to make his own. For a tank he used two sandwich boxes, cutting slots for the paper bridges and inserting platinum wire for electrodes. For a power supply he constructed his own to generate a fixed 150 V DC. Using this equipment we conducted crossover electrophoresis for species identification using 1% agarose on a 3" x 2" glass microscope slide. Bryan published the method and I have to say that I still use this procedure today, albeit with some minor modifications & a better power supply.

1966: by this time the laboratory was increasing in size and we were due to move into the new New Scotland Yard to be located on Victoria Street. The move had been planned for some time but by 1966 we had already outgrown the space assigned for us. So we moved to a temporary building in Holborn. We had 10 floors of lab space situated above the Alien Registration Building. This temporary home lasted nine years!!!! Our permanent building was planned to be located at Lambeth but in typical government fashion the contract was awarded to the lowest bidder who dug a huge hole at the site and then went bankrupt!

1967: this year saw the first protein typing system to be utilized in bloodstains. The system was Haptoglobin The determination of the three haptoglobin types in whole blood serum was carried out on Starch gel and stained with orthotolidine. The separation and interpretation was easy but when trying to analyze bloodstains the hemoglobin in the stains smeared and covered the band patterns. So Bryan and I used an immuno- electrophoresis system with a specific anti-haptoglobin serum where, to say the least, the interpretation of the separation was not easy. We published the method in 1967.



We then set out to see how each marker separated on the different substrates and how aged bloodstains could be correctly typed in blind trials. The program came to be known as "Starch Wars."

Also that year we had started work on some enzymes systems, notably PGM(Phosphoglucomutase) and AK(Adenylate Kinase).

1968: our enzyme and protein work was generally done at that time on thick starch gels. This consisted of a half a centimeter thick starch gel which, after separation of the enzyme, was sliced in two horizontally. After removing the top slice, no easy feat, the bottom portion of the gel was stained for the enzyme in question. The big disadvantage to this procedure was that a large amount of bloodstain was required for the test. So I started experimenting by reducing the thickness of the gel to approximately 2 to 3 mm in thickness. Again the gel had to be sliced horizontally. If you thought removing a 3 mm slice of starch gel was difficult you should try it with a 1 mm thick piece of gel. I got really tired of this procedure so I simply poured the reaction mix on the top of a simple 1 mm

Serological Research Institute, Richmond, California.
This lecture was presented at the CAC seminar, Fall 2006, Temecula, CA.

thick gel with no slicing. It worked and the savings in the size of bloodstains required was enormous. And so began the use of thin layer gel electrophoresis for the use of enzyme typing in forensic bloodstains.

1970: this year saw my first trip to the United States. Bryan and I had been invited by LEAA (Law Enforcement Assistance Administration) to teach a three-week course in forensic serology at John Jay College in New York. 25 students had been selected from across the country, a few of whom clearly did not want to be there. However the majority treated to course with great enthusiasm including 1 of the 3 from California, Jerry Chisum. Many of the students had little or no experience in forensic serology but we taught enough antigen and electrophoresis techniques that they could take back to their labs.

As I mentioned before Bryan was a great influence on my career and one of the many memorable things he said was "you know we are all different and therefore our blood must be different. We just have to find a way to prove it"

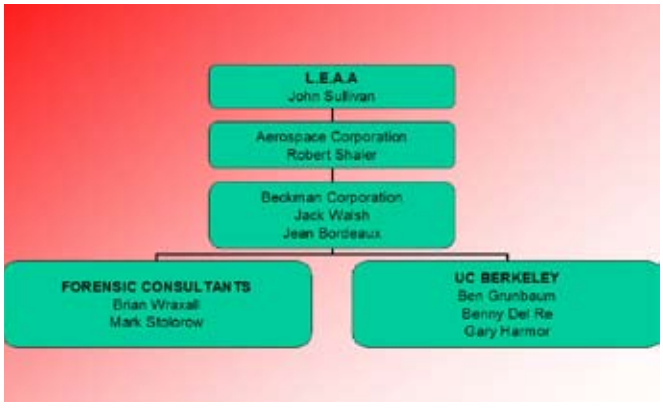
1972: My first paper presentation. It was at the International Forensic Science meeting in Edinburgh Scotland. No pressure! I presented two papers, one on EAP(Erythocyte Acid Phosphatase) and the second on the separation of seminal and vaginal acid phosphatase.

1975: This was my second paper presentation, again at the International Forensic Science meeting, this time in Zürich Switzerland. My paper was on the typing of Group Specific Component (Gc) in bloodstains. At this meeting I met, among others, a man named Benjamin Grunbaum from the University of California at Berkeley who was working on the use of cellulose acetate for typing enzymes and proteins in bloodstains.

1976: by this time we had a number of enzyme and protein systems in our arsenal for the typing of bloodstains and seminal stains. In the summer of this year Bryan received a letter from Benjamin Grunbaum stating that he was obtaining a grant from the US government to work on a project involving bloodstain analysis and stating that he knew me and would I like to come to California to work on the project. I accepted and made plans to travel to California.

1977: I arrived at San Francisco in the evening to be treated to that wonderful lit up city skyline but unfortunately had to start the work right away.

The project had a Statement of Work that required us to use sufficient genetic marker systems to reach a one in 200 discrimination, to work on bloodstains at least a month old and to use no more than three setups. This therefore required a multisystem or a multiplex approach. The organization for the grant was as follows:



LEAA could not administer the grant so the Aerospace Corporation oversaw the project which was controlled by the Beckmann Corporation (they made pH meters and other scientific equipment) who contracted with the University of California Berkeley with Benjamin Grunbaum as the principal investigator. Two of his staff, Benny Del Re and Gary Harmor, were assigned to the project. LEAA wanted someone on the project with forensic experience. Mark Stolorow from the Michigan State Police Crime Lab and I provided that experience. On campus the White Mountain research laboratory was where the project was to be conducted. Attached to the building were two trailers that had been set up as mobile laboratories for the space program. Mark and I used one of these trailers as our working laboratory. There was no plan in place for how the project was to be conducted but Mark and I were instructed to set up procedures for starch gel work while Gary and Benny were working on the cellulose acetate approach. After set up was complete Mark and I developed a strategy where we were going to look at the four main substrates for separating enzymes and proteins i.e. starch, agarose, acrylamide and CAM. We listed all of the enzymes and proteins which we knew were polymorphic and reduced the list to eight systems which gave the best discrimination. We then set out to see how each marker separated on the different substrates and how aged bloodstains could be correctly typed in blind trials. The program came to be known as "Starch Wars."

The original eight markers were grouped together using their original separation pH as a guide. We ended up with three groups, Group I analyzing the enzymes GL01, ESD and PGM; Group II analyzing the enzymes ADA, EAP and AK; Group III the proteins Haptoglobin and Gc.

Five months into the project Mark had to return to Michigan. Seven months into the project Grumbaum and UC Berkeley pulled out of the project. Gary and I moved the project to the Beckman facilities in Anaheim, Southern California. The finished Multisystem was subjected to blind trials which we passed and then a feasibility study was carried out where the system was evaluated by four laboratories plus the FBI after a two-week training session in Anaheim. All the equipment and supplies were provided by the project and the multisystem was successfully integrated into their laboratories.

1978: with the successful completion of the project LEAA wanted us to teach other serologists. But we needed a laboratory to conduct the training. The facilities at Beckmann were too small and Gary and I wanted to move back to Northern California. We had heard that Peter Barnett and Edward Blake, who were partners in Forensic Science Associates, we're looking for lab space as well. We joined up to share space at the Shell Oil building in Emeryville. Serological Research Institute or SERI was born and incorporated in California as a private nonprofit laboratory. We cleaned up the laboratory space, installed equipment and supplies and trained nearly 100 criminalists over the next 12 months in the multisystem procedures.

1979: at the beginning of the year Benjamin Grunbaum filed a complaint with LEAA stating that the research work on the multisystem project had been falsified and that the multisystem analysis did not work. LEAA appointed a three-person panel to investigate the allegations. After a six-month investigation the panel concluded that all of the allegations were unsubstantiated.

1980: we continue teaching after the grant ran out and introduced other courses including Examination of Sexual

Assault Evidence. SERI started excepting casework and developed a new procedure for PGM subtyping that did not involve using iso-electric focusing (IEF).

1981-86: during this time we developed with Ed Blake another group system, GroupIV , which consisted of four genetic markers with variants found mainly in American Blacks (G6PD,CA,PEPA and Hemoglobin). We also looked at Gamma Marker (Gm) and Kappa Marker (Km) and began using the systems on bloodstains using an absorption inhibition technique. During this period George Sensabaugh of UC Berkeley had found a semen specific protein, P30. He had used a radial diffusion procedure to test for the antigen. We converted the testing to a crossover electrophoresis procedure and developed a rocket immuno- electrophoresis test as a semi quantitative method for semen quantitation.

1987: two things happened this year. First a lawsuit was filed against me and SERI accusing me of withholding exculpatory evidence from a defendant in a capital murder trial. I was retained initially by the brother who was a co-defendant in the case. The co-defendant pled out but it was determined by the judge in the civil case that I had a fiduciary responsibility to the defendant who had not retained me! Eventually, six years later, judgment was made in my favor. (There was *no* exculpatory evidence).

The second thing that happened was a Symposium on Forensic Serology sponsored by the Bureau of Forensic Sciences, the CAC and UNISYS. For the symposium five groups of serologists were selected to study five different areas, prepare recommendations and present them to the symposium. The five areas where as follows: #1.Quality Assurance, #2 Standards of Training, #3 Collection and Preservation of Stain Evidence, #4 Method Evaluation, and #5 Interpretation and Reporting of Results. A report was published on the Symposium.

1988: DNA using RFLP was introduced for use on forensic stains. SERI moved to our new laboratory in Richmond Northern California and we started to look into the use of DNA typing in forensics.

1989: this was the year that Certification of forensic analysts began to take hold. The process has been discussed in 1977 when the Criminalists Certification Study Committee was formed. Representatives from all the regional associations were part of the committee and in 1979 a ballot was presented to the forensic community on whether certification was wanted. The initiative failed but the CAC as a body voted for it. The CAC continued with the process, developed exam questions and procedures and offered the first certification examination in October of 1989. A few years later another national ballot was taken and the American Board of Criminalistics (ABC) was formed. This is a voluntary program but in my opinion very worthwhile. Three of us at SERI participated in the pilot program for the specialist exams of biochemistry and molecular biology.

1990: this year saw the start of PCR-based DNA analysis. First came HLA DQ alpha followed by Poly Marker and then by D1S80 on acrylamide gel in 1992.

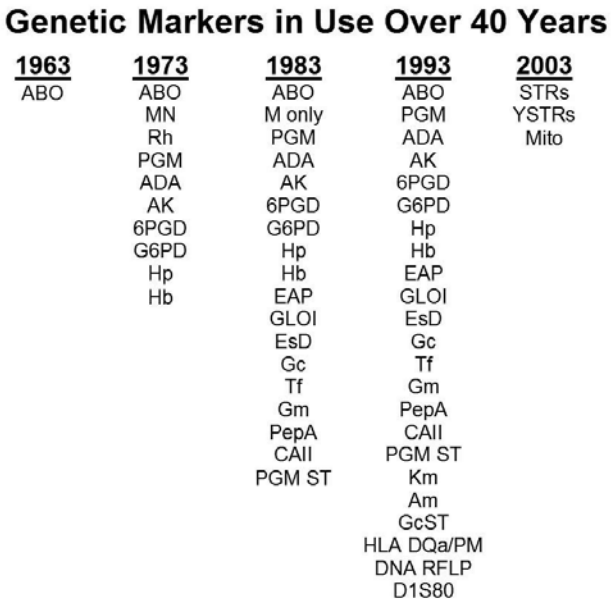
1996: by this time STRs were also being evaluated using acrylamide gels. Interpretation of some of these markers was quite often difficult but when I saw the separation of a one base pair difference on a 310 genetic analyzer I knew that I had to bite the bullet and purchase the equipment. SERI was one of the first forensic laboratories to use this technology on forensic stains and we immediately started validating both the Green and Blue kits (the first STR multiplex kits).

1999: we started looking at mitochondrial DNA testing and introduced the procedure into casework the following year. 1999 was also the year that SERI became accredited under ASCLD/LAB.

The accreditation process was established under ASCLD in 1985. The DNA Advisory Board or DAB was formed in 1996 after a recommendation by the NRC. As I said SERI was accredited in 1999 and generally I thought it was a good experience. I don't think that the process is perfect but I think it's a good beginning and a work in progress. In my opinion there is too much attention paid to minutia e.g. fire extinguishers and too little attention paid to sections like report writing.

2003: so here we are and it is 40 years since I started in this field. The following is a comparison of the introduction and use of genetic markers in forensic serology over that time:

It is interesting to see how we kept adding to our arsenal of markers until he we are in 2006 only using a collection of three systems although the discrimination that we get with them is amazing.



In 2003 also saw the introduction of PSA(Prostatic Seminal Antigen) cards utilizing an immuno assaying technique which increases the sensitivity for finding semen stains to a very high level. A slide that I showed at this presentation shows a positive result for semen diluted one in a million times.

Since 1978 we have been carrying out both training and casework, both for the prosecution and defense. I have traveled to the East Coast to testify in cases, as far north as Barrow Alaska for a trial where they had to arrest the victim and as far south as Costa Rica and Guatemala with a translator to teach laboratory personnel in forensic serology. As part of our casework we also have had to participate in *Frye* or Admissibility hearings. Before 1982 these types of hearings occurred very infrequently but in 1982 Ben Grumbaum started challenging the Multisystem in court starting with *Kansas v Washington* where he filed an amicus brief.

Following is a list of some of the cases concerning admissibility issues that we at SERI have been involved in:

1984 *CA v Kevin Cooper* Enzymes and proteins together with the Multisystem was challenged.
1985 *CA v David Lucas* This was known as the mother of all Frye hearings. It took 14 months to complete (although not continuous) and I spent 25 days on the stand as a witness, just on the admissibility issue of the Multisystem and Gm/Km.
1992 *CA v Morganti* Also Gm/Km, HLA DQ alpha.
1994 *CA v Wright* HLA DQ alpha, Poly Marker and D1S80.
1998 *CA v McClanahan* STRs Green Kit (THOI, TPOX, CS1PO & Amelogenin)
2000 *CA V Maevao* STRs Green Kit & Blue Kit (D3, vWA & FGA)
2001 *CA v Hobbs* Mitochondrial DNA

In all of these cases the courts found that the systems presented were admissible for trial despite Ben Grumbaum's involvement in most of them.

SERI has been involved in a number of high profile cases in many parts of the country. The following are just a few examples of the ones that I've been involved with.

OK v Miller This involves one of the first post conviction cases where HLA DQ Alpha was used as an elimination of the suspect as the semen donor. Another suspect with a similar MO was later convicted of the two murders.

OK v Bryson This case is known as the Bitten Penis Case. Mr. Bryson had been trying to obtain DNA testing since 1986. I eliminated him as the semen donor in 2000 but it was only recently that he was released after spending nearly 20 years in jail.

NY v Hayden This is another case involving post conviction testing this time from the Innocence Project in New York. I located the semen on the evidence from two victims but DNA testing showed that the semen originated from Mr. Hayden thus confirming his conviction.

CA v Pete Rose This is not the baseball player but someone convicted on false testimony. Using YSTRs on previously extracted DNA I was able to eliminate Mr. Rose as the semen donor. He was released.

FL v Diaz Mr. Diaz was convicted of being the Bird Street Rapist having committed seven rapes. A vaginal sample was determined by a previous laboratory to contain deformed sperm and therefore unsuitable for DNA testing! I was able to generate a full DNA profile which eliminated Mr. Diaz as the semen donor. Subsequent work by the crime lab on other evidence from a linked case produced the same profile and Mr. Diaz was released.

NJ v Larry Petersen Semen and hairs found on a murder victim and at the scene were used to originally convict Mr. Petersen of rape and murder. Using STRs on the semen & fingernails and mitochondrial DNA for the hairs I was able to eliminate Mr. Petersen as contributing to the evidence. Mr. Petersen was released after spending nearly 20 years in jail.

The following are three non forensic projects that we have been involved with.

In 1985 we worked on a project with the California Dept. of Fish and Game where we were able to distinguish blood and tissue of Bighorn sheep from Domestic sheep using the enzyme super oxide dismutase.

In 1990 we worked on the controversial program in San Francisco regarding giving syringes to drug addicts. The aim of the project was to determine if self reporting by the addict as to how many people had used syringe was accurate. Using antigen systems and DNA we were able to show that self reporting was unreliable!

In 1999 we were asked to conduct a study for the California Family Health Clinic to see if we could detect leakage from condoms using P30.

2006: So what have I learned in 40+ years doing all this? A lot! I have seen and/or been involved in lots of new types of analyses and techniques. I have been lucky to see other forensic laboratories and to review many other serologists work (not easily available to people working in public labs). I would say that the majority do good work but having said that it is important to note that evidence is still being missed or not examined, misinterpretations of data are being made and report writing leaves a lot to be desired. It is shocking to me that laboratories that used to produce reports with tables of enzyme results today do not include a table of STR results in their reports. I spend a lot of my time interpreting these types of reports for attorneys.

Are we leading the rest of the world in the forensic examination of evidence? We are not! I recently was able to visit the Forensic Science Service in England where I learned that they were processing 40,000 samples per month to be added to their national database. Last year the goal was to process 95% of their evidence samples in less than 10 working days. They achieved their goal! Their latest project is a mobile laboratory that can be driven to scenes to process evidence on site including fingerprints and bloodstains. They believe that they can extract a blood stain from the scene, produce a DNA profile and upload it to their database in eight hours!

I believe we have much to learn!

So how to finish my talk? This is not the end of my journey. My wife believes that I will be found dead at my bench clutching my test tubes in my cold white hands! I have two passions in my life, apart from my family; my profession and growing orchids so in closing I will leave you with a picture of one of my orchids.

This is the end of my presentation but not my journey. Thank you!

The Editor's Desk

Character Endures

Clarifying…

I want to take a second to clarify something from the last editorial. As a Board we would like to see more involvement from members. At the same time, I am honored and content to be serving the Association in the role of Editorial Secretary.

Acronym time…

Forensic science is full of acronyms, so let's enjoy a couple more courtesy of Mike Krukow, Giants' baseball announcer. Don't ask me about the Giants this year because I have BBA – Bad Baseball Amnesia. As a result, the rallying cry for the rest of the season is ABD – Anybody But the Dodgers!

756…

756 was the homerun milestone driving Barry Bonds for the past several years. What is the milestone you are most looking forward to in your own life? Will it be eclipsed by another like the homerun record, or will it live into eternity?

Speaking of 756…

There are reports that as much as $210,000 could be collected in taxes on a ball projected to be worth $600,000 .[1] I must admit, it is a good way for the government to recover some of that money spent on all those grand jury sessions spent trying to indict Bonds on a number of issues over the past years.

Interesting thoughts…

"Most people say it is the intellect which makes a great scientist. They are wrong: it is character."—Albert Einstein

"In looking for people to hire, look for three qualities: integrity, intelligence and energy. And if they don't have the first, the other two will kill you." – Warren Buffet

"Rules cannot substitute for character."—Alan Greenspan

Threats…

I recently had the privilege of speaking to a group of new firearm and tool mark examiners. It was the first afternoon of an arduous 15-week classroom stint and I was charged with the responsibility of teaching a module on ethics. I never realized the difficulty I would have until I was faced with it that very afternoon.

Have you ever tried to role play various scenarios with a group of people who were not sure of each other let alone the instructor? Throw on top of that, scenarios that addressed potential ethical dilemmas that each may encounter one or more days during their career. Then, increase the heat a bit by tinkering with the scenario so that the most obvious answer is not so obvious anymore and it has the makings of a very difficult four hours.

It can be a difficult situation because ethics seem to have much more gray associated with them than one might first imagine. Mind you, I am not saying they should, I am just saying that they do. For example, there are those who argue that Bonds' record is not tainted even if he did use steroids[2] because the greater portion of Major League Baseball probably was using them too. Therefore, in the end, it all evens out. It's all relative. This calls to mind another statement made by Albert Einstein— "Relativity applies to physics, not ethics."

Some people would call this situational ethics—a term that has loosely come to mean ethics depending on the situation. However, if we examine the foundations of the philosophy we will see that the situation is very specific.[3] Situational ethics in its root form says that the only law that is absolute (and could not be laid down in favor of another) is that of agape love. Agape love, in its Greek roots, is a love that is absolute, universal, unchanging and unconditional for all people. Everything else was subject to that. If one could make the claim that violating a particular rule or law in a given situation would be for the greater good, that being agape love, then ethically it could be defended.

Examining situational ethics in its root form, we readily see one issue that will not be compromised—agape love. I posed a significant question to the class before moving into the role play scenarios. What are the things you would never compromise no matter the circumstance? That was a necessary starting point for them and it is a necessary starting point for us. What are yours? Take a few minutes and write them down.

Now that you have identified them, expect them to be tested. After all, we never really know how firm or true to form something is unless we actually test it now do we? Will they, will you, withstand the heat?

Always wanting to be ready, there are several potential threats I wish to highlight so that we can be better prepared when they actually materialize. They include fear, pressure, justifiable compromise (when opposing core values come head-to-head), pride and image.

I spent a good deal of time discussing fear as it relates to ethics in a previous editorial.[4] If the unspoken practice and attitude in the workplace is "one mistake and you're out" an element of

Ron Nichols
CAC Editorial Secretary

[1] Wohlsen, Marcus, AP Writer, "Man Could Face Big Tax Bill Bonds' Home Run Ball," SFGate.com, August 8, 2007.

fear is introduced; primarily the fear of loss of income, position and career. Self-preservation is a very strong motivator and if there is an atmosphere of fear in the workplace it is a significant threat to our ethics.

Pressure can come from many sources, only one of which is the investigator. Others can include supervisors and co-workers with much more experience than we might have, pressuring us to give observations and interpretations more significance than we feel comfortable. Some of this may be a matter of training, especially if it repeated. Other times it is not. The question is, "How far are you willing to go?" When pushed, one of the students in the class simply said, "Well, I guess I would be pushing shopping carts at Walmart." Are we willing to do the same to preserve our own integrity?

As a member of the California Association of Criminalists, we agree to abide by the CAC *Code of Ethics*. This is in addition to any other ethical code we have agreed to practice by, whether it be in the workplace or another organization. It is important to remember that individuals we interact with on a regular basis, attorneys, judges and investigators also have ethical codes that may or may not be similar to ours in all respects. What may be appropriate for one may not be for another. For example, in our country it is perfectly okay for police to lie. We cannot. It is important to be aware of this and be prepared to periodically have a fight on our hands when there is an attempt to encroach upon our territory.

The last two threats are image and pride. Probably more than any of the others, these are the biggest threats to our ethics. The desire to be seen as important and invaluable is a very strong motivator. This is especially the case if we are performance driven as opposed to simply finding value in ourselves as an individual. I suspect that this has driven many a sports figure to cheating when it appeared that others were getting the headlines they desperately craved.

A sense of infallibility begets pride. Sometimes we see ourselves as so experienced and well trained that the answer is simply that—the answer. We can also get tied into the fallacy that sincerity of belief is somehow actually related to the truth. Some things simply are not true, no matter how sincerely one may believe them to be.

Unlike fear, pressure, and opposing core values which can be confronted head-on, image and pride are much more subtle. They can sneak up on an individual without them even realizing it if they are not careful. They can be built over the course of many years, subtly influencing everything we do. If left unchecked, they become more and more prominent, threatening that ethical code on a regular basis.

Since image and pride are not effectively beat by a head-on confrontation we have to look at another tool. That tool is humility. Humility is the antidote that will consistently diffuse the subtle threats of image and pride, keeping them in check. It is important though to understand what humility is. It is not a sense of unworthiness. That is false humility and is as big as threat as image and pride. In fact, I would suggest that you do not have to deny your desire for greatness.

How can we openly desire greatness and still remain humble? First, realize that we have no inherent right to greatness, therefore, release our rights .[5] The second is to understand that true humility is not a denial of greatness but translating that desire for greatness into a passion to serve. Horace Greeley has said that, "Fame is a vapor, popularity an accident, riches take wing, and only character endures." While image and pride are fed by self-service and self-centeredness, character is built by service to others, a true other-centeredness. Have a desire to be great? Then serve others.

In closing, I would like to offer the following thoughts from John Maxwell—"We are all faced with conflicting desires. No one, no matter how spiritual, can avoid the battle. Integrity is the factor that determines which one will prevail. We struggle daily with situations that demand decisions between what we want to do and what we ought to do. Integrity establishes the ground rules for resolving these tensions. It determines who we are and how we will respond before the conflict even appears. Integrity welds what we say, think, and do, into a whole person so that permission is never granted for one of these to be out of sync."

I ask again, "What are your core values you would never compromise no matter the circumstance?"

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

Ron

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what needs to be done and if a commission needs to be set up to regulate the crime labs in the state of California. As of August 15, 2007 the bill was going to the Senate Appropriations for review on August 20th. I will keep an eye on this bill and I hope all of you will as well. Please see this website to look at any bills that are in the legislature. www.leginfo.ca.gov

One last item of politics and I will leave it to the politicians. The Paul Coverdell Forensic Science Improvement grant and the DNA Backlog Reduction grants are currently going through the legislature to be funded. I was informed that they doubled both of the grants and that was really exciting news. But later the bubble was popped and I found out that the Senate has funded both grants and the House has not even mentioned the Coverdell grant. The Coverdell grant has helped many of our Members through training, equipment purchases that assist in the processing of evidence, or through funding for personnel necessary to handle the cases. The Senate has allocated $40 million to fund the grant. I have written letters to several Congress men and women urging them to adopt the language in the Senate. This grant is important to all of us; the monies have helped us all in one way or another. I am asking for help once again. I think I will be the "help" president. If you feel the urge to write a letter to your local representative to the House asking them to adopt the language in the Senate I have another website to help you find your representative. www.house.gov

There are other bills that are out there that may or may not affect forensic scientists and I am keeping an eye on those as well with the help of our new legislative task force. My thoughts have always been leave the politics to the politicians and let me get my work done. I am finding that is not always possible. No more head in the sand. Back to work. As much as I can get done before the next bill comes in.

Julie

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[2] Whether he did or not is not the point. I have no knowledge with regard to the situation at all so will not make nor entertain any claims.

[3] http://en.wikipedia.org/wiki/Situational_ethics, August 15, 2007.

[4] Nichols, Ron. Mistake, Mistakes, *CACNews*, 1st Quarter 2006, p. 6.

[5] *Philippians 2:6*.

The Floyd Landis Sports Doping Case: *As seen through the eyes of a "mythical" ASCLD-Lab Inspector*

*Bob Blackledge**

For those of you who don't follow sports and particularly the sport of bicycle racing, I'll provide a very brief recap. Floyd Landis is a professional bicycle racer from Murrieta, California. Last year (2006) Floyd won the world's most prestigious bicycle race, the Tour de France. However, not many days after the race's conclusion, the Laboratoire National de Dépistage du Dopage (LNDD) "announced" (actually the information was leaked to the press) that a urine sample obtained from Floyd after stage 17 had been found to be positive for a form of synthetic testosterone. If this finding were to be upheld, Landis would be stripped of his title and also banned from participation in the sport.

Landis denied any sports doping and his strategy in fighting these charges has been to try to generate public support and to make all of the documentation of the LNDD tests available to the public. This information was available through the website: www.floydlandis.com At this website one could call up files that showed copies of the actual chain of custody documents, instrumental data, and correspondence. Although no longer available at the above website, one can still obtain the same information if you go to: www.box.net/files and type in "PublicAccess" for both "Login/E-mail" and "Password:"

Through the press and sporadically through the above websites I have followed the ensuing brouhaha. Events seem to be finally approaching a conclusion as on 14 May 2007 the American Arbitration Association - North American Court of Arbitration for Sport convened on the campus of Pepperdine University in Malibu to hear the case of the United States Anti-Doping Agency vs. Floyd Landis. This arbitration hearing ran from May 14-23. The hearing transcript may be found at:

arniebakercycling.com/floyd/other_links/AAA%20Official%20Transcript%20May%2013_23%202007.txt

At the outset, I should say: "I don't have a dog in this fight" (as my wife's red-neck brother might put it). I don't know Floyd Landis and I have no interest in bicycle racing. So why am I interested in this? Two reasons. 1) Although now retired, in the past I have gone through several iterations of ASCLD/LAB (American Society of Crime Laboratory Directors) inspections as the lab where I worked went through the process of applying for ASCLD/LAB accreditation as a forensic laboratory, being inspected, being re-inspected, gaining accreditation, being re-inspected after five years, etc. Fortunately, I retired before having to submit to the "virtual colonoscopy" of trying to meet ISO Certification!

As I read the LNDD chain of custody documents, read sections of the LNDD testing protocol, looked at the actual experimental data, and read the correspondence, I was struck by this thought: In past ASCLD Lab inspections the team leader has pulled out at random a broad spectrum of laboratory case files. Depending upon the types of examinations, inspectors qualified in that area examined everything in the file in detail. They compared what was documented in the file with 1) ASCLD Lab guidelines, and 2) the lab's own SOP. Even if something wasn't required in the ASCLD Lab guidelines, if your lab's SOP said you must do it, you would be gigged if you didn't. "How would LNDD fare if they were undergoing an ASCLD Lab inspection and the Landis case file was one of those pulled out for inspection?"

The second reason for my interest in the Landis case was my knowledge that carbon 13 stable isotope ratio mass spectrometry (IRMS) was considered to be the "gold standard" for determining if sports doping was indicated by examination of a urine sample from an athlete. I knew that IRMS had tremendous potential as a tool in forensic science. Although I've had no opportunity to use the actual instrumentation, I've extensively searched the scientific literature and even recruited a team of experts to contribute a chapter on the forensic application of IRMS for the book I was editing on trace evidence. I naturally wondered how this relatively-new technology would stand up to scientific scrutiny in such a highly-visible case.

The World Anti-Doping Agency (WADA) has guidelines for determining which athletes must provide urine samples, policies to insure against sample tampering, chain of custody protocols, and cutoff levels for various drugs above which they consider doping indicated. Normally, an athlete's urine sample is divided into A and B samples. Initially only the A sample is examined. In the initial drug screen of an A sample by GC/MS, a long list of various drugs are looked for. This data from LNDD is easy to follow since they use same Hewlett Packard/Agilent 6890 GC with Agilent 5972 Mass Selective Detector that I used for about 20 years. Also, the data printouts are in English. [My command of French doesn't extend much past "Voulez-vous coucher avec moi ce soir?"] Since no other drugs were found in Landis's urine, we will only consider the protocols for testing of testosterone.

Testosterone is normally produced in the body (both male and female humans). LNDD and other labs accredited by WADA are looking for indications that the testosterone level in an athlete has been augmented from sources outside the body. Epitestosterone is also normally produced in both male and female humans. However, epitestosterone has no anabolic properties and therefore athletes seemingly would have no motive to take it. In the initial screening of A samples for exogenous (outside the body) testosterone, epitestosterone is used like an internal standard. Quantitatively, the ratio of testosterone/epitestosterone (T/E) is obtained. If the T/E ratio is above a certain value (it used to be 6 but was lowered to 4), the sample is considered to be presumptively positive for exogenous testosterone and the analysis proceeds to the next level.

The A sample is not initially subjected to carbon 13 stable isotope ratio testing. Only if preliminary tests produce testosterone to epitestosterone profiles above cutoff levels do they then proceed with IRMS. WADA guidelines and LNDD's SOP are far too lengthy to be included in this article. I will only make reference to them in those instances where it would appear that certain guidelines or the SOP have not been followed in the Landis case.

The remaining article will (from the viewpoint of a "mythical" ASCLD Lab inspector) look at the following three questions:

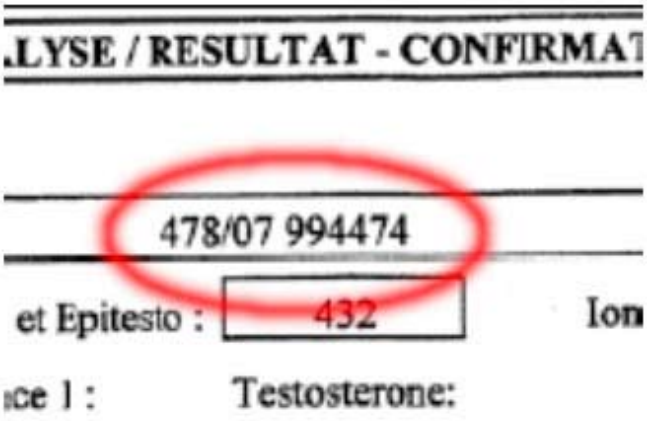
**Criminalist, Retired*

1. Are there chain of custody problems?
2. In every instance did LNDD follow WADA guidelines as well as their own SOP and did they adhere to their cutoff levels?
3. Does the IRMS data from LNDD follow their SOP and does the methodology used and the data produced meet reasonable standards of good scientific practice?

Chain of custody

We all use numbers to assist us in the identification of items, whether it be a FedEx tracking number on a package, a case number and item number on an exhibit, a serial number on a firearm, or a VIN on a vehicle. If the numbers are missing or incorrect on the documents of the case, in an actual criminal trial (rather than an administrative hearing) it is highly likely that the items in question will not be admitted into evidence.

On a page from LNDD represented as reporting the T/E (testosterone/epitestosterone) ratio from Landis's A sample, there is a two-part number near the top of the page. The 1st part is the laboratory identification number and the 2nd part is the athlete's identification number. The two-part number on this page is "478/07 994474." Both parts are in error. The laboratory number is actually "178/07" and Landis's identification number is "995474." Is this really a report of the T/E ratio found by LNDD in Landis's A sample, or was there a mix up and it's from some other athlete?



If you've worked in a crime lab for any period of time then it's inevitable that there have been instances when you've had to make corrections to a chain of custody document or to entries in your notes. Just as with ASCLD Lab, WADA has a policy on this:

"Any forensic corrections… should be done with a single line through and the change should be initialed and dated by the individual making the change."

--WADA Laboratory Internal Chain of Custody

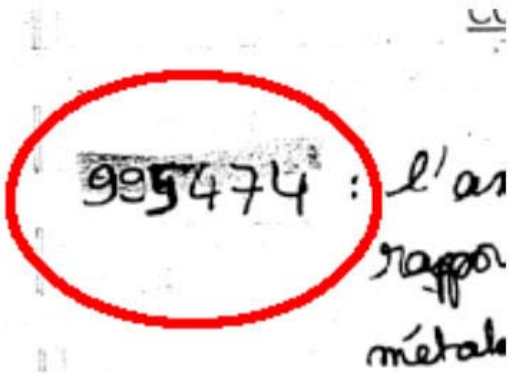
Additionally, WADA Rules state:

"Any forensic corrections that need to be made to the comment should be done with a single line through and the change should be initialed and dated by the individual making the change. No white out or erasure that obliterates the original entry is acceptable." [1]

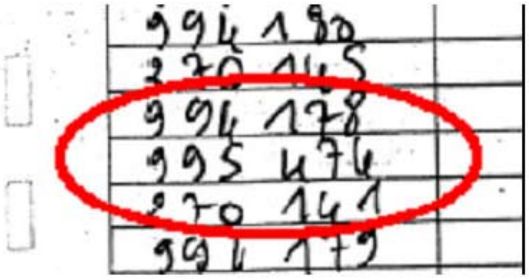
WADA labs are also governed by International Organization for Standardization Rules ISO 17025 [2]: "When mistakes occur in records, each mistake shall be crossed out, not erased, made illegible or deleted, and the correct value entered alongside. All such alterations to records shall be signed or initialed by the person making the correction. In the case of records stored electronically, equivalent measures shall be taken to avoid loss or change of original data."

Ignorance is not an excuse: "All personnel should have thorough knowledge of their responsibilities including the security of the Laboratory, confidentiality of results, Laboratory Internal Chain of Custody protocols, and the standard operating procedures for any method that they perform." [3]

In an LNDD page summarizing the testing results on Landis's stage 17 A sample, it can clearly be seen that the original sample identification number has been whited out and a different number entered (a number that now corresponds with Landis's identification number).

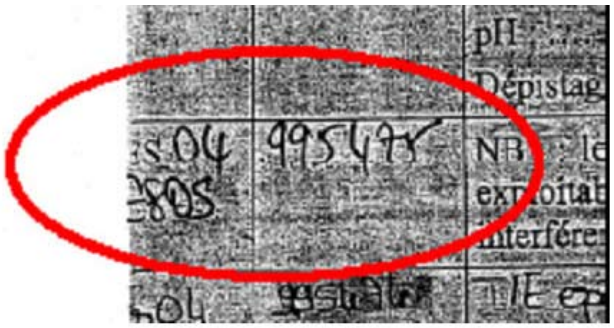


In an LNDD chain of custody document transport of Landis's stage 17 A sample (supposedly) to the laboratory the identification number is written "995476" rather than Landis's "995474." How do we know they even analyzed the correct sample?



In an LNDD summary page of results for tests from samples from three different riders, one is supposedly Landis's and yet the identification number written is 995475 (I'm not sure that the last number is a "5", but it certainly isn't a "4").

[1] WADA Laboratory Internal Chain of Custody. TD2003LCOC. (2003).
[2] International Organization for Standardization. 4.12.2.3. (2005).
[3] WADA International Standard for Laboratories. 29, (2004).



For a far more in-depth discussion of chain of custody issues in the Landis case go to:

http://blog.environmentalchemistry.com/

See bottom of page 1 to top of page 22. Even if you read nothing else, go to the end of the article and read the SUMMARY. Just one person's biased opinion? The same article with comments from readers can be found at:

http://blog.environmentalchemistry.com/2007/06/floyd-landis-wada-lndd-chain-of-custody_26.html

WADA Guidelines and LNDD SOP

WADA recognizes that samples may be contaminated and that analysis results from contaminated samples may not be reliable. WADA Technical Document TD2004EAAS specifies: "The concentration of free testosterone and/or epitestosterone in the specimen is not to exceed 5% of the respective glucuroconjugates."

Below are LNDD results taken from USADA page 283.

Name	Target Response	Amount	Units
Methyltestosterone	3924981	100.00	ng/mL
Epitestosterone	11645	0.44	ng/mL
Testosterone	41499	1.22	ng/mL

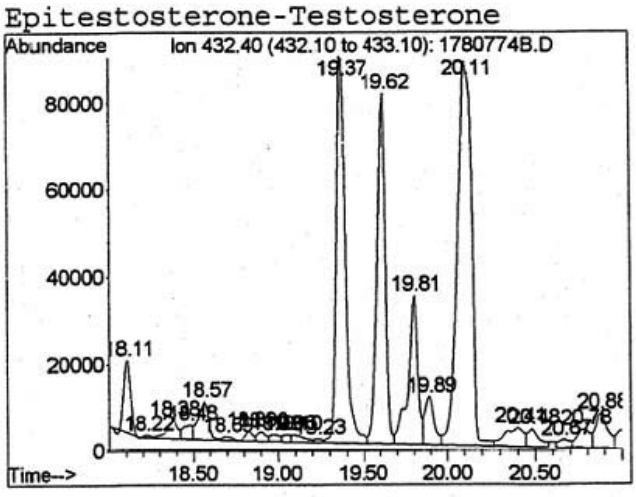
Then from USADA page 288, the average value for the conjugates is 5.7 ng/mL. By LNDD's own calculations the ratio of free epitestosterone to glucuroconjugates is:

0.44/5.7 x 100 = 7.7%

This well exceeds 5% and clearly the sample is either contaminated or degraded and by WADA's own guidelines any test results for this sample are unreliable and the entire process should have stopped at this point. However, apparently LNDD considered the test to determine the T/E ratio to be merely a presumptive test. Whether this rider was truly guilty or not guilty of doping with testosterone would be determined from the IRMS test results. Therefore, LNDD ignored the WADA guidelines and proceeded on to IRMS.

Did LNDD follow its own SOP? No! Instruments for measuring isotopic ratios (IRMS) need to be frequently checked for linearity. That is, for a given compound you get essentially the same isotopic ratio whether a comparatively large or small amount of that compound is introduced into the instrument. As a check on linearity, instruments for measuring carbon 13/carbon 12 isotope ratios have a source of CO2 gas of known isotopic ratio. A valve can be opened and this reference gas can be introduced and also the pressure can be changed. Carbon isotope ratios should essentially remain unchanged as the pressure is varied. Dr. Simon Davis, an expert on IRMS retained by the Landis defense team and who testified at the arbitration hearing, actually helped write the operational manual for the GC/C-IRMS instrument used by LNDD. Davis was present at LNDD when the tests were run on Landis's B sample. He was shocked that LNDD's SOP only required that linearity checks on their two IRMS instruments be run once a month. However, a check of the instrument log showed they didn't even do it that frequently. Additionally, Davis found that data files had been deleted. He had noted that in data files provided to the Landis defense team by LNDD there were numerous time gaps of several hours. Turns out that when the LNDD technicians didn't like the results for a given injection, they just did a repeat using the same file name and the old file was overwritten!

GI/GO. To determine the T/E ratio in a sample, LNDD uses selected ion monitoring (SIM) from the GC/MSD run and divides the area under the testosterone peak (computer generated) by the area under the epitestosterone peak (also computer generated). We all know that to obtain reliable results by this method we need to have peaks that are well-separated from their nearest neighbors. If peaks overlap the computer program will take this into consideration, but accuracy and precision will suffer. Also, if a peak is too small the measured area under it has high uncertainty (if the relative error in a measurement is +/- 1 and your measured value is "5", there is far more relative uncertainty than if your value was "50"). The E value is expected to be smaller than the T value. Any uncertainty in the E value can greatly skew the T/E ratio. Below is the SIM plot for the testosterone and epitestosterone peaks for one GC/MSD run of Landis's sample (page 0280 vial 5). The peak at 19.37 min. is testosterone and the peak at 18.57 min. is epitestosterone.



In terms of both peak separation and peak size, the epitestosterone peak is unsatisfactory. LNDD needs to review their protocol. A longer capillary column should produce better peak separation, and an added internal standard might provide better precision/reliability.

Additionally, WADA requires that a minimum of three ions be used for SIM and they must all be analyzed

and evaluated, not discarded. In the Landis case LNDD technicians claim they used three ions for SIM, but there is no data supporting their claims. Why is this important? A single SIM peak at the right retention time is untrustworthy as an identification of a specific compound. It's like using a flame ionization detector on your GC rather than an MSD. You know there is a peak there at the right retention time, but you really have no information about its molecular composition. By chance, some other compound could have the same retention time under those conditions. Using a single SIM peak is especially untrustworthy if you are using it as a basis for quantitation (determining the T/E ratio). How do you know that some other compound also having that ion (432) isn't co-eluting with either T or E? With three or more SIM ions you can look at the relative intensities of the peaks compared to your standard of T or E. If there is no co-elution the relative intensities should agree with the standard and this should be true whether you are looking towards the front, middle, or back of the peak. Also, if you display a stacked plot of the three or more SIM ions, they should all line up one above another if there is no co-elution of other compounds. This is especially necessary if one is dealing with a complex matrix such as urine.

Liars, damned liars, and statisticians. I was also somewhat bemused to see experimental results reported anywhere from two significant figures (5.2), all the way up to five (172.23). As a famous/notorious criminalist once said: "Something wrong here."

Before moving on to the IRMS tests, I'll briefly remove my hypothetical ASCLD Lab Inspector's hat and make some personal observations. LNDD has a rate of detecting exogenous testosterone that is over 300% of the other certified WADA labs and over six times that of the UCLA lab. Why is this? Also, it seems logical to me that if an athlete were trying to gain an unfair advantage by taking an artificial form of testosterone, then their total testosterone level should be elevated. If not, how has the athlete gained any advantage? If one had knowledge of WADA guidelines and LNDD testing protocols they might reason that if they took a mixture of testosterone and epitestosterone they could benefit from the exogenous testosterone but it wouldn't be detected because their T/E ratio would remain within normal ratios. However, in that case their total testosterone and epitestosterone should be elevated. LNDD test results show an approximate testosterone level for Landis of 45 ng/mL, while an average testosterone level is roughly 100 ng/mL and a reading of 200 ng/mL is considered elevated.

Also, WADA guidelines and the LNDD SOP both require that the identity of the athlete who provided the urine sample be unknown to the analyst. Although the letter of this requirement was followed, the spirit was not. Landis had a severely arthritic hip and was in fact scheduled for hip replacement surgery after the completion of the Tour de France. Because of this condition Landis was permitted to take cortisone that normally would be proscribed. Because Landis was among the top three through most of the race, he was required to provide a urine sample after stages 9, 11, 12, and 15. The LNDD would have seen his samples many times, and upon every occasion GC/MSD of the samples would have shown the pattern for the cortisone he was taking due to his arthritic hip. But perhaps I'm being paranoid; surely the French wouldn't discriminate against an American!

However, there is one other thing that supports my paranoia. From the Landis website:

New York / Paris., April 29, 2007 – Simon Davis, technical director of Mass Spec Solutions and expert consultant to Floyd Landis, today reported that critical evidence stored as electronic data files (EDF) had been erased from the hard drive and the original data destroyed at the Laboratoire National de Dépistage du Dopage (LNDD). The existing data bears indication of alteration.

The EDFs are electronically preserved records of the Isotope Ratio Mass Spectrometry (IRMS) tests conducted on Landis' Stage 17 samples. Davis was at the LNDD last Thursday along with representatives from the United States Anti-Doping Agency (USADA) to witness the extraction of the data files by an independent expert tasked with retrieving and analyzing the EDFs.

Originally run by the LNDD on outdated OS2 software, the Landis defense team had first requested access to the original EDFs last December in order to process them on more modern and accurate software.

Prior to the arrival of Davis and the independent expert on April 26, the LNDD, under the authority of USADA, extracted the EDFs from the machinery. The LNDD took the following steps in the absence of oversight by the independent expert or Davis:

- **The hard drive from the Isoprime OS2 machine had been "wiped" by the LNDD and all of the original files destroyed, thereby providing no way to verify the authenticity of the EDFs from Landis' Stage 17 analysis.**
- **Relevant files for Landis' Stage 17 sample analysis had been opened and re-saved by the LNDD, corrupting the integrity of the files' time stamp authentication and exposing the files to potential tampering. The data concerning the Stage 17 "A" samples were re-saved on 1/30/2007. Landis' "B" sample data bore a time stamp of 4/26/07, 9:51 a.m. CET, prior to the scheduled arrival of the independent expert and Davis later that day.**
- **The altered EDFs from the Isoprime OS2 hard drive had been removed by the LNDD and transferred to a CD-ROM.**
- **Other critical data from Stage 17 were missing from the files copied to disk.**

"Protecting and assuring electronic files are required by every certifying laboratory authority, as the International Standards of Laboratories clearly define," said Arnie Baker, M.D., scientific advisor to Landis' defense team. "With the erasure of original evidence contained on the hard drive, the lab simply cannot document its findings."

Putting my mythical ASCLD LAB inspector's hat back on, LNDD would certainly have their knuckles rapped for destroying any case data that were stored on an instrument computer's hard drive. However, the hard drives on GC/MSD systems rapidly get full and it's necessary to transfer files to other storage media. Perhaps I'm not sufficiently computer literate to understand the above problem. If there is a problem with transferring files from a hard drive to some type of storage device, then ASCLD LAB or perhaps a new technical working group for forensic computer geeks needs to put out a protocol for how this should be done. [Perhaps under ISO certification this has already been done, and we just need to insure that in transferring data files from the hard drive to storage media we follow ISL (International Standards of Laboratories) guidelines. If this is the case, the word has yet to reach most forensic analysts working at bench level.]

IRMS. Space does not permit a thorough explanation of the science behind stable isotope ratio mass spectrometry. In sports doping investigations the basic assumption is that the range of values for the ratio of carbon 13/carbon 12 originating for testosterone from endogenous (within the body) sources will be different from that of testosterone originating from exogenous sources (outside the body, usually plants). According to WADA protocols, carbon stable isotope ratios are looked at for four testosterone breakdown products. But what constitutes a positive test (proof of sports doping)? LNDD considers the test is positive if any one of the ratios for the four metabolites is abnormal. But WADA certified labs at UCLA and in Australia require that at least two metabolites be abnormal. How can these labs all be certified by WADA and yet not have the same criteria for what constitutes a positive test?

"Where an anabolic androgenic steroid is capable of being produced endogenously, a Sample will be deemed to contain such Prohibited Substance where the concentration of such Prohibited Substance or its metabolites or markers. . . in the Athlete's Sample so deviates from the range of values normally found in humans that it is unlikely to be consistent with normal endogenous production."

—The 2006 World-Anti Doping Code

According to LNDD SOP a value of above -3.0 +/-0.8 is considered to be beyond the range of normal values. Below are the LNDD results for the four testosterone metabolites from the Landis Sample:

	Blu	Echantillon	
	Δ‰	Δ‰ + 0,8‰	Δ ‰
Etio - 11 Kétoétio	-1.08	-1.22	-2.02
Andro - 11 Kétoétio	-0.08	-2.71	-3.51
5β Adiol - 5β Pdiol	-0.67	-1.85	-2.65
5α Adiol - 5β Pdiol	-1.60	-5.59	-6.39

Using the > 3.0 +/-0.8 criterion, only one of the four metabolites is beyond the normal range. Had the lab at UCLA run the IRMS tests and come up with these values a positive finding would not have been reported!

However, even the IRMS test values obtained by LNDD for the four testosterone metabolites are untrustworthy. In the IRMS test procedure, a sample of the athlete's urine (there may have first been some chemical processing) is injected into a capillary column GC. Ideally, the GC separates this complex mixture into individual components that elute from the GC at different retention times (time from injection to elution and detection). Pushed along by a continuous stream of helium gas, in line, the individual components pass through a combustion furnace. Since we are talking about molecules that are made up of hydrogen, carbon, and oxygen, complete combustion produces carbon dioxide and water. The stream of helium continues to push everything along and (ideally) the order and separation achieved as the different types of molecules exit the GC is maintained. Next, this vapor stream passes through either a membrane filter or a cryogenic trap and the water is removed but the carbon dioxide continues on and enters the isotope ratio mass spectrometer (IRMS). There the CO2 is ionized. Once ionized, the singly charged ions come under the influence of the IRMS instrument's magnetic field and the path they follow will be an arc as they speed towards the detectors. Lighter weight ions will follow a more tightly curved arc than heavier ions. In carbon stable isotope ratio mass spectrometry we are only interested in ions that either weigh 44 mass units (one carbon 12 atom and two oxygen 16 atoms) or 45 mass units (one carbon 13 atom and two oxygen sixteen atoms). However, as run by LNDD there are problems. Linearity (the instrument's response as the concentration of individual components changes) has already been mentioned. Of equal concern is peak identification. Since everything entering the mass spectrometer has been converted to carbon dioxide, how does one "identify" (the original molecular composition before combustion) the different peaks? And how do you know that for a given peak you had complete baseline separation (i.e. – the peak only represents the analyte you are interested in) and there is no overlap with anything eluting slightly before or after? LNDD uses an endogenous internal standard and using a GC/MSD having the same type of capillary column and using the same temperature program they inject the same sample into this instrument. In theory, from the fragmentation patterns the MSD can identify the peak that represents the internal standard as well as the peaks representing the four different testosterone metabolites. LNDD know that the absolute retention time values on the GC/MSD and the GC-C-IRMS will not be identical, but they figure that they can nevertheless identify the peaks from the GC-C-IRMS if they use the endogenous internal standard to create relative retention times. The LNDD SOP requires that for peak identification the relative retention times of the peaks in the two instrument systems must agree within certain limits. When Dr. Meier-Augenstein examined the IRMS data from the Landis case he found that the relative retention times fell outside the limits specified in the LNDD SOP!

There is another aspect of IRMS that makes Landis's stage 17 urine sample especially unreliable. Samples of the same general category that have different histories [water obtained from different locations around the globe, plant material from different types of plants (C3 and C4) or obtained from different global locations, and testosterone obtained from humans or obtained from plants] have different stable isotope ratios because of a process called fractionation. In various physical and chemical processes fractionation occurs because the energy required for these processes is slightly different for the molecules having one or more of the heavier stable isotopes. LNDD would seem to be ignorant of the fact that in trying to separate complex mixtures (urine) by processes such as gas chromatography or liquid chromatography that the very same forces that cause the separation of the

various components of the sample after a plug of sample is injected into a GC or LC will also cause some slight stable isotope fractionation. Even if through GC or LC you are able to achieve (for your analytes of interest) perfect baseline separation from other components of the mixture, and even if the background (baseline when no peaks are eluting) is very low, there will be some fractionation (due to the GC or LC process) from the front of your peaks of interest (internal standard and metabolites of testosterone) to their trailing edges. This slight fractionation will be maintained when the components eluting from the GC or LC are then converted into 12CO2/13CO2 and water. The result of this is that even with perfect baseline separation of your peaks of interest the stable isotope ratio values obtained will be in error if integration errors are made in selecting the beginning and ending of the peak. Bottom line, if the chromatography of Landis's stage 17 urine sample was unacceptable for obtaining a reliable T/E ratio via GC/MSD, it would be even more unacceptable for IRMS!

From the standpoint of our hypothetical ASCLD Lab Inspector, the Landis case file would be only one of many examined. Many other factors would go into the overall assessment of the lab (adequacy of physical facility, security/chain of custody procedures, training and experience of examiners, documented and validated protocols for various examinations, participation and performance in proficiency testing, safety, training, validation of instrument performance, monitored performance/evaluation of laboratory employees' court testimony, etc.). However, if the Landis case file were any indication, LNDD would not do well.

Athletes accused of sports doping are not "innocent till proven guilty." The deck is clearly stacked in favor of the governing agencies. WADA and USADA (United States Anti-Doping Agency) are both very proud of the fact that they have a 100% conviction rate in athlete doping cases.

Athletes accused of sports doping are not "innocent till proven guilty." The deck is clearly stacked in favor of the governing agencies. WADA and USADA (United States Anti-Doping Agency) are both very proud of the fact that they have a 100% conviction rate in athlete doping cases.

Employees of WADA-certified labs are prohibited by WADA from testifying on behalf of athletes at these hearings. Thus, the defense in searching for qualified rebuttal expert witnesses is in a position analogous to a one-legged man in a derriere-kicking contest! [I thought the use of the French term was especially apropos!] On cross the defense experts will be asked if they now or ever have worked for a WADA-certified laboratory. Nevertheless, the Landis team came up with a very impressive array of experts. I have already mentioned Dr. Simon Davis, who actually helped write the IRMS instrument manual. And certainly anything but "liars for hire" are Bruce Goldberger, John Amory, and Wolfram Meier-Augenstein.

John A. Amory, PhD, is an Associate Professor at the Univ. of Washington in Seattle. He is an authority on andrology (male reproduction). One exchange regarding chain of custody for the Landis urine sample is especially interesting.

From the arbitration hearing transcripts starting on page 1375:

A: Well, there are some errors. Some of those were pointed out to me, in terms of the numbering of the document, and one particularly glaring error, there was actually a misnumbering of the sample.
Q: Is that significant to you?
A: Again, I have to judge these things against my medical experience. And in a medical context, if you send a sample to the lab with one number, and a lab slip with another number, they throw it away, because they can't be certain that it belongs to that particular patient, and the ramifications could be harmful, so they force you to retest it.

Bruce A. Goldberger, PhD, is a Professor and Director of Toxicology in the Department of Pathology, Immunology and Laboratory Medicine in the College of Medicine at the University of Florida in Gainesville. Unlike my esteemed CAC colleagues, Barry Fisher, John DeHaan, and Hiram Evans, I'm not far enough up the American Academy of Forensic Sciences food chain to actually know Dr. Goldberger, but he is the current president of AAFS. On direct Goldberger was asked: "In all of your 20+ years in the field, have you ever seen so many errors on a single sample?" His response was: "No." At some websites dealing with the Landis case there has been some criticism of Goldberger because he limited his testimony to GC/MS and said nothing about IRMS. I actually hold him in higher regard because he didn't. As director of a toxicology lab he has everyday experience with GC/MS but not with IRMS. There are far too many "hired guns" out there who think they are qualified to testify on just about anything!

Wolfram Meier-Augenstein, PhD, is one of the world's foremost authorities on IRMS. He is a Senior Lecturer (equivalent to an associate professor in the US) at Queens University in Belfast. The research lab he runs has roughly 14-15 IRMS instruments (quite possibly the most of any lab in the world). An excellent review, "Applied gas chromatography coupled to isotope ratio mass spectrometry", W. Meier-Augenstein, Journal of Chromatography A, 842 (1999) 351-371, can be found at:

http://www.arniebakercycling.com/floyd/other_links/Meier-Augenstein%201999%20J%20Chrom%20A.pdf

Meier-Augenstein's testimony was very technical, but he left no doubt that in his opinion LNDD results for IRMS on the Landis sample were untrustworthy. One of his responses on direct was especially telling:

A. Even cheaters have the right to a fair hearing and to have data used against them that are sound and can be proven. Here we don't even know what these peaks are. I just have to go back to the point I made earlier. I actually don't know what these peaks are. I refer to them under the names as identified by the lab. But, given the discrepancies in the relative retention times, I --

Please turn to page 20

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The Flodbit Problem: What Are We Doing?

The problem that we tackle today is one that has vexed one of us (KI) for quite a while;

What are we doing?

This question arises when considering the obvious and seemingly more relevant, questions that we confront[1] (or at least should confront) when presented with a piece of physical evidence in the context of a case. At a minimum, these questions include:

List A)
1. What is the relevant piece of evidence to analyze?
2. What is the correct analysis for this evidence?
3. How do we know we are right about the answers we provide?

And these questions lead directly to the more specific and relatively mundane ones we ask and answer every day, such as:

List B)
1. What is this (piece of evidence in front of me)?
2. How do we differentiate A from B?
3. How sure are we that this is A and not B?
4. What else could look like A, but be B?

The questions that we ask along the way reveal much about our mindset before, during, and after analysis. And our mindset necessarily and requisitely affects the path of our analysis. It is useful to think about any analytical process as a decision tree. With each branch, we leave behind, indeed eliminate, possibilities; as we proceed through categorization on the path to individualization (in some cases), our personal knowledge about the world, and experience with it, cannot help but color our choices and decisions.

In most analytical or comparative situations, we barely realize the assumptions we make. The evidence is so familiar —various swabs from a rape kit, a baggie of cocaine, a layered paint chip, a tube of blood destined for alcohol analysis—the protocols so ingrained, that the challenge of a true forensic unknown is rarely experienced by most analysts.

We believe that a useful tool to jolt us out of our complacency and refresh our forensic imagination is to perform the intellectual exercise of analyzing an item that is wholly unfamiliar to us. To that end, we proceed with the following scenario:

We respond to a crime scene and find a victim dead of some cause, unimportant to our investigation here. On the back of the victim a pattern is seen, as depicted in Figure 1.

This pattern appears to be important to the assault, and so knowing what made it and how it was made is relevant. The detective suggests that the pattern is made by a flodbit.[2] *With this information in mind, we proceed with our analysis.*

The first question to answer (from List A) asks whether this pattern is a piece of evidence that should be analyzed. This question is always case-dependent; flodbits found in their normal habitat (whatever that may be in a parallel universe) would not typically arise as candidates for comparison. In fact, we know of no case where a flodbit has been used in a crime. It therefore appears, at first blush, that at least one question about the crime could be answered if we can determine whether a flodbit was used.

The second question in List A asks about the correct analysis for this piece of potential evidence. We have chosen an impression of the item for this little exercise, rather than the item itself, because impressions pose a broader range of questions than objects themselves. What ways can we examine this impression to explore the possibility that a flodbit, and perhaps a specific flodbit, is the source? In order to answer this question, we invoke the second set of very specific questions outlined above as List B.

For example, perhaps small traces of the flodbit have been left behind. This suggests an analysis appropriate to detect the chemical constituents of the trace particles as well as of the reference flodbit. If those constituents are unusual, or so rare that we are convinced that they can only derive from one possible source, then we have acquired information supporting our belief that a specific flodbit made the mark. However, the careful criminalist will then proceed to pose various questions relating to possible alternative hypotheses that might otherwise explain the chemical similarity between the trace particles and the flodbit. Relating questions B2 through B4 above specifically to the flodbit:

Do we know the specific chemical composition of all flodbits?

Can we differentiate one flodbit from another flodbit by chemical composition?

Are we convinced that no other object possesses this unique chemical composition?

Does the chemical composition of these trace components of the flodbit change when transferred to skin?

Could any other object decay or be modified to appear similar to the chemical composition of flodbit-like material?

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[1] We have written at length in this column and elsewhere about why we think the criminalist should be intimately involved in helping to both ask and answer these types of global case-related questions.

[2] No such thing as a flodbit exists. You may search high and low in places near and far, familiar and exotic, and you will not find a flodbit. We made it up in order to pursue our questions with as few preconceptions and assumptions as possible.

In short, we want to know the likelihood that we could be fooled into thinking that this material is from a flodbit, when it in reality originates from something else, or that it originates from flodbit A as opposed to all other flodbits.

This initial analysis leaves substantial issues to resolve with regard to justifying our belief that a flodbit, in particular flodbit A, is the source of our mark. Until these issues are resolved, we must continue to question our belief in the flodbit-as-source conclusion. Handing off these projects to the intern-of-the-month, we turn to another potential avenue of inquiry to determine the flodbit-ness of this mark, pattern analysis. In other words, we ultimately compare the visual appearance of the mark to reference marks made by one or more flodbits in an attempt to determine whether some flodbit, or a specific flodbit, could be the source of the mark. This is an exercise in cognition, and specifically pattern recognition.

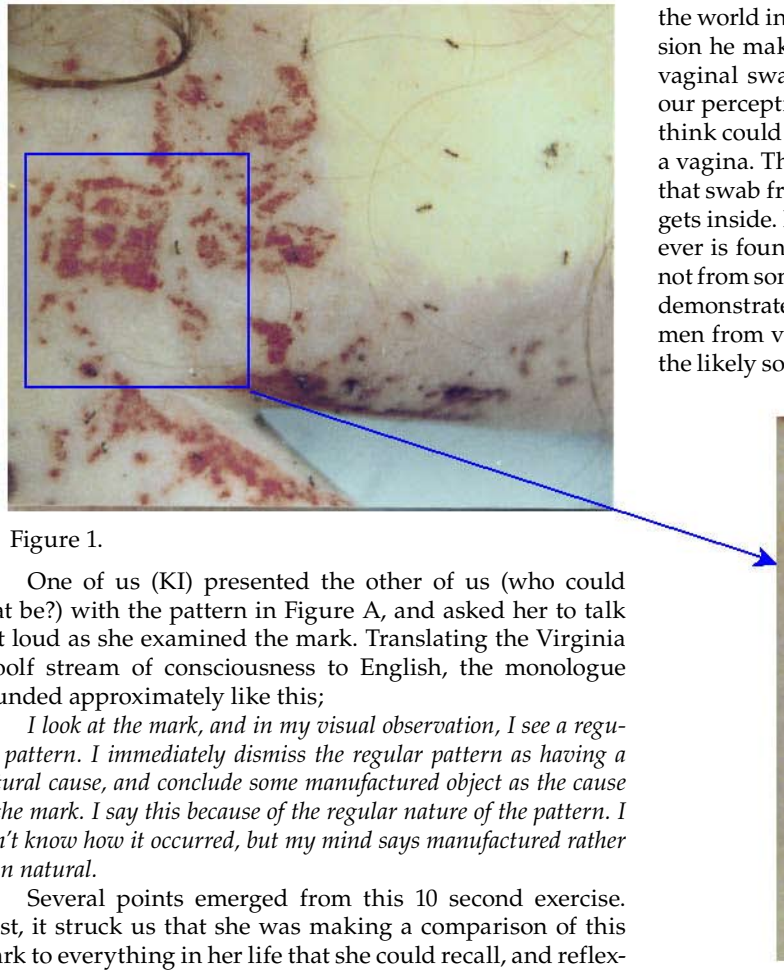


Figure 1.

One of us (KI) presented the other of us (who could that be?) with the pattern in Figure A, and asked her to talk out loud as she examined the mark. Translating the Virginia Woolf stream of consciousness to English, the monologue sounded approximately like this;

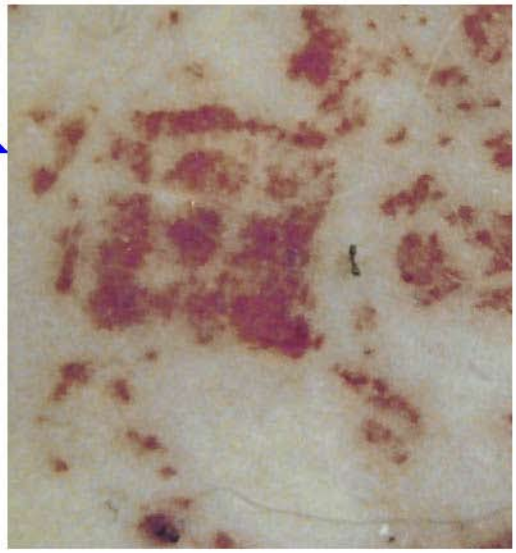
I look at the mark, and in my visual observation, I see a regular pattern. I immediately dismiss the regular pattern as having a natural cause, and conclude some manufactured object as the cause of the mark. I say this because of the regular nature of the pattern. I don't know how it occurred, but my mind says manufactured rather than natural.

Several points emerged from this 10 second exercise. First, it struck us that she was making a comparison of this mark to everything in her life that she could recall, and reflexively eliminated large numbers of things as possible sources of that pattern. As a silly example, she could easily eliminate the bottom of the wine glasses in front of us as a possible source (yes, we had wine for lunch; this is column is more easily written with wine on the table). When we compare the pattern we see to what we think is the pattern of the bottom of a wine glass, we know it can't be this.

Second, what about those objects unknown to us? What if it's from the bottom of a modern wine glass made by an *artiste* glass blower from the Portland Glassworks? Having never seen such an item, we don't know if one could create a pattern like this or not. In other words, we eliminate all of the things that we can remember, but we can't eliminate those things that we can't remember or haven't seen.

This demonstrates the value of an open mind, and of looking with what Suzuki calls beginner's eyes.[3] (Shunyru, 1973) By the time we get into a laboratory, we no longer have beginner's eyes. We have seen something of the world. And, interestingly, what we have seen of the world has little to do with formal education, but more to do with the fact that we have lived X number of years in Y number of places with Z types and numbers of friends and co-workers, and have developed preconceptions and experiences that undeniably color our perception of what we see and how we interpret what we see.

Karl Popper (1963, republished in 2002, pg. 61) insists that all observations (what we see) have expectations associated with them, and those expectations are determined by the needs in front of the observer. A hungry animal divides the world into edible and inedible objects; that's the only division he makes. For many analysts, it's easy to expect that all vaginal swabs have been inside of a vagina, and, therefore, our perception of what should be there is colored by what we think could or should be inside of a vagina, and only inside of a vagina. This typically excludes the idea of contamination of that swab from anything on the outside of the vagina before it gets inside. In other words, we have an expectation that whatever is found on a vaginal swab comes from the vagina, and not from some other source. And yet Enos and Slaughter (1978) demonstrated that this is not true for rectal swabs, where semen from vaginal leakage contaminating the rectal area was the likely source of semen found on some rectal swabs. What's



to exclude the possibility that semen on a vaginal swab was deposited elsewhere before it entered the vagina. Our experience tells us that this is unlikely, but that experience is colored by the facts and statistics of intercourse in general, specifically in the course of a rape, our experience with vaginal swabs, etc. Our initial assumption upon finding semen on a vaginal swab is that it arrived at that location through ejaculation by an inserted penis. We rarely state that which we know for certain (semen is present on this swab), and then entertain a variety of propositions to explain its presence.

Popper (*ibid*, pg. 60) continues by saying that the greatest expectation we have of the world is regularity, even if it

isn't there. Relating this to our purported flodbit mark, the eye is immediately drawn to the area of apparent regularity. Where is the regularity? How large of an area does the regularity cover? When looking at this pattern, the eye keys on the square outline with four dots arranged in a smaller square pattern inside it, enticing you to leap to the conclusion that the object is manufactured; natural things rarely have square corners (NaCl crystals excepted); rather, they tend to be irregular and frequently curved. When we see something with square edges, it appears out of context especially when seen on a body. Interestingly, some curved marks are present amongst those seen in Figure 1, but they don't stand out nearly as much as the square. We must be wary that our eyes don't trick our minds into believing that something is important just because it stands out; perhaps the curved mark is the most important part of the pattern for this case. And not having a flodbit in hand or in mind, we are hard-pressed to clearly delineate from the mark the precise outline or dimensions of the item making it. The forensic scientist must attempt to determine the most important and informative piece of the evidence, without preconceptions or assumptions clouding his view.

As humans, we are constantly trying to order the universe; for the forensic scientist, a key question is, at what point are we imposing an order that is not there?

As humans, we are constantly trying to order the universe; for the forensic scientist, a key question is, at what point are we imposing an order that is not there? Noted photographer Galen Rowell wrote about this phenomenon in terms of mature and immature subjects. When we first see an object, we need the entire item to identify it; but the more familiar we become with the object, the less of it we need to see in order to know what it is. In the beginning of nature photography, any photo of a tiger was published, simply because capturing a tiger on film was novel; Rowell termed this an immature subject. In the current climate of nature photography, a novel image might capture only the eye of a tiger hidden in the grass at sunset. But because we have seen so many photographs of tigers, they are now a mature subject; from only the eye, combined with other environmental cues, our minds fill in the missing pieces and we infer the whole tiger. Beginner's eyes will not automatically infer the tiger; the eye of the expert will. This is a blessing and a curse. In forensic science, when we have seen one thousand vaginal swabs, the thousand and first carries with it all the expectations of our findings from the previous thousand, and we become blind to other possibilities to explain that sample. If we see a tiger when only a tiger's eye is visible, we stop asking, what else can look like a tiger's eye, and not be a tiger? A current example of our natural inclination to infer the whole from a small part is encountered when interpreting low level DNA mixtures; should we happen to interpret the evidence profile concurrently with a reference profile (often the suspect) we see the suspect's profile because we are looking with mature expert eyes. We fill in the blanks based on our experience and expectations.

From our brief flodbit experience, we have discovered that we work much more from a process of exclusion than inclusion, probably because it is more absolute, as well as being easier. When you eliminate large parts of the world, you are saying "It's not that, it's not that, and it's not that either." This also comes directly from Popper (*ibid*, pg. 47-48), who believed that it is always easier to disprove a proposition than to prove one.[4] He insisted that the null hypothesis should always be the one most easily disproved. In forensic science, the most easily disproved hypothesis is, "this IS a flodbit," "this blood IS from X," "this fingerprint IS from Y." These propositions upset many forensic scientists because they sound biased. In fact, they are the best hypotheses because they are the most easily disproved. Additionally, it is difficult for many of us to get our head around the appropriate expression for the culmination of our tests, which is that we (typically) have failed to disprove the null hypothesis, and therefore accept it provisionally as true. And the strength of my provisional belief in the hypothesis is directly related to the strength of my test to exclude or eliminate other objects as the source of the evidence. Using another current example, the power of searching a large database is that you have *empirically excluded* large numbers of individuals. You have used the power of the computer to enhance your memory of those people or things who *could not* be the source of the evidence.

It is certainly tempting, in this day of long turn-around times and ever-expanding demand for science in the courtroom, to proceed quickly and confidently as mature experts in our analysis of physical evidence. But scientific rigor is easily lost when quick and confident wins out over thoughtful and skeptical. Rigor occurs when we pose multiple hypothesis and ask which can be disproved, then re-examine that which remains. Parker Bell, an old friend now deceased, used to ask, what else could cause this? In essence, he was always exploring question B4, what else could look like A, but be B?

We return to the original question stated at the beginning of this column, *what are we doing?* We believe that the heart of the flodbit problem is identifying the nature of our thought process as applied to the analysis of physical evidence, not simply or merely identifying the nature of the evidence. It strikes us that possessing a working paradigm is barely the beginning, but surely an essential component, of an epistemology of forensic science. It is for another time to debate whether we share an intellectual process with other disciplines, or whether we need one uniquely suited to the needs of forensic science But in spite of the fact that procedures and protocols abound, it is not clear that practitioners necessarily practice a rigorous thought process, nor is it clear that a consensus exists among the profession as to what constitutes such a process. It is hard to find a university curriculum that teaches one, and the current direction of accreditation does not foment the active practice of one. Perhaps this is but one of several reasons why forensic faux pas across the country are continually exposed. At the very least, we need to identify those parts of the process prone to experiential judgments,

[3] "In the beginner's mind there are many possibilities, but in the expert's there are few," Zen Buddhist, Shunryu Suzuki, (http://en.wikipedia.org/wiki. Shunryu_Suzuki. Shunryu, 1973)

[4] "When you have eliminated the impossible, whatever remains, no matter how improbable, must be the truth." Sir Arthur Conan Doyle, The Adventures of the Beryl Coronet.

and institute intellectual and analytical safeguards to minimize errors of expertise.

A rigorous thought process must include, at a minimum, the components that we have listed throughout this column: an intellectual framework for the purpose and flow of the examination, proper and relevant questions, multiple hypotheses, identification of potential bias, assumptions, and preconceptions, an understanding of the limitations of the evidence and the testing, and interpretation whose intent is to rely on analytical data to separate what is known from what is speculation or unsupported opinion.

On that note, we drain our wine glasses, pay the check, and trundle off to see if we have escaped the San Mateo meter maids.

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LOWELL BRADFORD, *cont'd from page 22*

cases over 26 years was his insistence on unconditional duty of care, for "every analysis you perform and case you present for court action will affect human lives in profound ways."

Lowell was involved in many pivotal activities along the way, such as founding the California Association of Criminalists and publishing countless articles on criminalistics subjects, often with James Brackett as a co-author. In private practice he continued to publish, much of which concerned the subject of questioned documents. In consulting status with the U.S. State Department, Lowell set up the crime labs in Saudi Arabia and at Scotland Yard. In 1978, he received the Roger Greene Award from the CAC for his contributions to the field of criminalistics.

Mr. Bradford was the former Chairman of the Criminalistics Section, American Academy of Forensic Sciences; Assistant Professor of Police, San Jose State University; a frequent lecturer and faculty member at the University of California, Berkeley; a faculty member at City College of San Francisco; and served for the first four years of the CAC as its Executive Secretary. He was a charter member of the Society of Forensic Engineers and Scientists. Among his most prominent cases were the John F. Kennedy and Robert Kennedy murders.

Lowell Bradford had a lifelong love of the outdoors. He deeply enjoyed hunting, fishing, and photography. In 1996 as the result of an unfortunate medical accident, Lowell was partially paralyzed, confining him to a wheelchair and bed for the last 10 years of his life. He continued to work in the forensic sciences as much as possible, despite his handicap, but died on April 12, 2007 at the age of 88. Lowell was one of the early pioneers of forensic science in California, and his passing is of great loss to the criminalistics community. He is survived by a son, a daughter, and two step-sons. At his request, there were no funeral services or newspaper obituaries.

Paul M. Dougherty
Edward Peterson

Laboratories accredited by WADA do have to participate in quarterly proficiency tests, but the results are secret. And forget about Daubert; WADA decides if a certain testing methodology is scientifically acceptable and what the cut off values should be. It sure would be nice to know how LNDD has performed on proficiency tests, how many total urine samples they've examined by IRMS, what values were obtained (by LNDD as well as other WADA-certified labs) for each of the four metabolites, and how often in known cases of synthetic testosterone doping not all four metabolite values (or even two) have registered as abnormal.

Want a sample retested by an independent lab? Forget about it. The same lab that ran the tests on the A sample will if necessary run the tests on the B sample. Hmmm, would any lab (not just LNDD) be eager to fess up and admit they screwed up when they analyzed the A sample? For more on this subject see "Presumed Guilty; Athletes' Unbeatable Foe; Anti-doping authorities serve as prosecutor, judge and jury. The innocent often pay a high price", by Michael A. Hiltzik, Staff Writer for the Los Angeles Times. Available at:
www.floydfairnessfund.org/resources/12-10-06_LATimes.pdf.

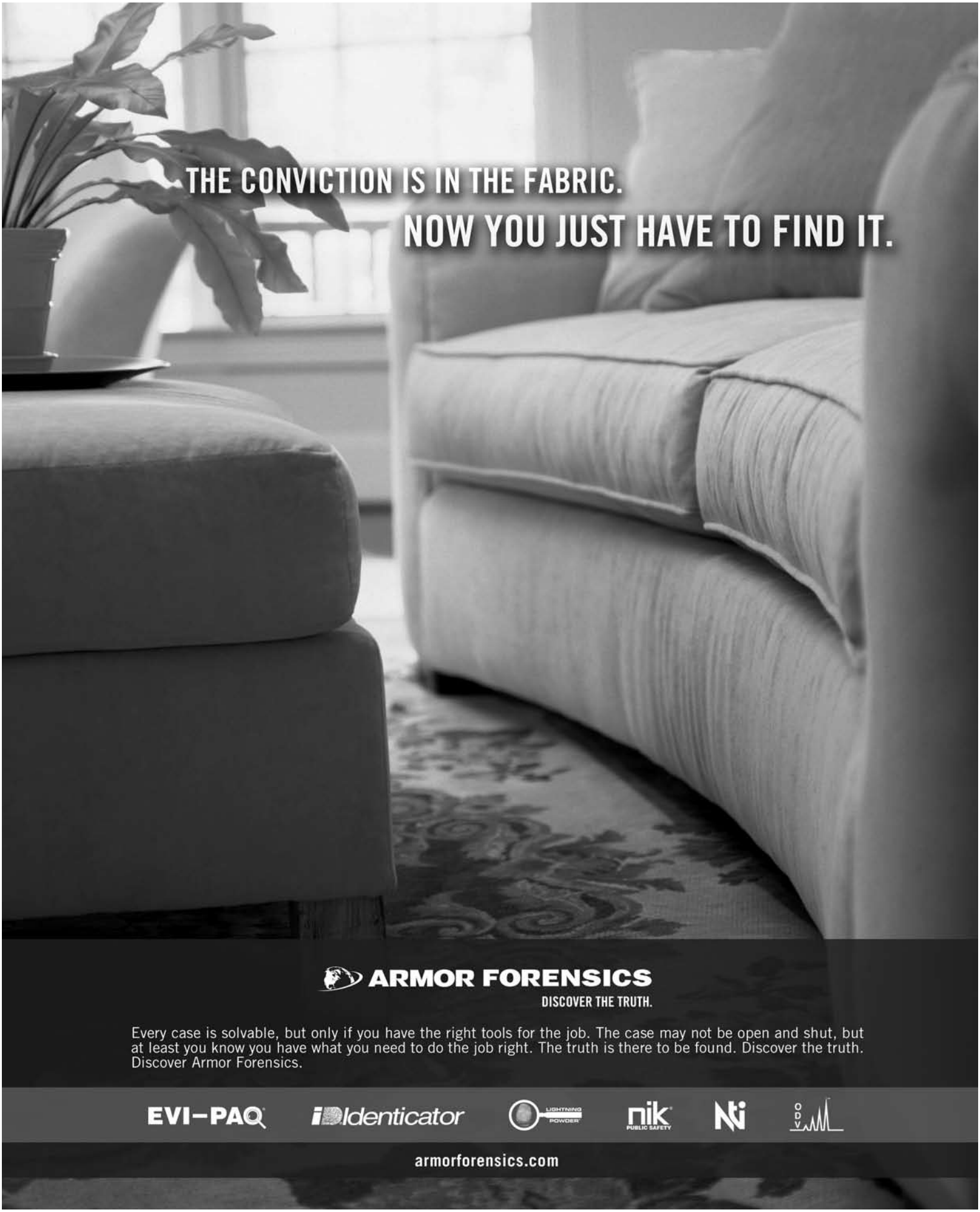
In reviewing LNDD's approach to urine sample drug analysis in the Landis case, I can't help but recall the comments of two of my esteemed fellow CAC members. Ron Nichols published an article in *Science & Justice* and the article's title says it all: "Drug proficiency test false positives: a lack of critical thought."[1] Peter de Forest states: "Real cases demand more than unthinkingly applying 'tests' on 'items' of evidence."[2]

In the Landis case the technicians at LNDD unthinkingly applied the lab's testing protocol to his urine sample. Had they instead used critical thinking, they would have realized that not only was the sample too degraded, the GC baseline far too noisy, and peak size and separation unacceptable to provide a reliable T/E ratio, they would have realized that these same problems could only exacerbate any attempt at IRMS.

Were LNDD's data presented at an actual criminal trial before a jury in the adversarial U.S. court system, I wager the trial would never even reach the stage of closing arguments. At the conclusion of the prosecution's case the judge would opine that the government had not produced a prima facie case and would render a directed verdict of not guilty!

[1]Nichols, Ron, *Science and Justice*, 1997 Vol. 37 (3), 191-196.

[2] Blackledge, Robert D., Editor, Forensic Analysis on the Cutting Edge—New Methods for Trace Evidence Analysis, John Wiley & Sons, Hoboken, New Jersey, 2007, ISBN978-471-71644-0, on page xx of the Forward.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OBITUARY

LOWELL WILLIAM BRADFORD
1918 – 2007

Lowell William Bradford was born in the town of Arbuckle, California on August 30, 1918, his father being the local blacksmith and wheelwright. Although his dad had completed only the 4th grade, he developed his own form of mathematical reasoning for designing wagon wheels and barrels. He passed this math on to his son, which allowed Lowell to excel in mathematics at all levels, especially trigonometry and calculus. Lowell attended Pierce High School in Arbuckle, where he played guard on the football team, varsity basketball and tennis, and also became the valedictorian of his class. An accomplished musician, he played clarinet in the school band. Upon graduation from high school in 1936, Lowell went to the University of California at Berkeley on an academic scholarship. Lowell's decision to attend U.C. Berkeley was somewhat influenced by his cousin Fred Weyand, who was 2 years older, also played football at Pierce High School, and served as the valedictorian of his class. Lowell followed Fred to Berkeley, and they remained life-long friends even though the latter was totally absorbed by a 35-year military career, ultimately becoming a 4-star general and the Army Chief of Staff.

Lowell's Chemistry 1A professor at Berkeley was Dr. Paul Kirk, who turned into a life-long friend and mentor. Dr. Kirk inspired Lowell to enter the field of criminalistics. Lowell lived at the International House and exhibited a strong appreciation for the people and cultures of other countries. He enjoyed interacting with the students there, and many of those friendships endured through the rest of his life.

Lowell played in the Cal Marching Band, the Straw Hat Band, was a "hasher" at the Kappa Alpha Theta sorority house where he met his future wife, and participated in the Army ROTC. Although Lowell gave the salutatorian address to the University's graduating Class of 1940, he purposely neglected to take a chemistry course that was required for graduation so that he could spend one more year with Dr. Kirk in undergraduate status. He officially graduated in 1941 and was commissioned a second lieutenant in the U.S. Army. Lieutenant Bradford was assigned to the Presidio of San Francisco as an Ordnance Officer, where he was put in charge of inspections and correcting defects in the San Francisco Bay Ordnance Group (Coast Artillery). His senior supervisor was Lt. General John L. DeWitt, Commanding General of the Western Defense Command and 4th Army, who drew national attention by signing the Japanese exclusion order. As the war in the Pacific Theater peaked, Lowell saw combat against the Japanese in the Aleutian Islands. By the time he was barely 26 years old, Lowell had risen to the rank of Lieutenant Colonel.

In 1944, General DeWitt entrusted Lowell with countering the Japanese balloon bombs which were landing mostly on the West Coast. Lowell consulted with Dr. Kirk for a scientific evaluation of their design and construction. As a result of this collaboration, effective countermeasures were developed to keep the bombs from harming military or civilian personnel or setting forest fires. After the war, Lowell did not stay in the Army, choosing instead to return to civilian life and immerse himself in his first love, forensic science. This said, he felt a lingering urge to serve his country beyond World War II, which led him to join the U.S. Army Reserve three years later, rising to the rank of colonel in 1961.

In essence, Santa Clara County's original crime laboratory took root in a small room that was little larger than a closet. It had a dirt floor and inauspiciously operated across the narrow hallway from the county morgue. Lowell and Jim laid a sheet of plywood on the floor to avoid having to stand in the dirt while they worked.

In late 1945, Kirk offered Lowell a job in his commercial laboratory. The state crime laboratory (CII) trumped this long-awaited opportunity by offering Lowell a 6-month contract to work in the lab in Sacramento, which desperately needed help. Always a champion of the criminalistics profession, Dr. Kirk encouraged Lowell to help the state lab get on its feet, but they continued to confer with each other on a long-distance basis. Lowell then returned to Dr. Kirk's laboratory where he remained until his recruitment in 1947 by Santa Clara County's District Attorney to establish a laboratory in the basement of the County Hospital to analyze blood and urine from suspected drunk drivers.

It was at this point that Lowell developed the "Bradford Modification of the Kozelka-Hine Method" of determining blood-alcohol levels. He soon was joined by James Brackett, and, for a period of time, they were the only two employees in that office.

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Lowell later designed and oversaw the construction of the world-renowned Santa Clara County Crime Laboratory. He remained its Director until 1973, when he resigned and went into private practice. His legacy from managing innumerable criminalistics

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Fall 2007
Jan Bashinski Lab (Richmond)
DOJ DNA

Spring 2008
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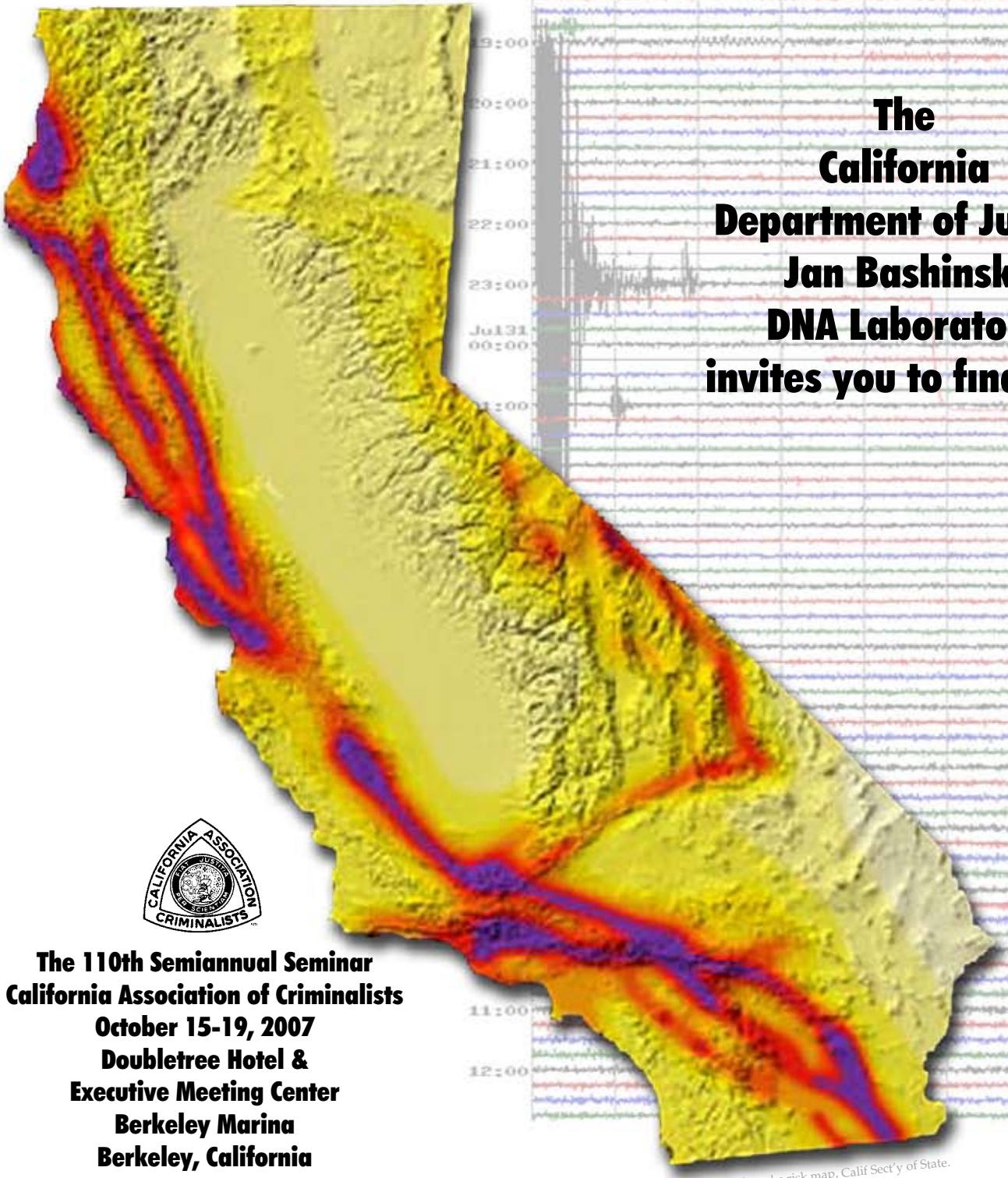
Fall 2008
Sacramento County DA Lab

Spring 2009
San Bernardino

Fall 2009
Santa Clara County

What's Shakin'
in forensic science



The California Department of Justice Jan Bashinski DNA Laboratory invites you to find out!

The 110th Semiannual Seminar
California Association of Criminalists
October 15-19, 2007
Doubletree Hotel &
Executive Meeting Center
Berkeley Marina
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