TECHNOLOGY & FORENSICS ESSAYS BY JULIUS WACHTEL

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A DAY LATE, A WARRANT SHORT

An investigative delay puts warrantless electronic tracking in front of the Supremes

By Julius (Jay) Wachtel. Thanks to a goof by the Feds and a friendly appeals court Antoine Jones is for the time being an extremely lucky alleged drug dealer. Whether his fortune will hold will soon be decided by the Supreme Court.

In 2004 the FBI and Washington D.C. police were investigating Jones, the owner of a D.C. nightclub, for running a cocaine ring. Agents placed a camera outside the club and got a warrant to listen in to his cellular phone calls. They also obtained a warrant to place a GPS unit on the Jeep Grand Cherokee he was driving. Federal law has never required agents to get court approval to plant a tracking device on a vehicle, so the step was apparently taken as a matter of prudence.

Agents had ten days to install the GPS, but they didn't get it done until the eleventh, while the Jeep sat in a parking lot in Maryland, a different judicial district. Within days they replaced the battery, again in Maryland.

In 1997 the Ninth Circuit affirmed the conviction of two suspected marijuana growers, Christopher McIver and Brian Eberle. Their movements had been tracked for about ten days by Forest Service agents who attached a beeper to the undercarriage of McIver's vehicle without securing a warrant. Justices ruled that McIver did not have a legitimate expectation of privacy in his driveway, where the car had been parked, and that placing a device on his vehicle's undercarriage was not a "seizure" deserving of Fourth Amendment protection.

As the century turned law enforcement agencies were transitioning from beepers to the more modern GPS. Signals emitted by beepers must be physically tracked with portable receivers that analyze signal strength and direction. They are far less effective than GPS units, which place targets on a map with up to 50 foot accuracy. On the other hand both kinds of devices perform the same function: to help keep suspects safely under observation while minimizing the risk of detection and using as few resources as possible. Trailing vehicles in an urban setting without getting "burned" (or being involved in an accident) is an art form, and to successfully pull it off over any distance without the benefit of a tracking device can require multiple ground units and, preferably, air support.

At the time of the Antoine Jones investigation the issue of planting tracking devices on vehicles had not been specifically addressed by the Supreme Court. But it got close in 1984 when it ruled in U.S. v. Knotts that agents did not need a warrant to hide a beeper in a container of chloroform that was provided to suspected illicit drug manufacturers during a narcotics sting. Agents used the device to help them follow the suspects' vehicle on public roads and ultimately to a remote cabin. They got a warrant for the cabin, and the fruits of that search were ruled admissible.

In *Knotts* the surveillance only lasted a few days. Antoine Jones was a different matter. Helped along by the GPS unit the Feds trailed him for a month. Using information from fixed and GPS-aided

surveillance and wiretaps they obtained search warrants for several locations, recovering large amounts of cash, drugs and related paraphernalia.

At trial Jones objected to the GPS evidence. Since the delay had rendered the warrant invalid the judge issued a split ruling. Evidence that stemmed from mobile tracking was admissible. But he disallowed GPS information for periods during which the Jeep was in a private garage for which Jones had a reasonable expectation of privacy, as that could only be offset by a valid court order. Jones and his principal codefendant, club manager Lawrence Maynard were eventually convicted of a drug trafficking conspiracy and got life.

Then one of them got lucky. It wasn't Maynard. Being caught in a van full of cocaine-soaked cash is pretty damning, and on August 8, 2010 the D.C. Circuit Court of Appeals affirmed his conviction. But Jones was a different story. His conviction relied on observations made during a GPS-assisted surveillance that went on twenty-four/seven for a month:

> *Knotts* held only that "[a] person traveling in an automobile on public thoroughfares has no reasonable expectation of privacy in his movements from one place to another," id. at 281, not that such a person has no reasonable expectation of privacy in his movements whatsoever, world without end, as the Government would have it.

Paradoxically, the D.C. circuit's argument that *Jones* wasn't controlled by *Knotts* was inspired by a passage in the latter:

> Respondent…expresses the generalized view that the result of the holding sought by the Government would be that "twenty-four hour surveillance of any citizen of this country will be possible, without judicial knowledge or supervision"… But the fact is that the "reality hardly suggests abuse"…if such dragnet-type law enforcement practices as respondent envisions should eventually occur, there will be time enough then to determine whether different constitutional principles may be applicable.

As far as the D.C. Circuit was concerned a "dragnet-like" situation had come to pass and they weren't going to let the government get away with it. Jones' conviction was overturned.

Prosecutors were flummoxed. "Dragnets," they insisted, are when cops don't know who did it so they round up the "usual suspects," not when they have particularized suspicion and focus on just one. But the D.C. circuit insisted that *Jones* is special:

> The whole of one's movements over the course of a month is not constructively exposed to the public because, like a rap sheet, that whole reveals far more than the individual movements it comprises. The difference is not one of degree but of kind, for no single journey reveals the habits and patterns that mark the distinction between a day in the life and a way of life, nor the departure from a routine that, like the dog that did not bark in the Sherlock Holmes story, may reveal even more.

One circuit that reviewed similar circumstances and came to the opposite conclusion is the notoriously liberal Ninth. In U.S. v. Pineda-Moreno (1/11/2010) justices approved the warrantless planting of a

string of devices on a drug suspect's vehicle over a period of *four months*. One of the gadgets was a GPS device that stored location information, enabling officers to sit back and wait, then download the data when their target returned.

That's the approach that cops took in Wisconsin. Eager to nail a meth cooker who bragged that he couldn't be caught, they affixed a memory-type GPS device to his car, then retrieved it days later. Officers learned that the vehicle had been on a certain tract of land. Its owner gave consent to search. Sure enough, cops found an improvised meth lab. All they had to do was hide and wait until the suspect returned. According to the Seventh Circuit (U.S. v. Garcia, 2/2/2007) planting the device while the car was parked in a public place wasn't a significant intrusion, thus not a seizure. And under *Knotts* tracking a vehicle isn't a search. It was all perfectly legal.

It's unlikely that the Supreme Court will let *Jones* stand. Fiddling with established notions about what is public and under what conditions could upset an entire area of law. How to legally plant a device without having a warrant was settled by *Knotts*. And what supposedly wasn't – the appropriate length and intrusiveness of warrantless surveillance – seems far too vague a concept to be a useful guide, at least as articulated in *Jones*.

On the other hand, planting a beeper or GPS is not a trivial act. One can empathize with the D.C. Circuit's grasp for a means to corral what could be a dangerous beast. Only a handful of states, including Florida, Minnesota, Utah and South Carolina require court authorization for tracking devices, but all that must be shown is that the information being sought is relevant to a criminal investigation. Even if the Supremes were inclined to take it a step further and devise a rule, say, that calls for reasonable suspicion, they would probably want evidence that police have been abusing surveillance technology. That presents a conundrum, as most of what we know about tracking devices comes from court challenges, and with rare exception (check out the video for an embarrassing flub-up) law enforcement officers seem to have acted properly.

One thing's for sure. With all the flack that's been stirred police are likely to pay closer attention to the circumstances under which high-tech surveillance takes place. And that's clearly a good thing.

Posted 2/21/16

A DEAD MAN'S TALES

Apple extends posthumous protections to a dead terrorist's cell phone

By Julius (Jay) Wachtel. Here is something that never happened to your blogger during his ATF career:

> Jay and his colleagues pull into Orange U-Store, a garage rental business. They have a Federal search warrant for the unit rented by Billy Badass, who, after a long investigation, was arrested for peddling guns on the street.
>
> Jay approaches the main gate. He flashes his badge. "We've got a warrant for Badass's unit."
>
> Employee leaves, returns with his boss, Mr. Crook.
>
> Mr. Crook examines the warrant, snickers. "Sorry, boys. Can't let you in."
>
> Jay is astounded. He inspects his badge. It's only slightly tarnished. "Whaddaya mean...?"
>
> Mr. Crook sighs. "Look, letting you rummage through his stuff would break the bond between us and our clients, whose privacy we have pledged to protect, now and forever."
>
> Jay reddens. "But...we have a warrant! According to the Fourth Amendment..."
>
> Mr. Crook smiles impishly. "Orange U-Store treasures its standing in the community. We have real good lawyers, too. Are you aware of our market capitalization?"

Fast-forward to last week. That's when Tim Cook, Apple's COO (Chief Operating Officer, or His Majesty, for short) just said "no." Mr. Cook was responding to the FBI's request, backed by a court order, that Apple help unlock the iPhone used by the late Syed Farook. On December 2, 2015 Farook and his wife, Tashfeen Malik, murdered fourteen persons and wounded twenty at a workplace party in San Bernardino, California, then came out second in a vicious firefight with local cops.

Although the legal and technical aspects of the dispute between Apple and the Feds seem complex, the facts are disarmingly simple. After the shootout, the Feds recovered a cell phone used by Farook. Suspecting that other players might be involved, they want to scan the device for leads. Alas, they don't have Farook's password, and he's in no position to help. To be sure, a supercomputer could feed the phone an endless stream of possible passwords. Apple's new software, though, poses significant obstacles, as it creates delays between login attempts and wipes the unit's memory clean after ten unsuccessful tries.

Apple hasn't always been so recalcitrant. But in 2013, after fielding thousands of requests for cell phone data over the years, it introduced encryption, then upped the ante one year later by making it supposedly impossible for anyone other than a phone's owner to log in. Apple and its defenders scoffed at law

enforcement claims that these measures would benefit terrorists, calling the concerns wildly exaggerated. After all, there are plenty other places where cops can get what they need.

With Apple refusing to voluntarily cooperate, FBI agents turned to the "All Writs Act," a Federal statute that can be used to compel private persons to lend a hand. A magistrate promptly ordered Apple to create software that would allow an unlimited number of passwords to be run through Farook's phone without risk of purging its contents.

Despite the horrifying context of the phone's recovery, and the possibility that crucial leads rest in its memory, Apple demurred. According to its lawyers, the All Writs act is inapplicable. If the Government wants a law that forces technology companies to come to heel, let it pass one. What's more, Apple insists that its position isn't just about the law: it's about *principle*. An open letter, signed by Mr. Cook, argues that prying into the dead man's cell phone would "undermine decades of security advancements that protect our customers — including tens of millions of American citizens — from sophisticated hackers and cybercriminals." In an eloquent doomsday scenario, Apple's kingpin warns that helping the Feds would set a "dangerous precedent" with potentially catastrophic consequences:

> The implications of the government's demands are chilling. If the government can use the All Writs Act to make it easier to unlock your iPhone, it would have the power to reach into anyone's device to capture their data. The government could extend this breach of privacy and demand that Apple build surveillance software to intercept your messages, access your health records or financial data, track your location, or even access your phone's microphone or camera without your knowledge.

According to the Government, it's Apple's concerns that are wildly exaggerated. After all, the Fourth Amendment remains very much in effect. Non-consensual searches still require a warrant based on probable cause, while compelling third parties to release information or cooperate calls for at least a subpoena. No one's insisting that Apple redesign the phones or make its protective measures easier to defeat. Sure, a permanent back door would be nice, but the Fed's bottom line is that Apple help unlock this phone, then keep helping on a case-by-case basis, just like in the good old days.

But the iPhone no longer indisputably rules the roost. Android's big splash made privacy a highly competitive commodity. That, according to the Justice Department, is what really explains Apple's intransigence. It really *is* all about money. Meanwhile the rest of the tech industry remains mum but vigilant. On the one hand, no one wants to be branded as an enabler of crooks and terrorists. On the other, there is great uncertainty about the future. What will happen if Apple wins? If it loses?

> Back in the ATF office, Jay and his colleagues finish cataloguing dozens of guns found in Billy Badass's storage unit.
>
> Jay turns to Tom. "Did you see Mr. Crook's eyes bug out when you demonstrated our 'key'?"
>
> Tom fondles the group's treasured sledgehammer. "Well, I wasn't going to *beg* him to unlock the gate."
>
> Chuck walks in. He hands Jay a thick envelope. "We subpoenaed Billy Badass's bank statement."

Jay examines the contents, frowns. “It’s gibberish. Everything’s encrypted. Ever since Apple got away with it, everyone’s been demanding complete privacy about everything. Can you imagine working tax cases? Frauds?”

Tom returns the sledgehammer to the vault. “Good thing they can’t encrypt garages.”

Posted 5/29/11

A NEW CRYSTAL BALL

Reliability concerns plague a widely-used test for psychopathy

By Julius (Jay) Wachtel. Can someone be tested for psychopathy? And if so, are the results useful? These are some of the tantalizing questions addressed by a thought-provoking NPR report that examines the promises and consequences of trying to apply scientific knowledge to identify persons who assumedly pose the gravest threats to society.

As used today, the construct of psychopathy was popularized by Dr. Robert D. Hare, a psychologist who was skeptical of the usefulness of Antisocial Personality Disorder (ASPD). Unlike psychopathy, ASPD is officially recognized as a mental disorder by the American Psychiatric Association. A diagnosis of ASPD, though, isn't based on underlying traits such as impulsivity and lack of empathy but is wholly defined by behavior; for example, having an arrest record or being repeatedly out of work. Dr. Hare worried that ASPD's lack of a theoretical basis could lead psychologically dissimilar persons to be lumped together. There was also no way to distinguish persons with ASPD from psychopaths, a character type that had drawn his interest. So he decided to find one.

Twenty-eight years ago, at a time when violent crime rocked the U.S., Robert Dixon Jr. was very much part of the problem. Raised in Oakland, California, a community that remains one of the most dangerous in America, Dixon had been convicted as a youth for a beating and a rape. Then one day he and a friend robbed a man. Soon the victim lay dead of a bullet wound (it was supposedly fired by Dixon's partner.) Dixon was arrested and got fifteen to life.

He became eligible for parole in 2009. As part of the process a psychologist administered the Psychopathy Checklist-Revised (PCL-R), an exam that's been found useful in predicting violent recidivism. Dixon scored high, which in this test isn't a good thing. According to the psychologist, "Mr. Dixon obtained a total score on the PCL-R which placed him in the high range of the clinical construct of psychopathy." In other words, Dixon was a certified psychopath. It's a label that will likely keep him imprisoned for a good while longer.

Dixon has one man to thank for that exam. Dr. Hare's research took him to penal institutions in his home country of Canada. There he developed a scale to identify inmates who fit the ideal type of a psychopath: "remorseless predators who use charm, intimidation and, if necessary, impulsive and cold-blooded violence to attain their ends." His tests revealed that only 15-20 percent of prisoners scored high enough to make the cut. Those who did also tended to be rearrested more frequently once released. Indeed, a recent, independent meta-analysis of nearly 100 studies confirmed that higher PCL-R scores were associated with future antisocial and violent behavior.

1	Glibness, superficial charm	11	Promiscuous sexual behavior
2	Grandiose sense of self-worth	12	Early behavior problems
3	Need for stimulation	13	Lack of realistic goals
4	Pathological lying	14	Impulsivity
5	Cunning, manipulative	15	Irresponsibility
6	Lack of remorse or guilt	16	Failure to accept responsibility
7	Shallow affect	17	Many short-term relationships
8	Callousness, lack of empathy	18	Juvenile delinquency
9	Parasitic lifestyle	19	Revocation of conditional release
10	Poor behavioral controls	20	Criminal versatility

The PCL-R has twenty items. Administering it is a two-step process that includes a lengthy, approximate 90-minute interview and an extensive review of the subject's prison, police and clinical records. Psychologists use this information to rate items on a 0-1-2 scale, with 0 signifying the absence of a characteristic and 2 its definite presence. A score of 30 points or higher (the maximum is 40) defines a psychopath. According to Hare, the average score for offenders is 22; for non-criminals it's supposedly only 5.

Hare's scale has been subject to extensive validation. Most studies agree that it identifies a select group of hardened offenders. Really, the indicators encompass so many damning traits (cunning, manipulative) and behaviors (juvenile delinquency, criminal versatility) that it could hardly be otherwise.

For sure, something's getting measured. But is it the construct of "psychopathy"? To the extent that PCL-R items reflect behaviors (i.e., 11, 12, 18, 19, 20) rather than traits (i.e., 1, 2, 5, 7) the test seems vulnerable to the same objections that Dr. Hare flung at the ASPD: that it describes rather than explains. Perhaps a psychopath is simply someone so screwed up that they manage to breach the PCL-R's arbitrary threshold.

Factor analysis is a statistical technique that assesses the inter-connectedness of items. When Dr. Hare and his colleagues applied it to actual sets of PCL-R data two underlying dimensions became evident. Factor 1, which Dr. Hare defined as the "selfish, callous, and remorseless use of others," includes items 1, 2, 4, 5, 6, 7, 8, 16. Factor 2, "a chronically unstable, antisocial, and socially deviant lifestyle," includes items 3, 9, 10, 12, 13, 14, 15, 18, 19. (Items 11, 17 and 20 were the only loners.)

Assume that these two latent mega-traits are real. Does that suggest that the larger construct of psychopathy also exists? Dr. Hare says "yes." Others aren't so sure. In "Psychopathic, not Psychopath" Edens and his co-authors argue that the case for a "taxonic" (meaning categorical, yes/no definition of psychopathy) is yet to be made:

> To the extent that our results undermine the implicit or explicit legal presumption that psychopaths are a discrete category of criminals, they suggest that it is largely arbitrary to draw

> precise categorical boundaries between psychopathic and nonpsychopathic offenders. Although decision makers can and do use PCL–R scores to inform legal decisions that are by definition categorical (e.g., presence or absence of a behavioral abnormality, indeterminate commitment), there is no clear scientific evidence for a natural breaking point at which such categories should be defined regarding psychopathy.

Even if psychopathy is a fiction, the PCL-R could be a cost-effective way to decide whether inmates such as Robert Dixon Jr. should be released, and when. Since high scorers are notoriously unresponsive to treatment, the test might also help judges mete out more appropriate punishments. Surprisingly, though, it's when PCL-R is applied this way that its creator seems the most reticent. Although Dr. Hare earns royalties from the sale of the test, its use outside the laboratory leaves him conflicted. "I feel ambivalent about it," he admits.

Dr. Hare is right to be concerned. Studies by Murrie, Bocaccini et al of sex offenders being evaluated for civil commitment suggest that when the PCL-R is administered and scored for penal purposes things can easily go wrong. In one example mean PCL-R scores assigned by two "prolific" contract psychologists differed by nearly ten points. In another PCL-R scores assigned by prosecution and defense psychologists were consistently biased in their client's direction. Of course, Pearson isn't about to pull a popular and profitable test from the market just because a few researchers are whining. And there's no indication that Dr. Hare, who conducts training seminars on the PCL-R, has asked them to.

Dixon's family hired their own psychologist. As one might expect, he contradicted the state psychologist: "I concluded that [Dixon] has developed, among other things, a sense of caring, an ability to be compassionate with other people, that he's matured in that way." But as long as that high score on the PCL-R stands, the expert's opinion counts for little. In March the California parole board formally rejected a request that the PCL-R and other psychometric tools not be used because they are unreliable. PCL-R may be the psychological equivalent of a crystal ball, but it affords a patina of objectivity that is highly prized by those who make sentencing and release decisions. If its use might occasionally exaggerate the threat posed by criminals and lead to their prolonged and unnecessary incarceration, it's a cost that society seems more than willing to bear.

Posted 5/11/08

BEAT THE ODDS, GO TO JAIL

DNA random match probabilities may be overstated

By Julius (Jay) Wachtel. Looking for a growth industry? Think genetics. With more than one million profiles, California's DNA databank is the third largest in the world, trailing only those of the FBI and Great Britain. At its 1990 debut the GoldenState's database only kept track of sex offenders, but it has since expanded to include everyone convicted of a felony. What's more, starting next year DNA specimens will be collected from every adult *arrested* for a felony, a move that should increase the databank's size by 390,000 profiles *each year*.

When DNA got its start there weren't databanks, so police had to have someone in mind to make crime scene DNA useful. Now it's possible to run unknown DNA through massive databanks like California's hoping for a "cold hit." A recent example is the case of John Puckett, a previously convicted rapist who is appealing his conviction on a thirty-year old rape/murder. An expert testified that there was only one chance in 1.1 million that the match between Puckett's DNA and the crime scene sample could have happened at random. With a probability of error that low, prosecutors suggested there was only one explanation: both samples came from the same source. Not unexpectedly, jurors agreed, sending the 70-year old to prison.

Since the human genome is exceedingly large, DNA is only typed at thirteen known places ("loci") in the strand. Each location has two chemical sequences ("alleles"), one inherited from each parent. Scientists have determined how often specific loci/allele combinations occur in different populations, such as Caucasian males. Single combinations are commonplace and can be present in one out of every three or four persons. Multiple loci/allele combinations occur less frequently. In this example the probability of randomly selecting a DNA profile with four specific loci/allele combinations is 14 in 100,000.

Just like with fingerprints, a single dissimilarity between DNA profiles means that they're not from the same person. If no differences are observed a sufficient number of identical loci/allele combinations must be present to suggest that they have a common origin. How many is enough? There's no set answer. Five and six loci/allele combinations can yield probabilities of a random match in the one-in-a-million range; while seven or more can generate probabilities in the hundreds-of-millions, billions, trillions or even quadrillions. (For an online tool that lets users run a sample profile, click here.)

When a suspect is independently developed a subsequent DNA match obviously carries enormous weight. Still, the DNA match alone is *not* a probability of guilt -- it's an estimate of the likelihood that DNA *drawn at random* will match the profile of crime scene DNA. (Probability of guilt requires that all other pertinent factors be considered. This requires use of Bayes' theorem.) Random match probabilities also assume that we only draw *once* from a population. But that's not what happens in cold hits. No one knows whether the match that cooked Puckett's goose came on the computer's first draw or last (at the time California had 338,000 DNA profiles online.) Had the expert witness followed the recommendation of the National Academy of Sciences he would have multiplied the random match probability of one in 1.1 million by the number of draws (338,000), yielding a true random match probability -- in effect, the chance of mistakenly identifying an innocent person -- of *one in three.*

Interestingly, the expert told a reporter that he didn't mention the adjustment, which he agreed was a superior approach, because the judge wouldn't allow it. After the trial jurors said that the probability of one in 1.1 million was a key factor in deciding to convict. Asked if correcting it might have affected the verdict a juror said, "of course it would have changed things. It would have changed a lot of things."

Bigger DNA databases will yield more matches. While that seems beneficial, more profiles mean more draws, so the probability that matches may be caused by chance will increase. Of course, random match probabilities with denominators that approach or exceed the population of the U.S. or the planet will remain noteworthy. In any event, understating the probability that a match might point to the wrong person is no solution. At least one expert has already warned that an invaluable tool for freeing the innocent -- DNA -- could inadvertently become an instrument of wrongful conviction.

Only days ago Puckett's appeal was argued before the California Supreme Court. Its decision is expected soon. In the meantime keep away from the lottery. The probability of hitting it is so low that if you do, it could be evidence that you fixed it!

Posted 6/10/16

BETTER LATE THAN NEVER (PART I)

A "hair-raising" forensic debacle forces DOJ's hand

By Julius (Jay) Wachtel. Since coming on scene in 2007 we've regularly warned about unproved forensic techniques, whose thoughtless use has led to numerous wrongful convictions and at least one execution. Most recently, in "State of the Art...Not!" we criticized the National Institute of Justice for doing little to counter the toxic effects of junk science.

To be sure, we're not the only (and certainly not the first) to complain. Seven years ago, after a detailed review of the sorry state of forensics, a truly influential body, the National Academy of Sciences, called for the creation of a standalone agency, independent of the Department of Justice, that would promulgate and enforce best practices in forensic science.

That didn't happen. As we reported earlier, NAS issued a follow-up critique in 2010. NIJ responded with a glossy self-congratulatory piece (we're doing great!) one year later. Reform would have probably foundered but for a providential 2012 exposé by the *Washington Post*, which revealed that quasi-scientific conclusions by FBI hair and fiber analysts had brought thousands of criminal prosecutions into question.

It took three years, but in 2015 the FBI came clean with an unusually detailed press release entitled "FBI Testimony on Microscopic Hair Analysis Contained Errors in at Least 90 Percent of Cases in Ongoing Review." For some "hair-raising" facts we return to the pages of the *Washington Post*:

> The Justice Department and FBI have formally acknowledged that nearly every examiner in an elite FBI forensic unit gave flawed testimony in almost all trials in which they offered evidence against criminal defendants over more than a two-decade period before 2000....The cases include those of 32 defendants sentenced to death. Of those, 14 have been executed or died in prison, the groups said under an agreement with the government to release results after the review of the first 200 convictions.

One of these "errors," the wrongful conviction of Kirk Odom, was made possible by testimony from an FBI lab examiner that a single hair found on a rape victim resembled Odom's hair (it turns out, mainly as to color,) and that such coincidences were exceedingly rare. Actually, Odom was in a way "lucky," as there *was* DNA, and it

ultimately fingered someone else. Alas, by the time that was discovered he had already served 21 years.

When a renowned agency says "Houston, we've had a problem" denial is no longer an option. NIJ had to do something, and we'll get to that in a moment. First, though, it's important to emphasize that concerns went far beyond hair analysis by a handful of incompetent Feds (ed. note: your author, a retired Fed, was of the other kind.) Using prior posts and the website of the National Registry of Exonerations let's take a quick, highly abridged trip down the junk science memory lane:

> May 2005: Virginia's crime lab comes under scrutiny after botched DNA tests nearly lead to the execution of a man who served 16 years after being wrongfully convicted of rape and murder.
>
> June 2007: Deemed deficient "across the board," Houston's crime lab is blamed for at least three wrongful convictions, including two caused by faulty serology (the exonerees served 17 and 4 ½ years respectively).
>
> September 2008: An audit of the Detroit crime lab's ballistics work revealed that examiners erroneously declared a match, or overlooked a match, in nineteen out of a sample of 200 cases. Detroit PD shut down the entire crime lab and turned over all forensic analysis to the State. That same year, a Federal report rejected the notion that marks on bullets and cartridge casings can be conclusively linked to a single gun.
>
> November 2008 - January 2009: Six defendants were exonerated by DNA after spending nearly two decades in prison for rape and murder. Their convictions relied in part on reports by serologists that blood found at the scene "could have" come from one of the accused, and that semen came from someone with a blood type "similar" to that of another defendant.
>
> October 2010: A Texas man was exonerated after spending sixteen years on death row. How could this happen? A state's witness testified that a knife similar to one that the defendant once owned fit the victim's wounds "like a glove."
>
> April 2012: California Governor Jerry Brown commuted the sentence of a grandmother who allegedly shook her grandson to death, an act she vociferously denied. Pathologists had testified that the child's brain evidenced "shaken baby syndrome," a diagnosis that has since come under fire. In time, medical experts and an appeals court agreed that grandma was innocent. Unfortunately, by then she had already served ten years.

September 2013: Concluding that "the wrong person was prosecuted," a judge exonerated a man who served 23 years for murder. His conviction was partly due to testimony by a dog handler who insisted that her dog only followed scents in the direction someone traveled. (Dog scent evidence has been heavily criticized. Click here and here.)

June 2014: A defendant who had served three years of a life sentence for murder was acquitted at his second retrial after his lawyers challenged a claim by prosecution experts that handwriting consisting of "55, 65, 9, 10," "4 time stop," and "left right left right" sufficed to positively identify its author.

December 2015: A state fire marshal's testimony that a fire that killed six persons had two points of origin and was set using accelerants helped convict three men. One died in prison. His codefendants served thirty-one years before they were exonerated by testimony that "pour patterns" cited by the prosecution were actually produced by a natural effect called "flashover." (For another case involving "accelerants" and "pour patterns" click here. Unfortunately, that defendant was executed.)

Clearly, errors bedevil most forensic disciplines, not just hair analysis. In 2013 (one year after the *Post* blew the whistle,) to "promote scientific validity, reduce fragmentation, and improve federal coordination of forensic science," DOJ and the Commerce Department's National Institute of Standards and Technology formed the National Commission on Forensic Science.

NCFS's lofty goal is addressed through seven subcommittees: Accreditation and Proficiency Testing, Interim Solutions, Scientific Inquiry and Research, Medicolegal Death Investigation, Reporting and Testimony, Human Factors, and Training on Science and Law. Last year they started producing "views documents" and "recommendations" that provide limited forms of non-binding advice in each topical area. For example, on May 1, 2015 the NCFS interim solutions subcommittee issued "Views Document on Defining Forensic Science and Related Terms as Adopted by the Commission." On March 22, 2016 its scientific inquiry panel cranked out "Recommendation to Fund Post-Doctoral Projects to Facilitate Translation of Research into Forensic Science Practice." On August 11, 2015 members of the medicolegal team released "Views Document on Increasing the Supply of Forensic Pathologists as Adopted by the Commission." And so on.

Good enough. But what did the subcommittees think about hair comparison? Is it a good procedure or bad? We scoured the website but found no guidance on whether hairs can be accurately compared, and if so, what conclusions might be drawn. Ditto for

analyzing marks on bullets and cartridge casings, dog scent evidence, handwriting and arson. NIST may be a useful exercise in building the discipline of forensics, but it seems to have little if any value as a guide for its actual practice.

Mystery solved! It turns out that regulating the trenches of forensics is something that DOJ wishes to reserve for itself. Several days ago the agency released draft rules that specify how ATF, DEA and FBI forensic experts should report their findings, in writing and when testifying in court. These proposals cover toxicology, serology, latent prints, glass, footwear and tire impressions, textiles and fibers, and general chemistry (e.g., drugs and chemicals.) We'll have more to say about this in Part II.

Stay tuned!

Posted 8/3/16

BETTER LATE THAN NEVER (PART II)

DOJ proposes rules for forensic testimony. Do they go far enough?

By Julius (Jay) Wachtel. In Part I we reported that the Department of Justice was making an (alas, badly belated) effort to address the many wrongful convictions and other miscarriages of justice caused, in part, by forensic "experts" who reach conclusions unsupported by science. To help keep things on the straight and narrow DOJ has begun the process of issuing official regulations that will govern forensic testimony by Federal employees. (DOJ's move doesn't apply to state and local forensics experts, but one can imagine they will feel compelled to adjust their practices as well.)

Why rules are needed was discussed earlier. We'll start by commenting on those proposed for three forensic disciplines that came under fire in the National Academy of Science's landmark 2009 report, "Strengthening Forensic Science in the United States: a Path Forward." (Keep in mind that the regulations are in the proposal stage, with some still out for comments, so don't expect anything final until the new Administration.) We begin with the granddaddy of all disciplines, fingerprint identification.

Latent prints. As best is known, fingerprints are unique. Comparing the individual characteristics of "questioned" (i.e., "latent") prints recovered at crime scenes to "known" prints of individuals is a long-established practice that is seldom blamed for convicting the innocent. Still, the quality of latent prints varies greatly. What's more, the process leaves it for examiners to select which "minutiae" (i.e., identifying characteristics) to compare and how many must match to conclude they came from the same source, thus introducing considerable subjectivity. Human nature also gets involved. It's such things that undoubtedly led to the most celebrated FBI forensic goof ever, when its lab mistakenly identified Brandon Mayfield as the source of fingerprints found on evidence left behind by the perpetrators of the horrific 2004 Madrid train bombings.

Proposed fix: Examiners could no longer testify that "two friction ridge prints [an impression taken from a person, another recovered at the scene] originated from the same source to the absolute exclusion of all other sources." Instead, they would have to say that "two friction ridge prints originated from the same source [person] because there is sufficient quality and quantity of corresponding information such that the examiner would not expect to see that same arrangement of features repeated in another source." Reducing conclusions to a probabilistic certainty is also forbidden.

And the difference is...: Specialists might appreciate the distinction between the bad, old language (absolutely exclude all other sources) and the good new language (another source not expected.) But jurors are, after all, laypersons, and unless the different approaches are explicitly contrasted, the new, more modest method seems by itself unlikely to lead to a different decision.

Footwear and tire impressions. In 1985 Derrick Jamison was convicted of robbery-murder and sentenced to death. The evidence against him consisted of a crime scene shoe print from the same brand of footwear that he wore, plus testimony of an alleged accomplice who testified in exchange for a ten-year term. Only thing is, Jameson was six-four in height, while several witnesses, whose testimony was kept from the defense, described the second man as about five-six. Jameson was released from death row and exonerated in 2005.

Unlike fingerprints, which are unique, shoes and tires of the same brand and model share tread patterns - so called "class characteristics" - that create identical impressions when new. To determine whether an impression was made by a particular shoe or tire requires that it have been "individualized" through wear and tear. Just how many imperfections must correspond to call a match, though, is hard to say:

> ...there is no consensus regarding the number of individual characteristics needed to make a positive identification, and the committee is not aware of any data about the variability of class or individual characteristics or about the validity or reliability of the method. Without such population studies, it is impossible to assess the number of characteristics that must match in order to have any particular degree of confidence about the source of the impression.

Proposed fix: As with fingerprints, DOJ's proposal forbids examiners from excluding all other possibilities. Instead, they would evaluate shoe and tire impressions on a seven-point scale:

1. Identification: ...shoe/tire is the source of the impression because there is sufficient quality and quantity of corresponding features such that the examiner would not expect to find that same combination of features repeated in another source...

2. Probably Made: ...shoe/tire probably made the impression and it is unlikely that another shoe/tire is the source of the impression; however, there are limitations which prevent effecting an identification...

3. Could Have Made: ...shoe/tire is a possible source of the impression, but other shoes/tires with the same class characteristics are also included in the population of possible sources...
4. Could Not Be Determined

5. Indications Did Not Make: ...evidence indicates that the shoe/tire is not the source of the impression, but there are limitations which prevent eliminating the shoe/tire...

6. Elimination: ...shoe/tire is not the source of the impression...

7. Unsuitable: ...submitted evidence is unsuitable to conduct footwear/tire examinations...

And the difference is...: Again, jurors aren't specialists, so whether an analyst settles on #1 (identification) or #2 (probable) might make little difference. Actually, simply mentioning there is a scale, which seems inevitable, could lead jurors to exaggerate the probative value of items with extreme or near-extreme scores. As for #3, given that innumerable pairs of shoes and sets of tires have identical tread patterns when new, "could have made" seems a very risky option. Considering the scientific limitations, it would seem far better to restrict testimony about footwear and tire impressions to instances where examiners are positive about either a match (#1) or an elimination (#6).

Hair examination. In the notorious 1978 case "Ford Heights Four" an Illinois state forensic analyst waxed astonishingly about the results of a hair comparison: "I couldn't distinguish if I was looking almost at two hairs," he testified. "They looked just like one." Based in part on his account jurors convicted four defendants of rape/murder. Only problem is, all were innocent. It took eighteen years for DNA to clear them and convict the real evildoers.

Improper hair analysis was cited by the Innocence Project as the second most frequently occurring forensic lapse in 300 DNA exonerations where improper or invalidated forensic techniques had been at least partly to blame. Indeed, the reputation of hair comparison is so grim and its scientific underpinnings so thin that the discipline received an unqualified thumbs-down from NAS: "The committee found no scientific support for the use of hair comparisons for individualization in the absence of nuclear DNA" (at page 161, paragraph 2.)

Proposed fix: NIJ refuses to throw in the towel. To its credit, it openly acknowledges that "the comparison of hair characteristics does not constitute a basis for personal identification." Accordingly, examiners may not "state or imply that a hair came from a particular source to the exclusion of all others." On the other hand, the proposed rule

would allow examiners to testify that "the questioned human hair is microscopically consistent with the known hair sample and accordingly, the source of the known hair sample can be included as a possible source of the questioned hair.

And the difference is...: Irreconcilable. "No scientific support" seems pretty unequivocal. It will apparently remain for the defense to bring up the National Academy's biting views during cross-examination.

Everything else. DOJ also issued proposed rules for forensic anthropology, explosives chemistry, explosives and hazardous devices, forensic geology, forensic handwriting analysis, forensic metallurgy, Y chromosome and mitochondrial DNA typing, forensic paints and polymers, forensic toxicology, forensic examination of serology, forensic glass, forensic textile fiber, and general chemistry (click here and here.)

Unfortunately, some key disciplines – forensic odontology (i.e., bite marks), causes of fire, and toolmarks and firearms – remain unaddressed. As mentioned in "State of the Art...Not!" and the other posts referenced below, their application and misapplication have led to terrible injustices, and in the case of fire science, the execution of Cameron Todd Willingham, an innocent man. For now, NIJ's regulations are also silent about bloodstain pattern analysis, or blood spatter, for short. Popularized in Phil Spector's first murder trial, where its use by the defense helped hang the jury, the method's inherent subjectivity led NAS to depict its uncertainties as "enormous" (report, p. 179).

So where do things stand? DOJ is accepting comments on the proposed rules. (To review those received go to www.regulations.gov, enter "forensic" in the search box, then scroll through the hits.) For example, click here for the only comment we found on hair analysis. Filed by a professor of law and member of the National Commission on Forensic Science, it elaborates on the clash between the discipline's fundamental uncertainty and DOJ's proposed language, and suggests that its use would lead to "over-valuation of testimony."

That's not to say that DOJ has a simple task, nor that it's not trying. But at some point one must really, really stop splitting hairs or, in our favorite turn of phrase, making "distinctions without a difference". Desperate efforts to keep forensic "sciences" like hair analysis alive virtually guarantee that innocent persons will keep getting convicted and imprisoned, and occasionally worse. It really is time to pull the plug on these derelict disciplines and move on.

Tomorrow's my birthday (President Obama's, too!) Please, DOJ, give us a present!

Posted 12/7/07

C.S.I. THEY'RE NOT

Lab goofs and dueling "experts" give forensics a black eye

By Julius (Jay) Wachtel. New York State's Inspector General recently recommended that criminal charges be considered against the retired director of the New York Police Department's crime lab and three former analysts for botching thousands of drug tests in 2002. Investigators claim that analysts took shortcuts when analyzing large seizures, falsely certifying that every container of suspected drugs was tested, and that managers who suspected something was amiss turned a blind eye. The lapse caused NYPD to start re-examining 3,000 individual drug tests last March. However, by that time more than 700 had been destroyed, bringing every conviction based on those tests into question.

Problems at crime labs are nothing new. In June 2007 an investigative panel cast doubt on thousands of convictions in Houston, calling its police lab deficient "across the board," with serious errors in ballistics, drugs, DNA and serology. The damage was not merely hypothetical, with mistakes responsible for *at least three wrongful convictions*: Ronald Taylor, who served 14 years because the lab missed finding the real perpetrator's DNA on a bedsheet, and George Rodriguez and Josiah Sutton, who served 17 and 4 ½ years respectively due to faulty serology. Nearly two-hundred other cases are on review.

In May 2005 Virginia's Governor ordered a review of 150 cases processed through the State's crime lab after two botched DNA tests nearly led to the execution of Earl Washington, Jr., who served 18 years after being wrongfully convicted of rape. Washington was only nine days away from lethal injection when discrepancies in the case prompted the prior Governor to commute his sentence to life imprisonment. A properly conducted DNA test later proved that the perpetrator was an already-convicted serial rapist. Auditors attributed the Virginia lab's sloppy work to pressures to increase productivity. A Federal civil jury awarded Washington $2.25 million in compensation.

Two months after terrorists bombed a Spanish train, leaving 200 dead and 1,400 injured, FBI agents arrested Portland attorney Brandon Mayfield as a material witness. FBI fingerprint examiners said they matched Mayfield's fingerprints to latent prints found by Spanish police on a bag of unexploded detonators. Confident that they had the right man (Mayfield is Muslim and represented a suspected terrorist in a civil action), the Feds refused to believe Spanish experts who insisted that the

prints were not Mayfield's. A chastened FBI eventually apologized when Spanish investigators positively identified the fingerprints as belonging to an Algerian suspect.

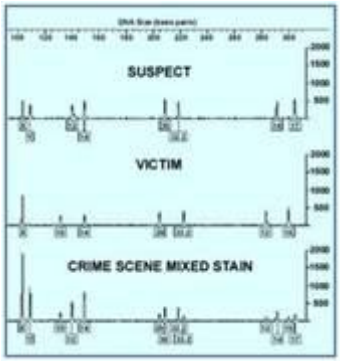
It's not just lab goofs that give forensics a black eye. In the recent Phil Spector trial renowned experts argued about, well, everything -- from the cause of the injury to the victim's tongue, to how far blood spatter can travel, to whether the victim could have coughed after being shot. Spector's trial is remarkably similar to the 2004 murder trial of Idaho resident Craig Perry, who insisted that the uncle he was accused of shooting committed suicide. Thanks to blood spatter expert Stuart James, the same witness who raised enough doubt to hang Spector's jury, Perry won an acquittal. (Demonstrating the whimsical, musical-chairs aspect of forensic "science," another of Spector's experts, Dr. Vincent Di Maio, testified *against* Perry. Back then Di Maio was still Chief Medical Examiner for San Antonio and working for prosecutors.)

A litany of lab disasters, dueling experts, wrongful convictions and bizarre acquittals (O.J. and Robert Blake come to mind) have done little to reassure a skeptical public about the merits of physical evidence. Police, prosecutors, courts *and juries* must be confident in the accuracy of laboratories and the trustworthiness of government witnesses. That's hard to do when labs and experts are captive parts of the law enforcement establishment. Regaining confidence in forensics calls for a national system of independent, government-funded laboratories, much like the National Institutes, that are operated and controlled by top-notch scientists. Anything less is not good enough.

Posted 4/16/10

DNA: PROCEED WITH CAUTION

Subjectivity can affect the interpretation of mixed samples



> *"It's an irony that the technique that's been so useful in convicting the guilty*
> *and freeing the innocent may wind up leading to wrongful convictions in mixture cases, especially those with very low amounts of starting DNA."*

By Julius (Jay) Wachtel. Some might consider these words unduly alarmist. After all, no less an authority than the National Academy of Sciences has declared DNA to be *the* gold standard: "With the exception of nuclear DNA analysis...no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source."

Yet for years there have been troubling signs that interpreting mixed DNA – meaning DNA that's a blend from different contributors – isn't as straightforward as some forensic "experts" claim. Consider the case of John Puckett, who was mentioned in "Beat the Odds, Go to Jail," a post about random match probability, the likelihood that a particular DNA match could have happened by chance alone.

In 2003 a partial DNA profile from an unsolved, decades-old rape/murder was compared against the California DNA database. Although the biological specimen was badly degraded and had fewer than the minimum number of markers the state usually requires to call a "match," what was there was consistent with the DNA profile of Puckett, a convicted sex offender. Although nothing else connected him to the victim or the crime scene, Puckett was tried and convicted. Jurors said they were swayed by a prosecution expert who testified that the probability that the evidence DNA *wasn't* Puckett's was one in a million. It's since been suggested that the

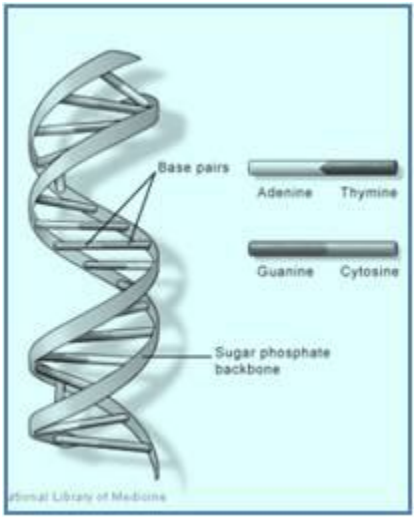
government's logic was faulty and that the true chance of a mismatch was actually *one in three*.

Since then the trustworthiness of the DNA processing has also come under attack. After sitting on a shelf for twenty-one years the biological sample was badly degraded, leaving only a tiny bit of DNA, and that being a mixture from both the victim and perpetrator. A growing chorus of scientists (and even police labs) warn that such factors can introduce dangerous uncertainties into DNA typing, making matching far more subjective that what one would expect.

But let's turn this over to a *real* expert. Greg Hampikian, Ph.D (the source of the introductory quote) is professor of biology at Boise State University and director of the Idaho Innocence Project. One of the nation's foremost authorities on forensic DNA, Dr. Hampikian jets around the globe giving advice and testimony and helping set up innocence projects. He graciously took the time from his busy schedule to give us a primer on DNA and the issues that attend to mixed samples.

An interview with Greg Hampikian, Ph.D.

What is DNA?

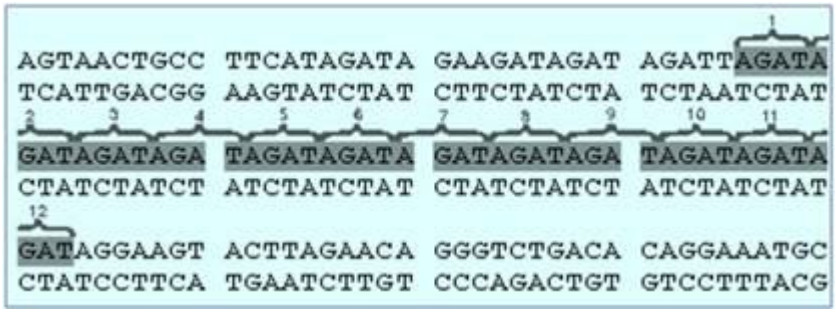


DNA is the repository of all hereditary information. It provides the recipes for all the proteins that can be made by an organism. A stringy acid, it's comprised of a chain of subunits or "bases," the chemicals Adenine, Guanine, Cytosine and Thymine. These are linked in pairs, with A only binding to T, and G to C.

Nuclear DNA, the kind most often used for identification, is found in twenty-three pairs of chromosomes – one inherited from each parent – that occupy the nucleus of every cell (except mature red blood cells). The complete set of nuclear chromosomes (all 23 pairs) is known as the "genome." Sperm and egg cells contain only one of each of the 23 chromosomes, and thus have half the DNA of other body cells.

Is the full genome used for identification?

No. A genome is comprised of millions of linked pairs, far too much information to process efficiently. And it's not necessary. Instead, identification relies on comparing repetitive sequences (for example AGAT in figure) which can be found at various chromosomal locations, or "loci." These "short tandem repeats," or STR's, can take various forms.



For example, at locus CSF1PO (in chromosome 5) it's always AGAT. Each locus actually has two STR sequences: one is the "allele" or gene variant contributed by the mother's chromosome, and one is the allele contributed by the father's chromosome. In this example, one of the two CSF1PO's alleles has twelve AGAT repeats. According to population studies alleles at CSF1PO can have between six and sixteen AGAT repeats.

Wouldn't there be many people who have the same number of repeats at this locus?

Locus	Sample	Suspect
CSF1PO	11	11
D13S317	12	12
D16S539	12,13	12,13
D18S51	10,20	10,20
D21S11	29,30	29,30
D3S1358	16,18	16,18
D5S818	12,13	12,13
D7S820	9,11	9,11
D8S1179	11,15	11,15
FGA	23,24	23,24
TH01	6,9.3	6,9.3
TPOX	8	8
vWA	17,19	17,19

Yes. Numerous persons have the same alleles at one or more loci. But when one compares alleles at thirteen loci, the number required under the FBI's CODIS system, the probability that a biological sample will be tied to an innocent person (the so-called "random match probability") is infinitesimally small, far less than one over the population of the Earth.

This example demonstrates a perfect match at each of the thirteen loci used by CODIS. Repeat sizes are reported for both alleles. (If both parents contributed the same number of repeats only a single number appears.)

So this suspect must be the source of the DNA sample.

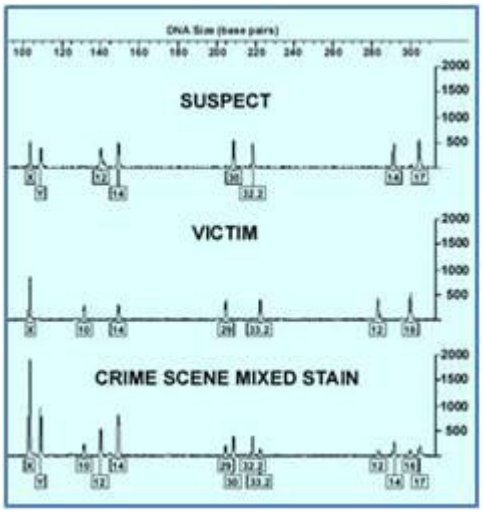
Yes, most likely, unless they have a twin. Analysts will testify that a match at thirteen loci establishes a positive identification. However, the statistics are less impressive when low amounts of DNA or degradation makes it impossible to type a biological sample at all thirteen loci. CODIS does accept DNA profiles from forensic

samples with as few as ten loci, which also yield high match probabilities, but are not unique. Some State systems may allow fewer.

Does subjectivity ever intrude into DNA identification?

It can. When evidence DNA is from a single source there is general agreement on computing random match probabilities. But interpretation is more difficult when samples are mixed; for example, a rape with multiple assailants. Mixed DNA is like mixing names made with scrabble tiles. For each person you add to the mix, the number of possible names you can pull out soars, so excluding anyone becomes problematic.

Mixture electropherograms, the charts used to detect alleles, can become crowded with peaks, making contributors extremely difficult to distinguish. We know from laboratory studies that an allele may sometimes be undetectable because one contributor's DNA is in a low concentration and a few alleles have "dropped out." Other times an allele may be obscured by someone else's peak. When two people touch an object, one profile might dominate while the other may be completely absent. These difficulties and differences in protocols can lead labs to vary a billion-fold when estimating mixed-sample match probabilities from the same data.



And there's another problem that becomes more of an issue with mixtures – the possibility of bias. Most labs train analysts not to look at suspect profiles before performing mixture analysis. However, since it's always easier to traverse a maze backwards, the goal of true blind testing is frequently violated. Analysts who have suspect DNA profiles on hand are susceptible to bias and could be less likely to exclude a suspect in a complicated mixture. Also, while most lab protocols require a second, independent analysis, the second analyst is often a close colleague who may have access to the first analyst's conclusions.

What suggestions do you have for the future?

There needs to be a lot more study and experimentation with mixed-sample DNA. There's no accepted standard for interpreting mixed samples, nor is there general agreement among experts as to when to exclude a suspect. Studies by independent researchers are also needed to help labs avoid bias, and enforcement of true independent analysis should be instituted. Defense lawyers and prosecutors are by and

large uninformed about these issues, and courts tend to leave it to jurors to work out any apparent contradictions. It's an irony that the technique that's been so useful in convicting the guilty and freeing the innocent may wind up leading to wrongful convictions in mixture cases, especially those with very low amounts of starting DNA.

DNA'S DANDY, BUT WHAT ABOUT BODY ARMOR?

As lethal threats to police increase, protection languishes -- but there's hope

By Julius (Jay) Wachtel. It's no surprise that Boston cops feel a chill. With criminals wielding powerful semi-automatic weapons whose rounds can sail through walls (and, as in an incident last week, pierce a mattress and strike a 12-year old girl watching T.V.) you've got to wonder why anyone would be so foolhardy as to pin on a badge.

Commenting on the tragic event, Boston's commish bemoaned the proliferation of assault rifles, like the one that wounded the child. They are indeed a significant threat. But there are others. In March a parolee used an AK-type rifle to kill two Oakland SWAT officers who burst into the apartment where he was hiding. Police were there because the man had just shot and killed two patrol officers -- with an ordinary pistol.

And it's not just "real" criminals who we should worry about. Consider the middle-aged Virginia Beach man who, angry over his eviction, opened up with an AK-47 and a MAC pistol, killing two and wounding three before taking his own life. Or the recent massacre in Alabama where a deeply disturbed 28-year old went on a rampage, slaying ten and wounding six. His weapons? A handgun, a shotgun and two assault rifles.

You'd think that with all the bullets flying around there would be a massive, Federally coordinated effort to improve ballistic protection for police. But you'd be wrong. Compared to the huge bundles of cash that get thrown at DNA, what's spent on body armor R & D is puny. Firearms lethality has gone through the roof, yet what beat cops wear today -- when they can, if it's not too hot -- isn't much different in comfort and protection than what they wore *decades* ago.

Enough ranting. At the recent NIJ conference your blogger met someone who really knows what he's talking about. S. Leigh Phoenix (he goes by Leigh) is Professor of Mechanical and Aerospace Engineering at Cornell University. On faculty since 1974, Leigh specializes in composite materials and high performance fabrics. Dr. Phoenix has designed composite overwraps for containers used in the Space Shuttle and space station programs. He's also been working on ways to measure,

predict and enhance the performance of police body armor. If you're half as interested in keeping cops protected as he is, read on!

An interview with S. Leigh Phoenix, Ph.D.

How does soft body armor work?

When a projectile hits it creates a small pyramid-shaped pocket. Soft armor, which is comprised of many fabric layers, tries to slow down the projectile by pushing back on it at the peak of this pyramid. The best analogy is to a tent, with the central pole representing the projectile. Applying tension to the sides of the tent drives the pole into the ground. As tension on the tent guys increases and the tent's wall angles become steeper the force on the pole also increases.

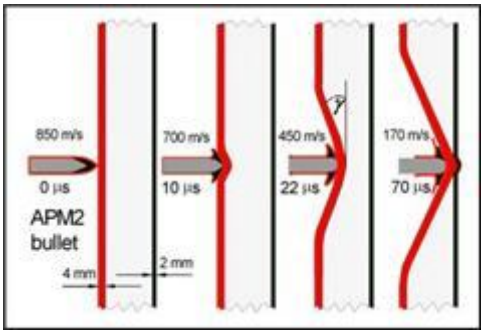
What happens when a bullet strikes armor?

When a continuous-weave fabric is struck by a bullet tension waves fan out in all directions along the yarns, traveling at more than ten times the bullet's speed. Yarn material behind the waves feeds back towards the peak of the pyramid, allowing a relatively deep pocket to form with fairly steep angles (the steeper the better.) Normally the first few fabric layers will be penetrated, which slows down the projectile a bit. It's the job of the remaining layers to bring it to a full stop.

Yarns used in body armor are more than five times lighter than steel, yet two to three times stronger. They must be very light, stiff and resistant to stretching. These characteristics allow tension waves to travel quickly; they also keep strands from breaking as they're pulled into the pyramid. Fabrics must also be light, for wearability, and sufficiently flexible to resist crushing and shattering. Some of these factors work against each other, which complicates things.

Why are ceramic plates used?

Fabric works better when the diameter of the impact patch increases. When high velocity bullets with sharp points strike a plate their tips are blunted. Continued contact with the plate causes mushrooming and deposits debris, further reducing the projectile's velocity. Current ceramic plates are completely sacrificed in the process.



Is this the ballistic vest of the future?

How can we stop high-velocity ammunition?

The diagram depicts a hypothetical approach to stopping an armor-piercing rifle round using a combination of ceramic plates and soft armor. Here the "super" ceramic plate (4 mm. layer) has some flexibility and initially blunts the projectile, causing the lead inside the tip (dark area) to splay out. As the bullet continues its copper jacket slides forward and mushrooms and the interior steel core (large pencil-like region behind the lead) tries to push through, but you want to blunt that too, which takes a little more distance. A final fabric panel brings the slowed projectile to a full stop. This concept illustrates a basic tradeoff: you need distance to stop a projectile, but you don't want to fill the needed space with heavy materials or the vest will be too heavy to wear.

Impressive. But ceramics are hot and heavy. Are there alternatives?

With research and testing it could be possible to develop considerably lighter ceramics that can better withstand the rigors of the job

There's another approach. At present all ballistic vest yarn is continuous, allowing material to be sent to the impact point. However, the first few layers are usually penetrated, accomplishing little other than some projectile slowing and blunting. It turns out that a single layer of unwoven yarn can be hit at much higher speed without breaking because it's not loaded down by the drag of all the other yarns around it, especially as the pyramid deepens. In fact, a two or three inch length of the very strongest yarns can be hit at up to 2500 fps without breaking, even with a pointed-tip projectile.

I've given thought to using discontinuous yarns -- small segments, say two inches long -- for the first few layers, which instead of snapping would form a wad around the projectile's nose as it plows through. That would increase the bullet's frontal area, slowing it down and helping the fabric underneath do its job. Naturally, it would

require a lot of development and experimentation to optimize fiber lengths and combinations. Calculations suggest that it could work with velocities in the 2400 fps range, which covers some rifle threats. Otherwise there will be a need for some ceramic, though maybe a lot thinner than what's now used.

Officers are dying from head shots. What about helmets?

Helmets have a couple of limitations. First, they must float a distance from the skull so there's room for deflection. They also lack wide, flat surfaces that can be covered with material to pull into the pyramid. So one can't just take ballistic vest technology and apply it to helmets. But I think that it's possible to develop a helmet that's effective against handguns and light enough to wear on patrol.

What's happened in the last twenty years to improve ballistic protection for police?

Really, not that much. Kevlar has been tweaked, yielding stiffness/strength combinations that marginally improve its velocity performance. A few new fibers have come out. Zylon, which was used on vests and seemed superior, is now on hold due to degradation concerns. Another fiber, M5, potentially much stronger than Kevlar, hasn't gone commercial because of manufacturing or other problems. Two ultra high-strength polyethylene fibers, Dyneema and Spectra, are 50 percent lighter than Kevlar and just as strong and stiff. They've been used in cockpit doors. They may still be too expensive for wide use in vests but perhaps ideal for the helmets mentioned earlier.

Private industry has a big stake in body armor. Can't we expect them to lead the way?

Body armor makers sell all they produce, so I don't see major improvements happening under the present commercially-driven system. I know of an example where extensive manufacturing changes could make yarns stronger, but the company isn't convinced that the investment would pay off financially. Manufacturers also hold their work very close to the chest. They have their own ideas, needs and priorities and collaborating with them is generally difficult, though I've been fortunate in one case.

What about Government funding?

Funds from government agencies like NSF and the Army are available if you've got the right buzzwords, meaning nanotech, biotech, carbon nanotube structures and so forth, but a lot of what gets proposed and funded is unlikely to lead to useful applications in the near term. Funding systematic work on something practical like body armor is difficult because those making the decisions (who never get shot at)

consider the topic old-hat and think that the problems have been addressed and solved, which they certainly have not.

Federal law enforcement research dollars are spread very thin, especially when it comes to academic institutions. DOD concentrates on vehicle armor. Their successes are classified, making them unavailable to university researchers.

Where should we go from here?

A lot could probably be done working with present fiber materials, tweaking them with improved processing to increase their strength without changing the basic chemical structure. You could change how fabrics are designed, say, by developing hybrid layered structures. Coming up with an altogether new material could yield big improvements, but we should not underestimate what clever manipulating can do.

To push the frontiers not just as a scientific exercise but with the objective of making significant, practical improvements requires a consortium of knowledgeable, technically-adept researchers who appreciate all the issues, including the need for comfort so that body armor actually gets worn. In other words, one must work on the whole package. We need resources for research and experimentation. We also need an agency or a group of agencies that would host a long-term, comprehensive effort to develop a new materials system that would yield armor that is more protective and comfortable.

Source for figure: S. Phoenix and P. Porwal, “A new membrane model for the ballistic impact response and V50 performance of multi-ply fibrous systems,” *International Journal of Solids and Structures* (vol. 40, 2003, p. 6724)

Posted 7/22/11

DON'T BLAME THE MESSENGER

When jurors say that a case doesn't add up, we ought to pay attention

By Julius (Jay) Wachtel. Just when we thought it was finally safe to turn on the news, word comes that Casey Anthony didn't visit a website eighty-four times seeking information about chloroform as the D.A. had claimed. John Bradley, a Canadian software engineer who analyzed the family computer for the prosecution, determined after returning home that the site had only been visited once. Worried that someone's life might hang in the balance, he called prosecutors while the trial was still in session and volunteered to come back at his own expense to clear things up. But they weren't interested.

As it turns out, the D.A.'s men didn't bother to pass on the startling little tidbit to the defense. Oops!

Of course, now that Casey's dealing with the problems of being free, whether someone clicked once or a thousand times hardly matters. (Her mother said she was the one, but her timecards show she was at work.) Yet it's another example of the leaky evidentiary bucket that Florida's finest tried to pawn off as a forensic tour de force. With the help of CNN, which covered the trial in exhausting if not always dispassionate detail, let's take on three key items of physical evidence.

A single strand of hair. Eager to prove that the victim's body was left to rot in a car for days, prosecutors had an FBI trace evidence analyst testify about a single hair found in the trunk. She said that the hair was microscopically similar to Caylee Anthony's hair but not her mother's. A darkened area at the root was also consistent with post-mortem banding, suggesting that the hair had been attached to a decomposing body.

On cross-examination, though, the analyst conceded that her evaluation was hardly conclusive. In 2009 the National Academy of Sciences reported that "there is no scientific support for the use of [microscopic] hair comparisons." Post-mortem banding is even more controversial. Lawrence Kobilinsky, the head of forensic sciences at John Jay College later told *Time magazine* that banding can also be produced by air pockets and determining its real cause is purely subjective.

Another FBI expert analyzed the hair's mitochondrial DNA. That narrowed the strand's origin to anyone in the Anthony maternal lineage, from the victim to her brother, mother and grandmother.

Vapor of decomposition. To bolster its claim that Caylee's body decayed in the trunk prosecutors called Dr. Arpad Vass. A sprightly fellow with a Ph.D. in anthropology, Dr. Vass is the proud inventor of a process that analyzes air samples for the signature of decomposition. He testified that when a container of air from the trunk was opened he "jumped back a foot or two" because the odor of death was so pronounced. What his instruments detected, he said, could have "only" been produced by the decay of human remains. He also said that there were very high levels of chloroform.

Prosecutors called Dr. Vass's techniques "state of the art." On cross-examination, though, it became apparent that Dr. Vass, who lacks a degree in chemistry, was speaking only for himself. His secret recipe

is his alone. What's more curious is that the results he's reported have never been replicated. According to Dr. Kobilinsky, the process is "not junk science, but it never should be brought into a courtroom at this stage." As for the chloroform, Ruth Smith, a forensic science professor told *Time* that unless improbably large quantities were used, detecting it after so much time had passed was improbable. "Chloroform's quite a volatile liquid, and it wouldn't really stick around for that long."

The duct tape. Three pieces were found: one was still adhering to the victim's skull and two were on the ground nearby. Medical examiner Dr. Jan Garavaglia testified that her finding of homicide was based on three reasons: the alleged accidental drowning wasn't promptly reported, the body had been hidden, and there was duct tape present in sufficient quantity and of sufficient size to cover the mouth and nose and lead to suffocation. Her conclusion seemed like plain old common sense: "There is no child that should have duct tape on its face when it dies."

Over defense objections prosecutors played a grisly video that depicted strips of duct tape superimposed over the victim's nose and mouth. Under cross-examination anthropologist Dr. Michael Warren conceded that there was no tape on the face when the body was discovered and that the video depicted only a "possible" means of death. Still, the defense had to somehow neutralize the tape. For that they turned to Dr. Werner Spitz.

Dr. Spitz has a long and distinguished medical career. He served as chief medical examiner in Detroit and assisted the commission that investigated the assassination of President John F. Kennedy. As a pathologist for the defense his best-known work has been for Phil Spector, a music producer who was accused in the shooting death of a woman he invited to his mansion. At the 2007 trial Dr. Spitz concluded that bloodstain patterns indicated that the victim's wound was self-inflicted. His testimony was credited for helping hang the jury. (They voted 10-2 for conviction. Interestingly, the 2009 National Academy of Sciences report that discredited hair comparison did essentially the same with respect to bloodstain patterns.)

Two years later, at Spector's retrial, Dr. Spitz got into a prolonged argument with a prosecutor about his enormous fees. Rattled by aggressive cross-examination, Dr. Spitz seemed evasive and unconvincing. This time the verdict was unanimous: guilty. Spector got nineteen years to life and remains imprisoned.

At the Anthony trial, Spitz called the cause of death undetermined and criticized Dr. Garavaglia for conducting a "sloppy" autopsy. He also insisted that the tape was only applied after Caylee's death, perhaps to bind her jaw and skull. Dr. Spitz later called the acquittal "the right decision."

Prosecution witnesses and trial observers ridiculed Dr. Spitz's notions. However improbable his testimony, though, it apparently resonated with jurors. Interviewed after the trial, both the foreman and juror number three felt that not even the tape could prove that the child was murdered:

> ABC News: I'm going to press you on this, duct tape, on a baby, in a bag, rotting in the woods. Most people look at that, they put two and two together, they say it's a murder.
> Juror #3: Well, in our country, unfortunately, you have to prove it...But it's someone else's life, and if I'm wrong, and kill someone else, I can't live with that...why be mad at me, the prosecution had to prove it, why is it my fault that they didn't prove their case?

Juror #3 said she was one of six who were initially inclined to find Casey Anthony guilty of aggravated manslaughter. (According to the foreman the initial vote on the murder count was 10-2 to acquit.) But she eventually changed her mind:

> CNN: So what convinced you and the five others to switch your votes...?
> Juror #3: I think everyone will tell you the same thing, it's just lack of hard evidence...like I said, the duct tape and the chloroform and things like that...if you took a hard, good look at it, you could kind of...there was a lot of doubt surrounding all those certain things so, there's not enough to make anything stick.

It wasn't just the forensics. Jurors had grave suspicions about Casey's father, George:

> Foreman: There was a suspicion of him. That was -- that was a part of our conversation that we had of the -- well, what I'd call the round robin topics that we had when we were doing deliberation. That was brought up.
> FOX News: Suspicious that he was involved in covering up the death, suspicious he was involved with the -- an accidental death, or suspicious he was a murderer?
> Foreman: All three. We don't know. We don't know. The suspicions were raised.

And similarly, from Juror #3:

> ABC News: What did you make of George Anthony's testimony?
> Juror #3: He did not help the state's case
> ABC News: Why?
> Juror #3: Because he was clearly dishonest...he was evasive...his story seemed to change...if it wasn't going to help the prosecution's case, he was going to try..."I don't recall"....
> ABC News: Do you believe George Anthony had something to do with what happened to Cayley?
> Juror #3: I don't know if he had anything to do with it, but he was there.

In an era when so many wrongful convictions have come to light it's not surprising that there were concerns about calling it wrong, and especially in a capital case:

> ABC News: How much did the fact that this was a death penalty case weigh on you...?
> Juror #3: Well, it weighs heavily...it's pretty, it's the ultimate, the ultimate..it's as big as you can get...someone else's life in your hands...if they want to charge and they want me to take someone's life they have to prove it or I'm a murderer too and I'm not any better.

Unlike most states, Florida doesn't give jury instructions about direct and circumstantial evidence. (Click here for a discussion. Click here for current Florida jury instructions.) Accordingly, none were given at the Anthony trial. So who could blame Juror #3 for weighing their relative importance herself?

> They had good strong circumstantial evidence, but at the end of the day it was circumstantial and there was no [one] strong piece of evidence that said something definitively. Every piece of evidence could kind of [say] this or that, this or that way, there were many different ways you could have gone with each piece of evidence.

Well, not *every* piece, at least not at first. Until Dr. Spitz took the stand, that one "strong piece of evidence" that could have "said something definitively" was the duct tape. Of course, once he was done there were doubts about that too.

Not everyone was upset with the outcome. Lawyers and forensic experts expressed dismay at the "experimental," near-junk quality of much of the prosecutions' physical evidence and applauded jurors for seeing through the fluff. Some felt that a murder conviction would not have survived an appeal.

What to make of all this? The state had one undeniable jewel – the duct tape. Its value, though, was likely diminished by all the questionable testimony about vapors and such. Regrettably, the only DNA on the tape was matched to an FBI analyst who contaminated it during handling. Yet considering that similar duct tape was found at the residence, prosecutors could have made tape their centerpiece and perhaps gone after Dr. Spitz's improbable testimony with greater passion. Instead, they threw in the kitchen sink and confused the jury.

It's possible that the case was doomed from the start. Police ignored a tip about the remains for months, and by the time the body was found the cause of death couldn't be medically determined. So there's plenty of blame to go around. Meanwhile Casey Anthony faces an uncertain and highly problematic future. As she'll soon realize there may be worse things in life than being found guilty of murder.

Posted 10/12/08

FORENSICS UNDER THE GUN

Commonly accepted techniques may lack scientific value

By Julius (Jay) Wachtel. On February 17, 2004 Texas inmate Cameron Todd Willingham was strapped to a gurney and given a lethal injection. He had been convicted of arson and murder in a 1991 house fire that killed his three daughters. Evidence against him included the statement of a jailhouse informer who said that Willingham confessed and scientific testimony by the State Fire Marshal's office that the fire was deliberately set.

Willingham protested to the very end that he was innocent. Now it looks like he might have been right. In August 2008 the Texas Forensic Science Commission agreed to review a 2006 report by five nationally recognized fire experts who refuted the "arson indicators" cited by Texas authorities at Willingham's trial and said the fire was accidental. One of these indicators, crazed glass, was once thought to be evidence of a superhot fire fed by accelerants. It's now known to be caused by spraying water on hot glass. According to the experts, another indicator, burn patterns in the floor suggestive of accelerants were meaningless in a fire that burned as hot as the one that destroyed Willingham's home. And so forth.

In addition the Commission will also be considering the wrongful conviction of Ernest Ray Willis, who spent 17 years on death row for an arson/murder much like the Willingham case. While preparing to retry Willis (his case had been overturned on technical grounds) the prosecutor concluded that the State Fire Marshal's "scientific" testimony was mistaken and that the fire was accidental. Willis was released.

On March 11, 2004 terrorist bombings in Madrid train stations killed 191 and injured two-thousand more. During their investigation Spanish police recovered fingerprints from inside a bag of unexploded detonators and furnished images of the prints to the FBI.

FBI fingerprint examiners digitized the images and ran them through the national database. They soon identified the prints as belonging to Brandon Mayfield, a Portland attorney who was Muslim and once represented a suspected terrorist in a civil case. Confident in their conclusions, the FBI ignored Spanish investigators who insisted that the prints didn't match and that the bombers were Moroccan terrorists with no known connection to Al Qaeda or the U.S. On May 6, 2004 the FBI arrested

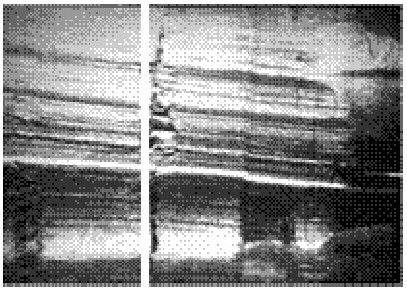
Mayfield as a material witness in the bombings and searched his residence. Within days Spain positively identified the man who left the prints as a known Algerian terrorist. Two weeks after arresting Mayfield the FBI let him go. He got $2 million in taxpayer cash for his troubles.


How could this happen? Found or "latent" fingerprints are nothing like the complete, neatly inked fingerprints taken from job applicants and persons arrested for crimes. Instead, they're often fragmentary, smudged, distorted and overlapping, which can make it difficult for examiners to identify the "minutiae", the islands, dots, bifurcations and ridge endings on which comparisons rely. (In this example, a "good quality" latent is on the left, and the same finger inked is on the right.)

Every State and the FBI have large repositories of digitized fingerprint cards. The FBI holds prints for nearly one-hundred million persons, split about evenly between arrestees and applicants. Running recovered prints through these databases yields cards with the closest matches. It's up to local examiners to order those of interest and microscopically compare them to the latent to see if there's a fit. Generally at least seven minutiae must match, while only one inconsistency disqualifies. Extrinsic factors such as investigator's suspicions must never intrude on an examiner's judgment; if they do, as what apparently happened in Mayfield, the examiner (in the FBI's case, several examiners and their boss) might mistakenly "find" matching minutiae in the latent that simply aren't there.

Firing a weapon leaves markings on bullets and cartridge casings that are supposedly unique to that particular gun. If cartridge casings or bullets found at a crime scene or extracted from a body have a sufficient number of identical markings and no inconsistencies examiners will testify that they were also fired by that gun.

That's the belief. However, a recent report by the National Academies concludes that while "one can find similar marks on bullets and cartridge cases from the same gun," the assumption that only that gun could have produced those markings "has not yet been fully demonstrated."



Even if we believe that ballistics evidence is reliable, humans aren't. In this comparison a recovered bullet in excellent condition is on the left, and a bullet test-fired

through the same gun is on the right. We can see that the striations left by the barrel line up perfectly. In the real world, though, bullets are often deformed and fragmented, making comparison difficult. Detroit PD's lab was recently shut down after State Police auditors found three "false positives", cases where examiners mistakenly reported a match that didn't exist.

Why did the State come in? After a recent murder conviction a retired State firearms examiner conclusively demonstrated that shell casings found at the crime scene came from at least two weapons, not one as the police lab claimed. The judge dismissed the case, which will be retried.

Everyone's heard of Phil Spector, the celebrity murder defendant whose first trial ended in a hung jury (his retrial will begin any day.) There's no disputing that the victim, Lana Clarkson, died from a bullet discharged while a gun barrel was in her mouth. Spector claims that he was six feet away when the gun went off. His claim was propped up by blood spatter expert Stuart James, who said that droplets could travel six feet. But Sheriff's criminalist Dr. Lynne Herold, who admitted she had taken one of James' courses, said no, that their range was at most three feet. That little duel is likely to replay itself. Meanwhile, what are we to think of blood spatter evidence? Is it meaningful or not?

Maybe CSI isn't all that it's cracked up to be. Physical evidence has to be collected, bagged, tagged and interpreted by fallible humans who can slip at any stage of the process, damaging the goods, making them out to be what they're not, or inferring that they mean something they don't. It's happened with arson, fingerprints, ballistics and blood spatter. Last week we mentioned that goofs leading to wrongful convictions have even happened with DNA, which is particularly scary given its aura of infallibility.

According to a recent article in the New York Post, the National Academy of Sciences is expected to shake things up this December with a report that will question the value and accuracy of accepted forensic techniques.

Not to worry, Joe Friday. Looks like shoe leather will be in style a while longer.

Posted 2/12/12

FREEDOM *FROM* THE PRESS

Encryption keeps police radio traffic from prying ears. Including the media's.

By Julius (Jay) Wachtel. Everyone's heard of the Rose Bowl. Fewer of its host city, Pasadena. And only a relative handful of the *Pasadena Star-News*. One of a chain of small dailies, it's suffered greatly because of the shift of classified ads to places like Craig's List. Like most papers it can't afford to have reporters hanging around police headquarters waiting for something to break. And that's where much of the trouble lies.

In the good old days, when newspapers were what they now pretend to be, reporters were staples at cop shops. Officers and newsies got to know one another on a first-name basis, and as long as reporters made police look good, they were granted access to a degree that is now unimaginable. But as the unrest of the sixties and seventies caused a critical reassessment of policing and officer conduct became fair game, the tenor of the police-press relationship changed. Then came the defining moment. In Monroe v. Pape (1961), the Supreme Court ruled that officers could be individually sued for Constitutional violations. Succeeding decisions extended liability to cities and States. Police departments slammed the brakes on the media, establishing press units and censoring information.

Reporters weren't completely thrown in the dark. After all, they still had scanners to keep up with significant events. Crooks, too. In time technology enabled laptop and smartphone users to listen in on police radio traffic. As the century turned ease of interception had become a significant public safety issue, leading NIJ to recommend in 2007 that agencies consider encryption.

Thanks to technical advances and falling costs police around the country have started encrypting everything from 911 dispatches to communications between plainclothes units. In Washington, D.C., where encryption began last September, chief Cathy Lanier called the move overdue:

> Whereas listeners used to be tied to stationary scanners, new technology has allowed people – and especially criminals – to listen to police communications on a smartphone from anywhere. When a potential criminal can evade capture and learn, 'There's an app for that,' it's time to change our practices.

Chief Lanier offered two examples: a burglary ring that pulled a dozen heists before being captured, and drug dealers who fled when an officer radioed for backup. Advances such as Scanner 911, an app available for 99 cents through the iPhone store, explain why Burlington (Vt.) police chief Mike Schirling followed in D.C.'s footsteps. "The difference is that now with contemporary cellphone and messaging technology, not everybody needs to carry a scanner with them. It has a force-multiplying effect for [criminals] that is pretty significant."

Police reluctance to let the media listen in on encrypted communications can keep reporters from learning of significant events in a timely fashion. According to a Washington, D.C. radio station manager, that threatens public safety:

> Members of the media made it clear to the administration that we feel this is a public safety issue. When a radio station like WTOP is able to put over the air in real time what is happening on major downtown streets in the nation's capital, it benefits not only the people who are listening to our radio station, but arguably law enforcement as it tries to take care of the situation.

A colleague offered a more alarmist message: "What if, God forbid, there is another act of terrorism here? It is our job to inform the public in times of emergency."

In this writer's opinion such fears seem a mite overblown. It came to the tiny *Star-News* to clarify why the media is so upset:

> So for over 80 years, police reporters and city editors at newspapers in the San Gabriel Valley have made sure the static-filled, squawk-box sound of police radio transmissions is a constant in the background of our newsrooms. You get used to it, we assure you. And you learn to tune your ears so that the unimportant stuff goes right past you, while the infrequent breaking news – a fire, a major accident, a barricaded felon with a gun – sends you out to cover the story for our readers.

Bottom line: reporters don't want to become mouthpieces of the police. To discharge their important roles as watchers of government they need access to facts while they're fresh, not after they've been digested by a press liaison officer or the chief. But according to the *Star-News* that's precisely what's happening:

> After so many decades of actual radio transparency, [police chief] Sanchez now wants media outlets to file Public Record Requests for transcripts of transmissions – transmissions we can't hear, so how do we know what to ask for? How does it help us cover crime in the community when police can legally put a hold on such records for 10 'business' days, and find excuses to do so for much longer?

One might think that the solution is simple: take a newfangled police radio, stick it in the paper's newsroom, and be done with it. But now that governments have gained the upper hand in the information wars they're reluctant to return to the old ways. As in Jacksonville, which abandoned leasing encrypted radios to the media, the excuse is over "confidentiality." That's also the story in Pasadena, where a spokesperson said that concerns over "officer safety" delayed a decision about issuing scanners to reporters. "We just had a robbery today on Hill Avenue and Washington Boulevard. The last thing I want to do is to have the helicopter or the officers set up on the street and the criminals have a scanner and know where our officers are."

Why a *Star News* reporter would fink is hard to figure. Then again, with citizens packing cell phone cameras, more "transparency" is probably the last thing that police chiefs want. Now that police have tasted freedom *from* the press, the luxury of not having reporters buzzing around crime and use-of-force scenes may be so appealing that it may take a lot more than whining to force them to regress.

Posted 5/6/18

IS YOUR UNCLE A SERIAL KILLER?

Police scour DNA databanks for the kin of unidentified suspects

By Julius (Jay) Wachtel. When a Sacramento-based task force recently arrested the long-sought "Golden State Killer" it wasn't the first time that "familial" DNA has been used to find a mass murderer. "The Killers of L.A." discussed the case of Lonnie Franklin, "The Grim Sleeper," who was convicted in 2016 of committing ten murders and one attempt between 1985 and 2007. Franklin was tracked down with the help of California's Familial DNA Search Program. Established in 2008, it offers an opportunity, when crime scene DNA does not match an existing profile in the state databank, to identify possible family members of an as-yet unidentified suspect.

More about that shortly. First, let's briefly review how crime scene DNA matching works. (For a more complete account, click here.) DNA, our chemical template, resides in 23 pairs of chromosomes we inherit from our parents. Twenty-two pairs are "autosomal," meaning gender-independent, and one pair is the sex chromosome (females have two X chromosomes and males have one X and one Y.) DNA has four "bases," Adenine, Guanine, Cytosine and Thymine that connect in tandem. Some locations always have the same sequence. For example, in chromosome 5, at the location ("locus") known as CSF1PO, the four unit base sequence A-G-A-T is always present.

Locus	Crime Scene	Known	Crime Scene	Known
CSF1PO	11, 11	11, 11	10, 12	10, 10
D13S317	12, 12	12, 12	9, 12	9, 9
D16S539	12, 13	12, 13	11, 12	12, 12
D18S51	10, 20	10, 20	24, 24	16, 24
D21S11	29, 30	29, 30	28, 31.2	28, 31.2
D3S1358	16, 18	16, 18	15, 17	15, 17
D5S818	12, 13	12, 13	12, 13	12, 13
D7S820	9, 11	9, 11	9, 12	12, 12
D8S1179	11, 15	11, 15	13, 13	13, 14
FGA	23, 24	23, 24	24, 25	24, 25
TH01	6, 9.3	6, 9.3	8, 8	7, 8
TPOX	8, 8	8, 8	8, 11	8, 8
VWA	17, 19	17, 19	17, 17	15, 17

Population studies have identified autosomal DNA loci where certain base sequences called “short tandem repeats” (STR’s) repetitively appear. For example, at locus CSF1PO, A-G-A-T repeats from six to sixteen times. To determine whether DNA found at a crime scene matches that taken from a “known” person, forensic scientists focus on thirteen loci where a certain STR string is always present. When the number of repeats inherited from each parent is identical for corresponding STR’s at all thirteen loci (columns on left), examiners can testify that the probability is overwhelming that the DNA originated from the same person or an identical twin. But if there are *any* differences (columns on right) sorry – wrong person!

That’s when a “familial” approach can help. Although the Grim Sleeper’s DNA profile was not in the California databank, an inquiry in 2010, after the state began familial searches, revealed that it resembled that of a recently convicted felon. In addition, the male (Y) chromosomes closely matched, suggesting a father/son relationship. Officers learned that the convict’s father, Lonnie Franklin, lived in the area and had a long rap sheet. They then shadowed him until he discarded some pizza.

Bingo! DNA from the crust matched DNA from the crime scenes. (For a paper about the matching process and its use in various cases, including the Grim Sleeper investigation, click here.)

Every state collects DNA profiles of persons arrested or convicted of certain crimes. Federal, state and local authorities also contribute DNA profiles to the FBI's National DNA Index System (NDIS). Of course, these databases only cover a thin slice of the population. That's what stymied investigators pursuing California's notorious "Golden State Killer." Crime scene DNA tied a single individual to twelve murders, forty-five rapes and over 120 residential burglaries between 1976 and 1986, but a familial search of official DNA repositories yielded nothing worthwhile. (Click here, here and here for detailed accounts about the investigation in the Los Angeles Times.)

Frustrated cops broadened their quest to include consumer genealogical databases. Those such as 23andMe and AncestryDNA require that users submit a vial of saliva and pay a fee. Cops lacked the killer's spit. So they turned to GEDmatch. Unlike the others, it accepts user-uploaded DNA profiles. To build family trees GEDmatch capitalizes on the fact that differences between human DNA are mostly in single base pairs at certain loci. In its hunt for relatives its software counts how many of these pairs, known as SNP's, match between samples. The more that do, the closer the relation. (For a thorough discussion click here.)

GEDmatch and other sites deny they knowingly helped police. So it was left to authorities to impersonate the Golden State Killer and supply crime scene DNA in the required format. This process generated a family tree of about 1,000 persons whose familial relationships traced back to the 1800s. Criteria such as physical characteristics and places of residence gradually whittled the list down. Four months later police identified a possible suspect, Joseph James DeAngelo, 72. Officers followed him and gathered discarded DNA.

Bingo! A perfect STR match.

Familial DNA is nothing new. Its place of origin, the U.K., has used it in violent crime investigations since 2002 with considerable success. An early application in the U.S. was in the case of Dennis Rader, the notorious "BTK Killer." In 2005, after a decades-long investigation suggested he was the one, analysts found a close match between crime scene DNA and the DNA of his daughter, who had been hospitalized for a medical procedure. Investigators collared Rader. He promptly confessed.

Thanks to lots of shoe leather, though, Rader was already a suspect. A recent example of a blind hit is the case of Gilbert Chavarria, the "San Diego Creeper," who forced his way into a string of homes and sexually assaulted children. After a couple of frustrating years police finally identified him through a familial search of the California databse, which identified a close relative. Chavarria was convicted in January. (For more success stories click here.)

In 2007 Colorado became the first state to allow familial searching of its state DNA databank. Since then the practice has spread to eleven additional states: Arizona, California, Florida, Minnesota, New York, Ohio, Texas, Utah, Virginia, Wisconsin and Wyoming. That still leaves a lot of holdouts. Why? One reason is that familial searching provokes considerable angst among civil libertarians, who object because it disproportionately affects members of minority groups, who are overrepresented in arrests and convictions. Indeed, that's reportedly why Maryland and the District of Columbia legally ban the practice altogether. And it's why the Legal Aid Society of New York has sued to block its use:

> This is dangerous. It's an end-run around the legislative branch. Clearly there's a racial bias to who is policed. Innocent people, largely poor and in communities of color, will now become a suspect group of folks.

There are other concerns. In 2014 familial DNA led Idaho police to accuse a filmmaker of a 1996 murder. Michael Usry was targeted through his father's DNA, which authorities had obtained from a genealogical website with a court order. Although Usry was ultimately cleared – the match was very close, but not perfect – the experience put him and his family through a miserable time.

Familial searching *is* intrusive. It can also prove *very* expensive. A Federally-sponsored study revealed that state laboratories that perform familial searches usually restrict them to crimes of violence. While these labs also conveyed worries about civil liberties, legal issues and the accuracy of findings, the one universally-cited concern was cost. This might be the principal reason why several states that use familial searching have rules strictly limiting its use. For example, California restricts familial searching of its database to crimes with "critical public safety implications" where an agency "has pursued all other reasonable and viable investigative leads, including DNA profile comparison(s) to suspect reference samples, with negative results."

Even when state labs are willing, localities may not be up to the task. Familial searches yield an inherently ambiguous forensic work-product that requires extensive

follow-up investigation. That responsibility often falls on local agencies that may lack the resources to assemble and scour family trees across multiple jurisdictions.

Still, when Grim Sleepers, Golden State Killers and their ilk get caught, it's time to celebrate. On April 10, following a multi-year investigation, Scottsdale (AZ) police arrested Ian L. Mitcham for the grisly murder of Allison Feldman. The breakthrough came when familial DNA provided a "near match" to a prison inmate. Mitcham was his brother. While acknowledging that the technique has privacy implications, the victim's father is planning a roadshow to encourage non-familial states to give it a go. "It's for Allison. I hope it provides some relief to other families, like it has done to us."

Posted 10/5/08

LABS UNDER THE GUN

Can police crime laboratories be trusted?

Click here to link to video

> "Of the 33 adjudicated cases from the Wayne County Prosecutor's Office that were reanalyzed, 3 exhibited Class I inconsistencies. In total, this equates to approximately 10% of the completed firearms cases having significant errors. On average, the DPD firearms unit analyzes 1,800 cases per year. If this 10% error rate holds, the negative impact on the judicial system would be substantial, with a strong likelihood of wrongful convictions and a valid concern about numerous appeals."

By Julius (Jay) Wachtel. These words aren't from do-gooders wringing their hands about possible miscarriages of justice. They're from an official September 2008 report by the Michigan State Police setting out the preliminary findings of an audit of the Detroit crime lab's firearms unit.

Firearms examiners often test-fire recovered guns hoping to link them to crimes. Firing a weapon leaves markings on bullets and cartridge casings that are supposedly unique to that specific gun. If a *sufficient number* of *identical* marks are present in the *same locations* on cartridge casings or bullets recovered at a crime scene (or extracted from a body) it's evidence that they were fired by the same gun. Naturally, great care must be taken to insure that there are enough points in common. It's also critical that there are no dissimilarities; just like in fingerprinting, only one inconsistency rules out a gun as being the source of a particular bullet or cartridge casing.

Michigan State Police auditors reviewed 200 firearms cases. Nineteen had "either Class I or Class II inconsistencies". A Class I error means that an examiner erroneously declared a match. Such "false positives" can obviously lead to a wrongful

conviction. In Class II errors, "false negatives," a match was overlooked, possibly letting a guilty person go free.

Detroit PD responded by shutting down the entire crime lab -- not just the firearms unit -- and turned over all forensic analysis to the State. It then set out on the unenviable task of reviewing past cases involving testimony by firearms examiners. There was little choice, as defense attorneys immediately announced they would begin questioning everything the lab has ever done. Meanwhile displaced lab employees mounted a protest, claiming that problems in the firearms unit did not affect the good work the lab was doing elsewhere, from fingerprint comparison to DNA. Their view was undercut by the words of their own superior, who in a September 2008 memo reported that the lab's overworked and underpaid staff was running *four-thousand* chemistry and biological cases behind. (She retired when the lab closed.)

Alas, Detroit isn't unique. In November 2002 Houston shut down the DNA section of the police crime lab after an investigation by a TV station revealed a history of shoddy work. A subsequent audit of the lab's DNA work disclosed "a wide range of serious problems ranging from poor documentation to serious analytical and interpretive errors that resulted in highly questionable results being reported by the Lab." Issues were also reported in firearms, trace evidence and drug analysis.

What's worse, *at least two cases of wrongful conviction* have been attributed to Houston DNA errors. Josiah Sutton served four and one-half years of a 25-year term after the lab incorrectly determined that his DNA was present in a sperm sample. George Rodriguez served *seventeen years* of a 60-year term; his conviction was due in part to bad witness ID, in part to a mistaken failure to exclude him as a DNA donor, and in part to an incorrect conclusion that a hair found on the victim was likely his.

That's not all. In January 2008, one and one-half years after the Houston lab's DNA section reopened, its new supervisor was allowed to resign for helping staff members cheat on proficiency exams. (Amazingly, she was then hired to run the State lab's DNA section.)

It happens to the best of labs. In May 2005 a grievous analytical error at the Virginia State crime lab, reportedly one of the nation's finest, prompted Governor Mark Warner to order the re-examination of 150 DNA cases. His move was prompted by a 1985 case, where a prisoner on death row, Earl Washington, *came within nine days of being executed* before a team of pro-bono defense lawyers finally got him a stay. In 1993, with the threat of execution again looming, a DNA test (which the State partly botched) got Washington's sentence commuted to life imprisonment. It would take another seven years and a correctly performed DNA procedure to

conclusively clear Washington and identify the guilty party. By the time he was finally released in 2000 the innocent man had spent *seventeen years* behind bars.

Mismanagement and lax quality control have vexed crime laboratories for decades. O.J. might have never been in the position to pull the shenanigan in Vegas except for a lab goof. (His acquittal in the 1994 murder was in large part due to evidence of widespread contamination at the LAPD crime lab.) But trying to keep labs on the straight and narrow with after-the-fact controls such as accreditation visits is a loser's game. As long as facilities are tidy, paperwork is in order, equipment is in proper repair, manuals are up to date and everyone on staff is certified a "pass" is virtually guaranteed.

Everyone wants to solve crime through science and technology. But as auditors in Houston pointed out, running a good lab is an expensive proposition. When resources are limited -- and when aren't they? -- it's easy to wind up with a production-oriented pressure cooker that encourages shortcuts and sloppy work. Throw in a dash of unskilled examiners and a pinch of poor oversight and it's a recipe for disaster.

Next week we'll look at issues in forensic techniques, from fingerprinting to ballistics. Stay tuned!

Posted 9/28/08

MINDBOARDING

Is brain scanning the new polygraph?

By Julius (Jay) Wachtel. Hey, Dick Tracy: don't knock yourself out pounding the pavement! There's a far easier way to solve a whodunit. Have a suspect put on a helmet full of electrodes. Then show him a series of photos, including some neutral pictures and some of the crime scene. Looking at the photos will stimulate brain activity, sending electrical signals through the helmet to an EEG machine. You'll wind up with an electroencephalogram, a chart that identifies the precise regions of the brain that the images stimulated.

Now look closely: if "experiential" areas of the brain "light up" for the crime scene photos, but not for the others, you've got your man. Hook him, book him and reward yourself with a trip to Winchell's! If not, move on to the next chump.

According to an emerging technology known as BEOS, for "Brain Electrical Oscillations Signature," there are places in the brain that store memories of events that one actively *experienced*, not just passively observed. Proponents claim that's what makes it possible to distinguish between a killer and someone who merely discovered a body. Peddled in the U.S. by companies including No Lie MRI and Cephos for use in everything from commercial disputes to intelligence, the technology supposedly far surpasses polygraphy in accuracy. In fact, it was recently used by prosecutors as evidence in a murder case in Mumbai, India. To clear herself, a woman charged of poisoning her husband volunteered for a BEOS test. It wasn't a wise choice -- the test said she did it. Oopsie!

No Lie and Cephos aren't alone. A competing technology known as Brain Fingerprinting also gauges the brain's electrical reaction to visual and aural stimuli, but in a fundamentally different way. Developed by neuroscientist Larry Farwell, it relies on a well-established neurological phenomenon, the so-called "P300 wave," an involuntary electrical impulse that our brains generate whenever we recognize (have an existing memory of) something, be it an object or a piece of information.

For example, tell a suspect that they're about to see a picture of the murder weapon, but don't say what it is. Strap on the helmet (on them, not you) and run a series of slides, say, a gun, a knife, a baseball bat, and what was actually used, Auntie's embroidery needle. If he emits a P300 wave when the needle comes up, and *only* when it comes up, have a scrumptious jelly-filled gut buster on us! If not, move on. To his credit, Farwell readily admits that the process has limitations; it won't

work, for example, if word of the needle got out to the public, since everyone would then react to its image. But he claims that when investigators come up with something only the real perp knows, the technology is virtually foolproof.

Alas, neither BEOS nor Brain Fingerprinting have made it into the judicial mainstream. (Brain Fingerprinting claims otherwise, but the episodes cited in its website hardly set a precedent.) According to the landmark Frye decision, before expert scientific testimony can come into court its validity must be widely acknowledged. But the kingdom of the nerds remains highly skeptical. As J. Peter Rosenfeld, a pioneer of using brain waves in lie detection points out, there's a lack of peer review and replication, the sine qua non of scientific acceptance. Other neuroscientists feel likewise. "Well, the experts all agree," says Michael Gazzaniga, director of a UCSB mind-research center, referring to BEOS. "This work is shaky at best."

Unlike the polygraph, which records physiological changes supposedly brought on by the stress of lying, neither BEOS nor Brain Fingerprinting directly measure deception. They're also far more passive, as no interaction is required between tester and subject. Keeping the two apart prevents contaminating the results, but it also means that EEG technicians won't get what polygraphers really aim for. It's the lie detector's dirty little secret that its real worth isn't in the squiggles it produces -- the National Academy of Sciences considers those close to worthless -- but on the incriminating statements, admissions and full-blown, tearful confessions that scared, stressed-out subjects occasionally make while in the chair.

But it's not just about ends -- *means* are also important. The privacy and liberty implications of brain-wave technology are (pardon the pun) mind-boggling. Just to mention one issue, polygraph subjects are free to clarify and challenge each question before answering. In contrast, EEG screening is purely passive, allowing sneaky administrators to venture into areas far afield of their manifest purpose without the test subject realizing or having a realistic opportunity to refuse.

What's more, we might not even know that we're being checked out. Technology now in development allows the remote detection of "anxious" people. FAST, an acronym for "Future Attribute Scanning Technology" (how's that for an Orwellian nightmare) uses cameras and sensors to screen passers-by for hostile thoughts and intentions, assessing characteristics such as facial expressions and pulse rate. Imagine the false positives that a gaggle of ACLU lawyers would produce!

Well, we've got a label for these precious new techniques: *Mindboarding*. Feel free to use it, but be sure to say that you saw it first on PoliceIssues.com!

Posted 5/2/10

MORE LABS UNDER THE GUN

Resource issues, poor oversight and pressures to produce keep plaguing crime labs

By Julius (Jay) Wachtel. "Thank God it got dropped. Now I can get on with my life." That's what a relieved thirty-year old man said last month as he left the San Francisco courthouse, his drug charge dismissed, at least for the time being. He's one of hundreds of beneficiaries of a scandal at the now-shuttered police drug lab, where a key employee stands accused of stealing cocaine to feed her habit.

Problems surfaced last September when veteran criminalist Deborah Madden's supervisor and coworkers became concerned about her "erratic behavior." Madden was frequently absent or tardy, and when present often stuck around after closing hours. She had recently broken into another analyst's locker and when confronted offered a flimsy excuse. By November her performance had deteriorated to such an extent that prosecutors thought she was purposely sabotaging cases.

Coincidentally, a team of external auditors was in town to review the SFPD laboratory in connection with its application for accreditation. They weren't informed that Madden had taken leave to check into an alcohol rehab clinic, nor that her sister told a supervisor that she found cocaine at Madden's residence, nor that a discreet audit of the drug lab's books revealed cocaine was missing from at least nine cases. Indeed, a formal criminal investigation wasn't launched until February, when officers searched Madden's residence. That turned up a small amount of cocaine and a handgun, which she was barred from having under state law because of a 2008 misdemeanor conviction for domestic abuse.

When interviewed by detectives Madden conceded filching "spilled" cocaine from five evidence samples. But she had an excuse. "I thought that I could control my drinking by using some cocaine.... I don't think (it) worked." Madden otherwise held

firm, claiming that sloppy handling by lab employees caused "huge" losses in drug weights. "You just have to check weights of a lot of stuff, because you will see discrepancies. That's all I'm going to say. I mean, I think you want to put everything on me, and you can't because that's not right."

The external reviewers were never told about Madden. Released in March, their report nonetheless chastised the drug lab for being understaffed and poorly managed, with three drug analysts expected to process five to seven times as much evidence as the statewide average, thus affecting the quality of their work. Evidence wasn't being properly tracked or packaged, precautions weren't being taken against tampering, and scales and other equipment weren't being regularly calibrated, making measurements uncertain.

Chief Gasçon shuttered the drug lab March 9, throwing a huge monkey wrench into case processing. That, together with Madden's alleged wrongdoing, led the D.A. to dismiss hundreds of charges. Dozens more convictions are at risk because Madden's criminal record was never disclosed to defense lawyers, depriving them of the opportunity to impeach her testimony.

So far Madden hasn't been charged with stealing drugs from the lab (she's pled guilty to felony possession of the small amount of cocaine found in her home.) Really, given how poorly the lab was run, figuring out just how much is missing, let alone what's attributable to theft and what to sloppiness, may be impossible.

In "Labs Under the Gun" we reported on misconduct and carelessness at police crime labs from Detroit to Los Angeles. Here are a few more examples:

- On March 12, 2010 Federal prosecutors revealed that six FBI lab employees may have performed shoddy work or given false or inaccurate testimony on more than 100 cases since the 1970's. The disclosure was prompted by the exoneration of Donald Gates, who served nearly three decades for rape/murder thanks to testimony by FBI analyst Michael P. Malone that one of Gates' hairs was found on the victim. Only thing is, the hair wasn't his, as DNA proved twenty-eight years later.

  As it turns out, prosecutors were first alerted to problems with Malone and his coworkers as early as 1997, when the DOJ Inspector General issued a stinging report discrediting analytical work in the Gates case and others. It then took *seven years* for DOJ to order prosecutors to contact defense lawyers. Even then, nothing happened. "The DOJ directed us to do something in 2004, and nothing was done," a prosecutor conceded. "This is a tragic case. As a prosecutor it kills you to see this happen."

Gates was released in December 2009.

- There was good news on February 17, 2010: an innocent person was exonerated. There was also bad news: Greg Taylor, the man being freed, had served 17 years for murder, mostly because of false testimony that blood was found on his truck.

  At his trial, jurors weren't told that the presence of blood was based on a fallible screening test whose results were quickly disproven by more sophisticated analysis. There was no blood – it was a false positive. Yet the examiner who ran the tests, Duane Deaver, never let on. This wasn't the first time: he had also kept mum about contradictory findings in an earlier case that resulted in the imposition of the death penalty. (That sentence was eventually vacated by a judge who rebuked Deaver for his misleading testimony.) Thousands of cases involving the lab are now being reviewed for similar "mistakes."

- In December 2009 the New York State Inspector General disclosed that State Crime Lab examiner Garry Veeder had been falsifying findings for a stunning *fifteen years*. Writing one year after the analyst's suicide, the IG reported that Veeder made up data "to give the appearance of having conducted an analysis not actually performed." Veeder, who had conceded being unqualified, said that he relied on "crib sheets," that others knew it, and that taking shortcuts was commonplace.

- In January 2009 the *Los Angeles Times* reported that goofs by LAPD fingerprint examiners caused at least two mistaken arrests. Reviews were ordered in nearly 1,000 cases, including two dozen pending trial. Six examiners were taken off the job and one was fired. Blame for the mismatches was attributed to inadequate resources and to lapses in training and procedures.

In 2009 the National Academy of Sciences issued a blistering report criticizing some forensic science practices as bogus and most others as being far less scientific than what we've been led to believe. Virtually every technique short of DNA was said to be infused with subjectivity, from friction ridge analysis (i.e., fingerprint comparison) to the examination of hairs and fibers, bloodstain patterns and questioned documents.

That's a stunning indictment. If analysts' conclusions have as much to do with judgment as with (supposedly) infallible science, it's more critical than ever to give

them the training, resources and *time* they need to do a good job. But if resource-deprived, loosey-goosey, production-oriented environments are what's considered state of the art, forensic "science" in the U.S. still has a very long way to go.

Posted 2/22/09

N.A.S. TO C.S.I: SHAPE UP!

Putting the "science" back in forensics won't be simple

Click here to link to video

By Julius (Jay) Wachtel. Three years in the making, the National Academy of Sciences' anxiously-awaited "Strengthening Forensic Science in the U.S.: A Path Forward" is finally in, and it doesn't paint a pretty picture. Although it's clearly a product of compromise -- the National Institute of Justice reportedly opposed funding the study, then demanded a say in the conclusions -- the report has more than enough meat left on its bones to threaten the interests of labs and self-styled "experts" across the country.

At its most general, the study urges that forensic science live up to its name. Processes used to analyze evidence and make comparisons should be objective, set out in detail, reproducible by others and, as a topper, yield conclusions whose certainty can be accurately estimated, a requirement that places a big question mark next to virtually every identification technique short of DNA. Lamenting the ease with which junk science weasels its way into court, the report's authors advise establishing a "National Academy of Forensic Science" that would guide research, set standards and certify labs and examiners. To keep unholy influences at bay, they also urge that labs function as independent entities outside the control of both law enforcement and private interests.

It's a heady agenda that runs head-on into how forensic science is presently organized in the U.S. While many of the more ambitious objectives stand little chance of being implemented in the near term, the report's disparaging views on some popular forensic matching techniques will surely be welcomed by the defense bar.

Here is some of what Chapter Five, "Descriptions of Some Forensic Science Disciplines" has to say:

- Fingerprint identification. The Grand-daddy of all identification methods comes under criticism, although not for its validity. (That fingerprints are unique between individuals, an assumption based on decades of observation, has apparently gained support from biological science.) Instead, the issue is reliability: does fingerprint comparison yield identical results across examiners? (For a brief depiction of the process click here.)

  Crime scene fingerprints are often of poor quality, leading to subjective judgments that occasionally prove wrong. If the error is a false positive (saying that two prints match when they do not) such as what happened in the Brandon Mayfield case, and more recently at the LAPD crime lab, the consequences can be catastrophic. Meanwhile the identification community resists objectivizing its methods; for example, by using point systems based on minutiae, presumably because setting thresholds would yield fewer matches.

  When examiners testify that two prints were deposited by the same person they do so to an absolute certainty. Yet, as the report points out, no judgment can be that "certain." Indeed, it's the ability to quantify the probability of error that's the hallmark of a true science. Whether fingerprinting can be raised to that level remains to be seen.

- Shoe prints and tire tracks. Impressions from footwear and tires have "class" characteristics, meaning patterns created during manufacture, and "individual" characteristics, reflecting everyday wear and tear. It's the latter that are used to match a certain shoe or tire to a certain impression. Like fingerprints, the process is beset by subjectivity and lacks a numerical threshold for calling a match. Unlike fingerprints, it hasn't been demonstrated that shoe prints and tire tracks are indeed unique, nor that they can be reliably distinguished.

- Toolmarks and firearms. Again, class and individual characteristics are applicable. (For an example of firearms identification click here.) As in shoe prints and tire tracks, issues of subjectivity, "lack of a precisely defined process" and the absence of a threshold for calling a match present significant concerns. In 2008 a Michigan State Police audit revealed that Detroit police experts incorrectly matched guns to ammunition in at least three cases, including one that apparently caused a wrongful conviction. (Detroit PD's entire lab was shut down and its functions were shifted to the State.)

- Hairs and fibers. Matching hairs through their physical characteristics has been widely used in sex crimes. What the "experts" haven't been letting on, though, is the abysmal error rate, with two studies citing false positives of about twelve percent, clearly excessive by any standard. These and other shortcomings led the NAS to declare that, lacking nuclear DNA, there is "no scientific support for the use of hair comparisons."

  More hope is held out for comparing fibers, whose chemical composition can be analyzed with existing tools and protocols. However, since little is known about the effects of manufacturing and wear, reliably matching fibers to specific garments or carpets remains out of reach.

- Handwriting. There is some scientific support for the notion that individuals exhibit distinct handwriting characteristics and that these are relatively stable over time. Unfortunately, comparison techniques remain highly subjective, making their validity and reliability difficult to assess.

- Causes of fire. Many arson convictions have relied on expert testimony that pour patterns, charring, glass crazing, etc. were caused by accelerants. But the origin of some of these fires, including one that led to an execution, were later shown to have been accidental. (For a brief discussion click here.) According to the NAS, long-accepted indicia of arson are plagued by poor science and subjectivity. Even so, "despite the paucity of research, some arson investigators continue to make determination about whether or not a particular fire was [deliberately] set."

- Bite marks. Bite mark evidence is occasionally used in the investigation of violent crime. Although an odontological dissimilarity might help exclude a suspect, the report concludes that the method's scientific basis is "insufficient" for matching, and warns that its use has led to wrongful convictions.

- Blood spatter. During Phil Spector's first murder trial a defense expert testified that spatter could reach six feet, potentially placing Spector, whose clothes were flecked with blood, far from the gun (the barrel was in the victim's mouth when it discharged.) As might be expected, a prosecution witness said that droplets could travel no more than half that distance. (For a brief discussion of the case click here.) Had it been up to the NAS neither witness would have taken the stand. Criticizing the opinions of blood spatter "experts" as overly subjective and driven by advocacy, the report concludes that "the uncertainties associated with bloodstain pattern analysis are enormous."

What gets admitted into evidence is ultimately up to a judge. Federal practice, on which most State laws are modeled, is set out in Rule 702, Federal Rules of Criminal Procedure, "Testimony by Experts." Before admitting scientific evidence, judges must determine whether "(1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case."

In the era of C.S.I., with an entrenched forensic establishment that has elevated itself to a near-religion, not even an epidemic of wrongful conviction has managed to slow the choo-choo train of junk science. On the other hand, should defense lawyers take notice of the report, many of today's quasi-scientific forensic techniques will pass into the realm of voodoo, where they've always belonged.

Here's to their speedy demise.

1/26/11

ONE SIZE DOESN'T FIT ALL

Overuse of Shaken Baby Syndrome may have led to many miscarriages of justice

By Julius (Jay) Wachtel. Things hadn't been going well for Shirley Ree Smith. After four years of bouncing from one relative's home to the other, the grandmother wound up in a single-room occupancy "hotel" on Los Angeles' infamous skid row. Thankfully, she can finally leave. Released in 2006 after serving ten years in a California prison, Ms. Smith recently received permission to relocate to Illinois, where she will stay with her daughter and three grandchildren.

What makes the story unique is that Smith was convicted of killing her daughter's 7-week old infant by shaking her to death. What makes it extraordinary is that if prosecutors prevail Smith will be returned to prison to finish serving out her term of 15 years to life.

"Shaken baby syndrome" (SBS) made its first appearance in the medical literature of the 1970's. Within a few years the concept had become an entrenched component of the prosecutorial arsenal. In the first known appellate case on point, decided in 1984, an Ohio court affirmed a conviction based on expert testimony that retinal bleeding and a subdural hematoma indicated a baby was shaken to death. There are 1,500 SBS diagnoses and an estimated 200 SBS-related convictions each year. About 800 SBS cases have been argued before appellate courts in the last two decades, with 258 during 2005-2008 alone.

SBS diagnoses have typically been based on:

> (a) The presence of a "triad" of symptoms – retinal hemorrhage, subdural hemorrhage and cerebral edema (brain swelling)
>
> (b) No evidence of another causal mechanism. Experts have claimed that for a blow to cause the same trauma as SBS it would have to be equivalent to falling from a second or third-story window or being struck by a car traveling 25-30 miles per hour.

It has also been widely assumed that the effects of severe shaking are immediate and catastrophic. That's why an SBS diagnosis virtually proves a case: not only was a crime committed, but the caregiver who had charge of the baby when symptoms appeared must be the one responsible.

In 1997 Wisconsin day-care provider Audrey Edmonds, a mother of three, was sentenced to 18 years in prison for shaking an infant to death. The victim had been dropped off at Edmonds' home and reportedly began convulsing after drinking formula. As usual, no one was present other than the caregiver. Twelve years later a string of physicians – including the county pathologist who helped convict Edmonds – testified at her habeas hearing that modern techniques, including magnetic resonance imaging, had undermined if not completely disproved the "common medical wisdom" that once underpinned SBS. When asked by the judge whether he now believed that "some" shaking took place the pathologist replied "I don't know."

Edmonds was released. A new trial was granted but the charges were soon dismissed.

On July 1, 2001 the influential American Academy of Pediatrics issued its first official policy paper on SBS. Its abstract highlighted the perceived severity of the problem:

> Shaken baby syndrome is a serious and clearly definable form of child abuse. It results from extreme rotational cranial acceleration induced by violent shaking or shaking/impact, which would be easily recognizable by others as dangerous. More resources should be devoted to prevention of this and other forms of child abuse.

Various indicators of SBS were mentioned, including cerebral edema and subarachnoid and subdural hemorrhage. However, the actual diagnosis was left to the judgment of physicians, who were encouraged to consider a host of factors including the caregiver's "psychosocial" characteristics.

Eight years later, in a superseding paper, the Academy supplanted SBS with the more inclusive diagnosis of Abusive Head Trauma (AHT). It acknowledged the difficulty of distinguishing between the effects of shaking and impact and conceded that internal injuries caused by blows had been mistakenly attributed to shaking. In passing it even mentioned that medical diseases can "mimic" the effects of trauma. Physicians were encouraged to "consider alternative hypotheses" to AHT and to use "restraint" in making diagnoses where evidence of physical abuse was unclear.

The old and new policies are in stark contrast. The old was written during the waning years of a decades-long wave of child abuse hysteria that led to many wrongful convictions. It emphasized the prevalence of child abuse and encouraged physicians to diagnose SBS. The new policy takes a more measured approach; while physicians are urged to look into the possibility of child abuse, they are also cautioned about the devastating legal consequences of making a wrong call.

Shirley Ree Smith's release in 2006 was not an acquittal. After exhausting her state remedies – she had appealed her conviction to the California Supreme Court without success – Smith filed a habeas motion in Federal District Court. Turned away, she then appealed to the Ninth Circuit.

Fortunately for Smith, the justices took her seriously. Poring over the trial evidence they discovered some very interesting things. Finding no sign of trauma during the preliminary examination, the admitting physician diagnosed SIDS (sudden infant death syndrome.) But then the autopsy surgeon found a minor abrasion and a small amount of pooled blood in the brain. Although these weren't by themselves sufficient to diagnose SBS, a prosecution expert witness advanced the theory, unsupported in the medical literature, that violent shaking tore the brain stem, making death instantaneous and minimizing bleeding. Circularly, that's also why the tear wasn't detected during autopsy.

Defense experts disagreed. One attributed the death to SIDS, the other to a recent or old fall. Both said that a torn brain stem would have caused significant hemorrhage. Smith was nonetheless convicted, essentially on the expert witness' uncorroborated speculation. That, the Ninth Circuit decided, was so unreasonable as to warrant a new trial.

State prosecutors appealed to the Supreme Court. It granted certiorari, then sent back the case to the circuit for reconsideration in light of Jackson v. Virginia, which requires that Federal appeals courts

evaluate the factual basis of state convictions "in a light most favorable to the prosecution." The Ninth Circuit did so and in 2008 reaffirmed its original judgment. Prosecutors appealed once more, and a decision by the Supreme Court is pending.

There is no doubt that severe shaking can harm or kill an infant. There's also no doubt that it has been over-diagnosed as a cause of death, and not only in the U.S. Canadian prosecutors recently moved to set aside the 1992 conviction of Toronto man Dinseh Kumar, who pled guilty to shaking his newborn to death. Kumar later said he confessed because the pathologist's report made it unlikely that he could prevail and because he was offered a 90-day sentence, far less than what he would receive if convicted of murder. Since then the pathologist has been thoroughly discredited and fourteen other child abuse convictions have been brought under serious question.

In her 2009 article in the *Washington University Law Review*, "The Next Innocence Project: Shaken Baby Syndrome and the Criminal Courts," Deborah Tuerkheimer worries that the deference given to SBS by the criminal justice system may encourage scientists to shade their testimony in the direction of guilt:

> The construction and persistence of SBS raises the distinct possibility that our adversarial system of criminal justice may be corrupting science. It may do so by placing pressure on scientists to articulate opinions more extreme — and certainly with more confidence — than those they actually hold.

For Shirley Ree Smith the consequences of transforming SBS into the Swiss Army knife of child abuse prosecution are all too palpable. When asked last month what she would do if her conviction was reinstated she was unusually blunt. "I would never go back to prison. I'll take my own life first, but I won't go back there."

Posted 4/30/17

PEOPLE DO FORENSICS

Conflicts about oversight neglect a fundamental issue

By Julius (Jay) Wachtel. In 2009 the National Academies published "Strengthening Forensic Science in the U.S. – a Path Forward," a meticulously documented critique of forensic practices in the U.S. In "Better Late Than Never" Part I and Part II we discussed NIJ's belated response to the slap-down. It took two forms. In 2013, "to enhance the practice and improve the reliability of forensic science," NIJ and the National Institute of Standards and Technology (NIST) created the National Commission on Forensic Science (NCFS). Three years later DOJ released draft rules that, once published in final form, would govern the testimony of Federal forensic experts in a variety of disciplines. Although our initial impression was that the proposed regulations seemed excessively permissive, it was, after all, a start.

Full stop. On April 10, 2017 the new Administration slammed on the brakes, withdrawing the revamp and consigning it to "archives." Alas, the text of the would-be rules is inaccessible. (Go ahead, click on the links under the "uniform language" heading. No, they don't work.) Meanwhile, in a carefully worded statement, Attorney General Jeff Sessions conceded that the NCFS charter had "expired." Meaning, in plain English, that he wasn't renewing it. DOJ's new boss nonetheless promised that his agency would labor to "increase the capacity of forensic science providers, improve the reliability of forensic analysis, and permit reporting of forensic results with greater specificity." To his credit, he did invite input. But the new AG said nothing about the rules proposed prior to his arrival, nor of the comments the stillborn effort likely inspired.

The NCFS got a final word. On the very next day, April 11, it published a retrospective, "Reflecting Back - Looking Toward the Future" that lists past recommendations and actions taken and provides detailed bios of former staff members, whom one assumes are looking for their next gig. Read closely and you'll also find a few wistful yet deferential hints about what might have been. (As of this writing the report hasn't been "archived." But just in case DOJ ultimately deems it offensive, we placed a copy on our server. Click here.)

Sessions, a former Assistant U.S. Attorney, is now the nation's top cop. His moves – or in the case of NCFS, his failure to act – have been criticized as a transparent effort by law enforcement to control forensic science. Some who felt they were being elbowed out from the decision-making process offered stinging criticism:

- "It is unrealistic to expect that truly objective, scientifically sound standards for the use of forensic science...can be arrived at by entities centered solely within the Department of Justice." (Federal judge Jed S. Rakoff, a former NCFS member)

- "...the department has literally decided to suspend the search for the truth...as a consequence innocent people will languish in prison or, God forbid, could be executed...." (Peter S. Neufeld, cofounder of the *Innocence Project*.)

On the other hand, many members of the establishment were pleased. Cops and prosecutors, who rely on forensics to provide actionable leads and validate their work, mostly applauded the AG. Of course, physical evidence has a mixed reputation, so the gloating was more or less tastefully restrained. Consider, for example, this extract from a press release by the National District Attorneys Association:

> The National District Attorneys Association (NDAA) supports the announcement this morning by United States Attorney General Jeff Sessions that he will not renew the charter for the National Commission on Forensic Science...The Commission lacked adequate representation from the state and local practitioner community, was dominated by the defense community, and failed to produce work products of significance for the forensic science community....

One day after the NCFS shut its doors the National Academy of Sciences (remember, they're the nitpickers who rebuked forensics in 2009) released "Fostering Integrity in Research." To no one's surprise this meticulously documented report concluded that scientific researchers lie and cheat for mostly the same reasons as everyone else: to secure and retain desirable positions, achieve prominence and gain material rewards.

"Fostering Integrity" wasn't directed at forensics. But selfish motives also pervade that discipline, where the harm is direct, and the victims often plentiful:

> • An early post, "CSI They're Not," reported that NYPD analysts "took shortcuts when analyzing large seizures, falsely certifying that every container of suspected drugs was tested." Thousands of drug tests were botched while managers who realized what was going on stood by as though everything was fine.
>
> • In "More Labs Under the Gun" we discussed the appalling case of a New York crime lab examiner who falsified reports, making up data to convey the impression that he performed analyses when he had not, *for fifteen years.* (He committed suicide when the authorities caught on.)

• Two years ago, in an unprecedented mea culpa, DOJ and the FBI acknowledged that "nearly every examiner in an elite FBI forensic unit gave flawed testimony in almost all trials in which they offered evidence against criminal defendants over more than a two-decade period before 2000." Thirty-two of the accused had been sentenced to deaths; fourteen were executed or "died in prison."

• But the trophy goes to…"superwoman"! That's what they called Massachusetts state crime lab chemist Annie Dookhan. Hired in 2004, the self-described "overachiever" (her output was triple that of her colleagues) eventually admitted to a seven-year long string of falsification, "forging her co-workers' initials and mixing drug samples so that her shoddy analysis matched the results she gave prosecutors." Dookhan was suspended in 2011 and pled guilty in 2014. A few days ago the courts officially dismissed a stunning 21,587 criminal cases that had used her work product. According to the ACLU that's an all-time record. We won't quibble.

Anyone who's even halfheartedly paid attention can't help but be appalled by the numerous miscarriages of justice, up to and including wrongful execution, that have been attributed to flawed forensics. So the AG's transparent attempt to evade outside scrutiny rings a decidedly sour note. Still, as experience suggests, it's not enough to have a watchdog on the prowl for junk science. One must be alert to junk scientists as well. After all, people do forensics. So if we're really serious about improving things, overseeing them far more closely must be job #1.

Posted 11/20/07

POLYGRAPH: SCIENCE OR SORCERY?

Its usefulness is mostly as a prop

By Julius (Jay) Wachtel. Exposing a stunning breach of national security, Nada Prouty, 37, a former FBI and CIA agent, pled guilty this month in D.C. Federal court to nationalization fraud, illegal computer access and conspiracy. Admitted in 1989 on a student visa, the Lebanese immigrant staged a sham marriage and gained permanent residency. In 1997, now-citizen Prouty was hired by the FBI and allegedly started passing top-secret information about Hezbollah to accomplices. A few years later the super-achiever landed in the CIA, an even better place from where to compromise American secrets.

So what's the rub? Prouty sailed through FBI and CIA pre-employment polygraph exams, supposedly the toughest in the universe. In all likelihood she would still be a mole except that her name came up during an investigation of her brother-in-law, Talal Chahine, who allegedly channeled millions of dollars to Lebanese militants.

The history of lie detection is replete with disasters. None seems worse than the case of Aldrich Ames, a CIA agent who got rich by exposing his colleagues to the USSR (Ames' treachery led to the execution of several Soviet citizens who were spying for the U.S.) While pocketing bundles of cash Ames passed two routine CIA polygraphs, and when caught bragged that he had never employed countermeasures.

Ames wasn't lying. In an exhaustive 2001 report, the National Academy of Sciences concluded that the polygraph is worthless for screening job applicants and employees. It held out a bit more hope when polygraphs are used for investigating specific, known events (i.e., crimes), but cautioned that research that supports this more limited application lacks scientific validity and probably overstates the technique's accuracy.

That's a warning to take to heart. Between 1982 and 1998 forty-two women, mostly prostitutes, were murdered in King County, Washington. Most of their bodies were found in or near the Green River. Suspicion soon fell on Gary Ridgway, a truck painter whom prostitutes accused of rough treatment. Ridgway took and passed a police polygraph. In 2001, improved DNA techniques proved that he was indeed the killer. Ridgway was arrested and plea-bargained to life without parole.

Polygraphs are frequently used to narrow the field of suspects. They are routinely administered to the parents and caregivers of missing and abducted children. Results

are not reassuring. In the 1997 disappearance of Sabrina Aisenberg, local police, who suspected the parents, called polygraph results "inconclusive," while an ex-FBI polygrapher hired by the defense insisted that it cleared them. A like controversy dogged the investigation of the 1996 murder of JonBenet Ramsey, where police rejected the findings of a renowned polygrapher who insisted that the victim's mother and father were being truthful. (The Ramseys refused to be tested by the FBI because its profilers told police that the murder was probably an inside job.)

Leery of being led down the wrong path, many savvy investigators shun the polygraph as a "truth machine" but use it as a prop when physical evidence or witnesses are lacking. Refusing to take a polygraph can land one on the short list of suspects. Even better, a few guilty persons get so intimidated by the black box that they shrivel up and confess even before the test begins. It's a form of legalized coercion that leaves no bruises and may be impossible to challenge in court.

It's no surprise that shortcuts to finding the truth are hugely popular. As long as we're willing to dig in our pockets there will always be someone happy to supply all the elixirs we want. We will soon be reporting on other questionable techniques, including cognitive interviews, profiling, investigative hypnosis and the recovery of repressed memories. Stay tuned!

Posted 9/5/10

PREDICTIVE POLICING: RHETORIC OR REALITY?

New data-mining techniques promise to reinvent policing. Again.

By Julius (Jay) Wachtel. "Are we doing anything new or innovative with this data or are we just doing it better and quicker?" Lincoln police chief Tom Casady's remarks probably led to a few gasps. Still, as the plain-spoken Nebraska native pointed out at a National Institute of Justice symposium last November, its focal topic was nothing new: "It is a coalescing of interrelated police strategies and tactics that were already around, like intelligence-led policing and problem solving. This just brings them all under the umbrella of predictive policing."

Indeed, the strategy's core concern – officer deployment – has its roots in the lowly pin map, a low-tech but remarkably versatile technique that was used to distribute officers and create beats well into the 1960's. To be sure, pin maps had their limitations. Some variables weren't easy to depict, and the process was clumsy, requiring constant attention and presenting the ever-present risk of getting poked. Computers soon stepped in, allowing managers to print detailed reports denoting the nature, incidence and distribution of crime for any area or time period that they wished.

In the 1990's police departments and academics formed alliances to solicit Federal funding for innovative crime-fighting programs. Notable initiatives of the era include Boston's Operation Ceasefire, a juvenile violence reduction program, Richmond's Project Exile, a hard-edged effort to incarcerate armed felons, and directed-patrol experiments targeting illegal gun possession in Kansas City and Indianapolis. Evaluations revealed that just like cops had always insisted, focused enforcement can have a measurable effect on crime and violence.

Academics also came to another conclusion long accepted by police, that crime and place were interconnected. "Hot spot" theory became the rage. Using probability statistics to distinguish hot spots from background noise, sophisticated software such as CrimeStat promised more efficient and effective officer deployment. It's an approach that fit in well with Compstat, an NYPD innovation that uses crime data to hold precinct commanders accountable for identifying and responding to localized crime problems.

In 2009 NIJ jumped in, awarding predictive policing grants to Boston, Chicago, Shreveport, District of Columbia, the Maryland State Police, New York City and Los Angeles. Los Angeles, Bratton's most recent fiefdom (he left earlier this year after completing his second and, by law, final five-year term) intends to go beyond crime data, gathering *non-crime information* from a variety of sources; for example, by extensively debriefing arrestees about their friends and associates. It's not unlike the approach that fell flat in New York City, where police were until recently entering all sorts of information from stop and frisks into the department's forbiddingly entitled "data warehouse." (Complaints from civil-rights groups and privacy advocates recently led the governor to sign a state law that prohibits computerizing information about persons who aren't arrested. Keeping paper records is still OK, though.)

And that's not all. In an application for a second predictive policing grant LAPD proposes to generate daily crime forecasts using probability statistics. Police managers would apply the information to make deployment decisions, with predictions streamed to patrol cars and displayed on computer screens. One can hear the conversations now: "Hey, partner, what do you say we hit sector eight? It's forty-percent certain that they'll have a burg in the next thirty days!"

Yet whether a Jetsons approach can distribute cops more efficiently is doubtful. Impossibly spread out and with only half the per capita staffing of New York City, L.A. 's patrol coverage is so thin that there may be precious little left to calibrate. One can't deploy fractions of a squad car, while diverting officers because computer models predict that the chances of crime are higher in one place than another is asking for trouble. Such predictions are subject to considerable error, and should the unexpected happen unprotected victims may be left wondering why they're paying taxes. As for roving task forces, they've long been placed where crime is rampant, so more number crunching is unlikely to yield substantial additional benefits. (To read more about LAPD staffing click here and here.)

Really, it's not as though crime analysts have been sitting on their keyboards waiting for a new paradigm to come along. Police computers have been churning data for decades. A few years ago your blogger, working as a consultant, developed a computerized system for generating gun trafficking leads from ATF tracing data. While it seemed to work well enough, there are never enough variables in the mix, or in the right weights or order, to escape uncertainty. Printouts can't arrest anyone, and it takes plenty of shoe leather to sort through even the most fine-grained information, select likely targets and build a criminal case. At least to this observer, hopes that automation will substitute for cops are a pipe dream.

There are other concerns. At a time when many police departments are so beset with conduct, use of force, corruption and personnel issues that they're on the verge of nervous breakdowns (think, for example, Denver, Indianapolis, Minneapolis, New Orleans, Tulsa and North Carolina), obsessing over data may be a needless distraction. Measures can easily displace goals. Just ask cops in New York City, where more than a few are complaining that pressures from Compstat force them to make needless stops and unworthy arrests. Two well known academics (one is a former NYPD crime analyst) agree.

Alas, no grants are in the offing for rediscovering the craft of policing. Meanwhile, Bill Bratton, Compstat's indefatigable booster, has left government service. Now a top security executive, he continues peddling his theories, albeit under the more expansive label of "predictive policing":

> "I predict [that in] the next five to ten years that predictive policing, we'll be in a position with the information that creates the intelligence that will be available to us that we will be like a doctor, we'll be working increasingly with the diagnostic skills of the various machines they get to work with, the tests they get to do, that is the next era."

Posted 12/21/15

STATE OF THE ART…NOT!

Forensics, six years after the NAS report

By Julius (Jay) Wachtel. It's been six years since an august panel of the National Academy of Sciences (NAS) reviewed the discipline of forensics. Its distinguished members clearly didn't like what they saw. As we summarized in "N.A.S. to C.S.I.: Shape Up!" the Academy's groundbreaking report, "Strengthening Forensic Science in the U.S., a Path Forward" brought into serious question a host of supposedly reliable forensic techniques, including handwriting comparison, the analysis of shoe prints and tire tracks, and the interpretation of burn patterns.

One year after handing out its slap-down the NAS issued a follow-up report, "Strengthening the National Institute of Justice," criticizing America's premier criminal justice organization for lacking the "independence, appropriate leadership, funding, and operational practices that characterize much more successful federal research agencies."

NIJ responded in June 2011 with a jargon-rich "Progress Report" that bragged of substantial gains in each problem area. Three years later the Executive Office of the President (that's President of the *U.S.*) issued its own densely-worded update, boasting of NIJ's many partnerships and its participation in multi-agency "working groups" that sought to develop best practices in key forensic disciplines.

Exactly what these "best practices" are remains a mystery. However, a few months ago the NIJ offered some tantalizing hints. A thin brochure grandly entitled "The Impact of Forensic Science Research and Development" and an online post from the agency's director outlined a series of initiatives that would, among other things, seek to "understand human factors, cognitive bias, and error rates in disciplines such as fingerprint analysis, firearms examinations, and handwriting comparisons" and "improve the interpretation bloodstain pattern analysis by studying factors that can contribute to dramatically different spatter patterns, such as type of fabric, velocity and impact angle."

Well, we're still waiting. As the Feds keep reorganizing, cranking out reports and forming committees to explore issues that the NAS addressed years earlier, the toll of junk science continues to increase. In "toll" we include not only those imprisoned thanks to junk science (see some fresh examples below) but victims of crimes that for lack of forensic expertise or the appropriate tools are never solved. Indeed, whatever relief is forthcoming hasn't come from NIJ but through the work of innocence projects, never-say-die defense lawyers and a few enlightened judges and prosecutors. Here are three recent examples:

- In February, 1980, a townhouse fire in New York took the life of a 27-year old woman and her five children. One year later three men were convicted on multiple counts of murder for setting the fire, thanks in great part to a fire marshal who testified that a "puddle shape" and other factors pointed to the use of accelerants. That, as prosecution and defense experts now agree, was bunk. (It's now believed that the fire's origin was accidental.) Only problem is, it took until last week for the truth to come in. Here's the prosecutor's apology:

"We've concluded that these three men were wrongfully convicted based on weak circumstantial evidence, outdated science and the testimony of a single, wholly unreliable witness who recanted before her death. Even though we cannot give these men back the decades that they spent in prison, with one tragically dying behind bars, justice requires that we, as prosecutors, do the right thing and clear their names."

William Vasquez and Amaury Villalobos were paroled in 2012 after serving thirty-one years. Raymond Mora died in prison.

- In June, 1987, a Texas couple suspected of dealing drugs is found dead, their throats slit. Suspicion focused on a man who supposedly owed the victims money. Two forensic dentists testified that an alleged bite mark on the male victim's arm matched the suspect's teeth to a one-in-one-million certainty. Despite testimony from multiple witnesses who placed him elsewhere at the time of the crime, the defendant was convicted.

  On Monday, October 12, 2015, the Dallas County District Attorney agreed that the bite-mark evidence used to convict the accused was "junk science." After twenty-eight years, Steven Mark Chaney was a free man. His comments were brief. "I could sit and recount all the losses. But this is a time for rejoicing."

  The judge gave Chaney and his fellow celebrants a pumpkin pie.

- Between February and July 1985 two persons were shot dead and one was wounded in a series of violent assaults in Alabama. A suspect was arrested, and his mother's gun was tied by a ballistics "expert" to bullets recovered from the bodies. There was no other evidence. Still, the accused was convicted and sentenced to death. But questions lingered. A full *thirty years later* the state supreme court ordered that physical evidence be reexamined. That's when recalcitrant prosecutors conceded that their experts could not "conclusively determine that any of the six bullets were or were not fired through the same firearm or that they were fired through the firearm recovered from the defendant's home."

  Anthony Ray Hinton was released on April 3, 2015. Considering the circumstances, he was remarkably magnanimous. "I've got to forgive. I lived in hell for 30 years, so I don't want to die and go to hell. So I've got to forgive. I don't have a choice."

Not even DNA is off the hook. In a notorious near-miss, a California man narrowly escaped near-certain conviction for a 2012 murder when it turned out that his DNA, which was found under the dead man's fingernails, was transferred by paramedics who, hours earlier, had treated the suspect for being a passed-out drunk. (He did serve five months, but hey, it beats the chair.) And as we've pointed out before (see "related posts" below) serious concerns remain about the exaggeration of random-match probabilities (click here) and the imprecision caused by mixed and degraded samples (click here and here.)

By all means, keep researching. But instead of the present arrangement, which leaves everything to good intentions and "coordination," we need a respectable centralized entity (are you listening, NIJ?) to draft specific standards, practices and certification programs that govern the use of every forensic

technique, from shoe impressions through DNA. Police, prosecutors and expert witnesses must be held to fixed national rules. Victims of crime and the wrongfully convicted are waiting!

Posted 10/4/14

TAKING THE BITE OUT OF BITE MARKS

Should bite mark evidence go down for the count?

By Julius (Jay) Wachtel. In February 1992 Columbus, Mississippi firefighters found the body of an 84-year old woman inside a smoldering home. She had been murdered with a butcher knife. Two fires were set, apparently to cover up the deed, but neither blaze took hold.

Police didn't discover any biological evidence. However, the victim had injuries consistent with rape. Investigators soon focused on Eddie Lee Howard. He lived nearby and had been in prison twice for sexual assault. Howard was picked up, driven past the crime scene and interrogated. Here is what police detective Dave Turner later wrote:

Again he [Howard] told me that the case was solved and he told me that there was–uh–five or six other individuals involved and to keep investigating the case, that I would find out their roles in this case. Uh–and he asked me if I thought he was crazy. I looked at him and I said, "no, man–you know, I don't think you're crazy" and he said "well I'm not. I'm not crazy" and he said "I had a temper and that's why this happened." And when he said that, I mean shock just went across my body and I felt like at that point this was the guy that had actually committed the murder.

Howard's rambling account, while enough for the cop, hardly made for an airtight case. Howard had serious mental problems, and he would go on to deny committing the crime. Police and prosecutors needed more. According to the pathologist, the victim had suffered bite marks. So the authorities turned to top-gun forensic odontologist, Dr. Michael West. Sure enough, after examining the exhumed corpse Dr. West matched Howard's dentition to bite marks on the victim's neck, breast and arm.

At trial, Howard represented himself. Jurors promptly convicted him and imposed the death penalty. But in 1997 the state supreme court ruled that Howard could not have competently represented himself. A retrial was ordered, this time with a lawyer. He proved equally ineffective. No expert was called to counter Dr. West's testimony, and Howard was again convicted and sentenced to death. These judgments were affirmed by the Mississippi Supreme Court in 2003.

In fact, warning signs about Dr. West had been popping up with some frequency. In 1994 the ethics committee of the American Academy of Forensic Sciences recommended his expulsion for "allegedly failing to meet professional standards of research, misrepresenting data to support a general acceptance of his techniques, and offering opinions that exceed a reasonable degree of scientific certainty." In the same year the American Board of Forensic Odontology (ABFO) cited like reasons for ordering Dr. West's suspension. These moves led a Louisiana judge to set aside the 1994 murder conviction of Anthony Keko, whose dentition Dr. West had positively matched to a bite mark.

There were other disturbing indications of Dr. West's fallibility. In 1992 he gave bite mark evidence in two supposedly unrelated Mississippi murders, leading to the conviction of Kennedy Brewer and, separately, Levon Brooks. Brewer was freed in 2001 when DNA conclusively proved that the real killer was Justin Johnson. Levon Brooks was freed seven years later. Again, the real killer had been Johnson.

But it's not just Dr. West. The Innocence Project faults bite mark evidence for fourteen wrongful convictions that were ultimately set right by DNA. "Only" four of the foul-ups are attributable to Dr. West.

In 2009 the National Research Council landed a seemingly crushing blow on bite mark evidence. Its landmark report, "Strengthening Forensic Science in the United States: A Path Forward," in effect called the technique non-scientific:

The fact is that many forensic tests—such as those used to infer the source of toolmarks or bite marks—have never been exposed to stringent scientific scrutiny.

The ABFO, whose members play a major role in the identification of human remains, continues to offer certification in bite mark analysis. To his credit, Dr. West is no longer in that business. Although he now freely concedes that bite marks are subject to error, Dr. West nonetheless disowns responsibility for Eddie Lee Howard's predicament: "I didn't put him on death row, the State of Mississippi did."

Eddie Lee Howard has spent more than two decades on death row. Meanwhile the mechanism of Mississippian justice grinds on. Last year, on motion of the Mississippi Innocence Project, the state's supreme court ordered that all evidence gathered in the case be comprehensively re-analyzed for DNA. Two weeks ago, Howard's defense team filed a follow-up brief that seeks to vacate his conviction. After an exhaustive search, technicians had found DNA on only a single (yet crucial) item. Here are the key sentences from page 32 of the brief:

A small amount of male DNA was detected on the blade of the butcher knife, the presumed murder weapon.

Y-STR testing was conducted on that sample. The results exclude Howard as the source.

Howard remains on death row.

Posted 10/18/19

TECHNOLOGY'S GREAT – UNTIL IT'S NOT

Police love Rapid DNA and facial recognition but hate encryption. Privacy advocates beg to differ.

By Julius (Jay) Wachtel. DNA's forensic applications date back to 1984, when Dr. Alec Jeffries discovered that he could distinguish between family members by comparing repeat sequences of linked chemical pairs in their genetic code. Within a couple of years he used the technique to assist police, and in the process helped free an unjustly accused man. DNA's usefulness for fighting crime (and exonerating the innocent) quickly became evident, and its use took off.

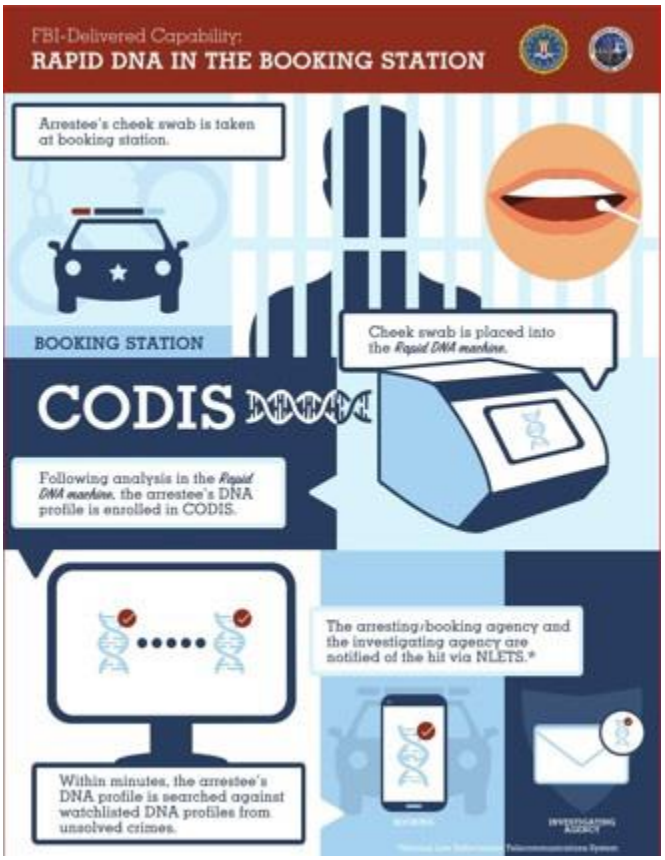
Forensic DNA analysis is couched in probabilities. An absolutely positive match, with the likelihood of error less than one over the population of the Earth, requires that samples have identical linked pairs at each of thirteen standard locations ("loci") in the human genome. (For more on this see our interview with a real expert at "DNA: Proceed With Caution.") Attaining that level of certainty is not difficult when DNA is abundant, say, from a cheek swab. But things can get tricky with crime scene evidence, and especially when the DNA is a mix with multiple contributors.

Processing DNA involves four steps: extracting whatever DNA may be present; measuring its quantity and assessing its quality; using the "PCR" method to make millions of copies of DNA sequences; and finally, separating the DNA molecules, reducing their characteristics to a profile that can be compared with other samples. Each step involves different groups of highly-skilled technicians laboring in clean rooms using specialized tools and expensive machines. Even under the most favorable conditions,

and with the most up-to-date equipment, traditional DNA typing can consume an entire day.

That's why the notorious backlog. Despite an infusion of local, state and Federal funding, the reported "average" wait for results is – hold on! – *five months*. (For information about the Fed's DNA "backlog reduction program" click here.)

Now imagine a lone operator doing it all in less than two hours with a single machine! That's what "Rapid DNA" is all about. First used in criminal casework by the Palm Bay, Florida police department, Rapid DNA has been adopted by many local and state agencies, most recently the Kentucky State Police. So far, though, the newfangled machines work best with substantial quantities of single-source DNA (i.e., cheek swabs) and tend to be flummoxed by small or mixed samples, such as "unknown" DNA found at crime scenes. Accordingly, Rapid DNA profiles are not considered sufficiently trustworthy for inclusion in or comparison with the approximately eighteen million DNA profiles of local, state and Federal arrestees and convicted persons present in the FBI's national CODIS database, which were processed in the old-fashioned, time-consuming way.



However, a major Federal initiative is underway to upgrade Rapid DNA technology so that its output is acceptable for CODIS. If it succeeds, and DNA typing becomes, as the FBI's "infographic" tantalizingly suggests, a routine aspect of the booking process, police could quickly compare crime scene DNA with genetic profiles of most anyone who's run seriously afoul of the law. And yes, its use to that end has been endorsed by the "Supremes." Here's what our nation's highest court said in *Maryland v. King* (2013):

When officers make an arrest supported by probable cause to hold for a serious offense and bring the suspect to the station to be detained in custody, taking and analyzing a cheek swab of the arrestee's DNA is, like fingerprinting

> and photographing, a legitimate police booking procedure that is reasonable under the Fourth Amendment.

At present, U.S. Government agencies collect DNA "from individuals who are arrested, facing charges, or convicted, and from non-United States persons who are detained under the authority of the United States, subject to certain limitations and exceptions" and "to preserve biological evidence in federal criminal cases in which defendants are under sentences of imprisonment." Each State also permits or requires collecting DNA from persons convicted of felonies, and thirty authorize it for certain classes of arrested persons. California, for example, allows DNA typing of everyone arrested for a felony and of a misdemeanor should they have a prior felony conviction.

Although there have been problems with DNA technology, and the legal authority to collect it is occasionally challenged, even the staunchest civil libertarians will concede that when it comes to wrongful arrest and conviction DNA has been an overwhelming force for good. But the advent of Rapid DNA – read, "cheap and quick" – has enabled the technique's use in politically controversial areas.

Such as immigration enforcement. DHS, for example, recently deployed Rapid DNA at the Southern border to combat fraudulent claims by would-be immigrants that the children who accompany them are blood relatives. Its successful use to confirm parentage inspired a Federal initiative that would collect DNA from everyone in immigration custody and transmit it to CODIS. That goal, which was clearly unattainable until Rapid DNA came on scene, was first authorized by a 2008 Federal rule that sought to use DNA "to solve and hold [unauthorized immigrants] accountable for any crimes committed in the United States…before the individual's removal from the United States places him or her beyond the ready reach of the United States justice system." But the ACLU balked. Here's what one of its lawyers said:

> That kind of mass collection alters the purpose of DNA collection from one of criminal investigation basically to population surveillance, which is basically contrary to our basic notions of a free, trusting, autonomous society.

Similar concerns have been voiced about the emerging field of facial recognition. Unlike DNA, the technology used to identify persons from photographs and video images isn't sufficiently trustworthy to use in court. Instead, it's all about generating investigative leads. Thanks to artificial intelligence software, detectives with, say, a robbery video can quickly scour photo databanks – think passports, driver licenses,

criminal record repositories, online social networks and so on – for a match. According to a recent NBC news investigation, that approach can yield impressive results:

> In Colorado, local investigators have foiled credit-card fraudsters, power-tool bandits and home-garage burglars and identified suspects in a shooting and a road-rage incident…The technology has led to the capture of a serial robber in Indiana, a rapist in Pennsylvania, a car thief in Maine, robbery suspects in South Carolina, a sock thief in New York City and shoplifters in Washington County, Oregon.

It's not just about conventional crime. Driver licenses are the predominant tool of everyday identification, so it's important to prevent their fraudulent issue. Motor vehicle agencies (New York State is one) have used facial-recognition technology for years to combat fraudsters who amass multiple licenses under different names.

Yet doubts about facial recognition linger. Accuracy-wise, it's got a ways to go. Even after all the development, it still works best for white males. Erroneous matches for persons of color and, especially, black women, are depressingly common. But just like Rapid DNA, the sharpest criticism is about the threat that facial recognition poses to civil liberties. "The Perpetual Line-Up," a project of Georgetown Law School, warns that there is "a real risk that police face recognition will be used to stifle free speech":

> Of the 52 agencies that we found to use (or have used) face recognition, we found only one, the Ohio Bureau of Criminal Investigation, whose face recognition use policy expressly prohibits its officers from using face recognition to track individuals engaging in political, religious, or other protected free speech.

Alarm that America will mimic China, where video surveillance is ubiquitous, have led the liberal burg's of Berkeley, Oakland, San Francisco and Sorverville, Massachusetts to ban government use of facial recognition technology altogether. Even Detroit has imposed strict controls. A crime-fraught place where more than four-hundred businesses beam continuous video to police, facial recognition is limited to still photos and violent crimes. So forget about using those video streams! Really, had it not been for Police Chief James Craig's supplications to the city council – he promised that police would compare photos with exquisite care – America's one-time "Motor City" would have likely imposed a total, Berkeley-like ban. Still, his mention that facial recognition had already identified many violent criminals enraged activists, who were upset that the technology had been employed without their assent.

Most recently, facial recognition has taken a hit over its use in – you guessed it – immigration enforcement. According to the *Washington Post*, more than a dozen States

are issuing driver licenses or their equivalents to illegal immigrants. Immigration authorities know that, so they regularly turn to those states' DMV databases to run the photos of, say, absconders who fail to show up for their hearings. That's drawn Georgetown Law's ire. According to Clare Garvier, who led the school's research, "it's an insane breach of trust" for DMV offices to knowingly issue licenses "then turn around and allow ICE access" to the photos.

Technology has given police new tools. It's also taken some away. In "A Dead Man's Tales" we wrote of the FBI's struggle to get Apple to give up the passcode for a dead terrorist's cell phone. (Eventually, the Feebs managed to unlock the device on their own.)

But law enforcement's concerns aren't only about "national security." The Internet is a known go-to place for a multitude of odious pursuits. Say, child sex trafficking. Yet service providers seem strangely indifferent. As Exhibit A, consider Facebook's plan to institute end to end encryption for all its messaging services (WhatsApp, Instagram and Facebook Messenger). Determined to make both sides to conversations impermeable to real-time interception (what we used to call "wiretapping"), humanity's most popular social media platform stubbornly resists the notion of incorporating an electronic "back door."

How to move forward? A recent Carnegie report about the struggle suggests that cops forego intercepting "data-in-motion," that is, as it flows in real time. In exchange, they could get (with a warrant, of course) a pass-key for accessing "data-at-rest", meaning what's present on devices they seize. Of course, from the law enforcement perspective that's hardly sufficient. Stripped of the ability to act proactively, police and the Feds would have to content themselves with collecting evidence after the fact; that is, what the bad guys and girls didn't erase. Preventing crime? Minimizing potentially horrific outcomes? Forgedabboud it!

And that "solution," dear readers, is what preeminent members of the American intelligentsia propose. Good thing they're not crooks!

Posted 7/11/10

THE KILLERS OF L.A.

DNA nabs three serial killers in four years, most recently through a familial search

Click here to link to video

By Julius (Jay) Wachtel. From all the hoopla surrounding the arrest of the "Grim Sleeper" (so dubbed because after an unexplained hiatus he supposedly rose to kill again) one would think it marks the end of a decades-long quest to capture the city's most murderous evildoer. Well, think again. Thanks to DNA, LAPD detectives have arrested three – that's right, *three* – serial killers in the last four years, and Lonnie Franklin isn't necessarily the most prolific.

April 30, 2007 was the day that society finally washed its hands of Chester Turner. Convicted of raping and strangling ten women and causing the death of a viable fetus, the middle-aged crack dealer had passed the final two decades of the twentieth century preying on prostitutes in the poverty-stricken neighborhoods that image-conscious politicians recently christened South Los Angeles but locals still call south-central.

In 2002 Turner's imprisonment on a rape conviction led authorities to place his DNA profile in the state databank. One year later an LAPD cold-case detective matched DNA from a 1998 south-central murder to Turner. Assembling profiles from dozens of similar killings, the detective matched Turner to nine more. But there was a glitch. You see, three had already been "solved" with the 1995 conviction of another Los Angeles man, David Allen Jones.

A mentally retarded janitor in jail for raping a prostitute, Jones initially denied killing anyone. Detectives finally badgered him into making incriminating statements

in three cases. Only problem was, as the D.A. later conceded, his blood type didn't match biological evidence recovered from his alleged victims. But prostitutes have complicated sex lives, so prosecutors convinced the jury that this apparent inconsistency wasn't definitive.

Jones was exonerated and freed in March 2004. He was compensated $800,000 for his eleven years in prison.

Well, Turner's DNA *was* present. At trial his attorney argued that it only proved that his client had sex with the women, not that he killed them. Jurors were unswayed. Turner is presently on death row awaiting execution.

During the mid-1970's someone was raping and killing elderly white women in southwest Los Angeles county. After subsiding for a few years the murders resumed nearly forty miles to the east, in the Claremont area. By 2009 there were two dozen, all unsolved.

Meanwhile, back in south-central, detectives were still on the trail of one or more killers, as many more prostitutes were slain than could be attributed to Turner. Finally in 2002 Chief Bratton ordered his troops to form a cold-case squad. Detectives began comparing biological evidence from unsolved cases in south-central to the DNA profiles of sex-crime registrants. One of these was John Thomas, 72, a parolee who had been imprisoned for rape in 1978. Although his DNA didn't match any of the south-central killings, it matched at least two of the southwest homicides. His time in prison also coincided with the interval between the waves of murder, and he was paroled to Chino, not far from Claremont.

Thomas was arrested in April 2009. After more DNA testing he faces trial in seven killings. Detectives think that he is responsible for others as well.

By 2008 the south-central investigation was stalled. All remaining crime-scene DNA had been compared to the DNA profiles of convicted felons in state and federal DNA databanks, without further success. Then, only two weeks ago, detectives received startling news: California's DNA database had a partial match.

DNA identification focuses on thirteen known locations, or "loci," in the human genome. Each contains chemical sequences that are inherited from one's parents. The FBI considers it a match if crime scene DNA and suspect DNA have identical

sequences at no less than ten loci, and there are no dissimilarities. Some analysts and state labs accept fewer. Now, unrelated persons will frequently match at one, two or even three loci, but the odds that they will share chemical sequences at, say, five or more loci are very low. (For more about DNA identification click here.)

A year ago California DOJ launched a familial DNA program, the first in the U.S. California's DNA repository has DNA profiles for most convicted felons. Until recently the practice has been to report no match with DNA profiles submitted for comparison unless a sufficient number of loci (say, ten) are identical, and there are no dissimilarities. Now, in serious cases, the state will provide the name of any felon in its databank whose DNA profile, although not identical to the submitted DNA(dissimilarities exist at one or more loci) is sufficiently similar to suggest a familial relation. (Pioneered in Great Britain, this procedure has also been adopted by Colorado. It's under consideration in other states and by the FBI.)

Detectives finally had their break. State analysts reported that a DNA profile from the south-central killings likely belonged to a brother or the father of a felon in the state databank. And it got better: that profile wasn't from just one killing: it was from *ten*, seven in the late 1980's and three between 2002-2007.

Detectives took on the father, who had lived in south-central Los Angeles for decades, as the likely candidate. Learning that he would be attending a birthday party at a restaurant, an undercover officer bussed his plates, utensils and leftovers. One assumes that yielded a complete, thirteen-loci DNA profile. Analysts compared it to the DNA found on the ten murder victims. There was no question: it was a perfect match.

Four days ago LAPD detectives arrested Lonnie Franklin Jr., 57. Although he has an extensive criminal record, including theft, assault, weapons offenses and, as recently as 2003, for car theft, his DNA had never made it into the state database. Without familial DNA, Franklin would have probably never been caught.

Dozens of south-central killings lack DNA and remain uncleared. However, detectives found guns in Franklin's home, and since some victims were shot they're hoping that ballistics can help. In any event, police are confident that, like Thomas, Franklin committed many more murders than what they can presently prove.

At last report, they think as many as thirty more.

Not everyone thinks highly of familial DNA. While California Attorney General Jerry Brown and police officials enthusiastically call it a "breakthrough," the ACLU's Michael Richter thinks that it could lead innocent persons to be harassed. Winding one's way through family trees, he worries, "has the potential to invade the privacy of a lot of people."

Richter's fears seem overblown. Policing is more likely to threaten privacy interests when physical evidence is lacking. Struggling with its own prostitute serial-killer situation, Daytona Beach recently asked gun stores to identify everyone who bought a certain model of weapon during a two-year period (natch, the NRA is crying foul.) *That's* intrusive, perhaps unavoidably so. DNA, including familial DNA, can prevent years of fruitless interviews and unproductive searches, to say nothing of more killings and a wrongful conviction. When properly used it's everyone's best friend.

Of course, good detective work is crucial. Every time that a new maniac comes to light there's a tendency to go "aha!" and attribute all unsolved homicides to them, risking that some culpable parties will go scot-free. Pressures to clear cases have led to wrongful convictions (remember David Allan Jones?) And as we've pointed out before, multiple DNA contributors and mixed DNA samples can yield ambiguous, even incorrect results. In the end, CSI can't do it alone. Proving that Franklin did more than have sex with his victims will require corroboration, either through statements, other physical evidence (like ballistics) or circumstantially, say, through his whereabouts and activities. It will certainly make for a fascinating trial.

We could also do with a bit of introspection. What in the end detectives skillfully resolved was, for victims and their loved ones, solved far too late. Why did it take until 2002 to mount a cold-case campaign? Would we have responded differently had the victims been different or had the killings occurred in a more affluent area?

And one must wonder. Three killers (one convicted, two alleged) are locked up. Is there a number four?

Posted 11/27/06

THE MYTH OF PROFILING

Pop psychology can lead investigators astray

By Julius (Jay) Wachtel. "That really ordinary guy living next door could be a serial killer." Dave Shiflett of the *Bloomberg News* says that's the lesson we can draw from "Inside the Mind of BTK," John Douglas's new book about the infamous serial killer Dennis Rader, who tortured and murdered ten Wichita women between 1973 and 1991.

But, wait! John Douglas is the most famous FBI profiler ever, an author of several true-crime best sellers and the model for Jodie Foster's superior in "Silence of the Lambs". If a sick puppy like BTK can seem so "ordinary", how could he be identified through profiling?

That, according to a lengthy exposé in *The New Yorker* ("Dangerous Minds," 11/12/07), is the problem. John Douglas and his FBI colleagues told Wichita police that BTK was an American male with a decent IQ, that he drove a decent car, liked to masturbate, was selfish in bed, a loner (but could get along socially), uncomfortable with women (but could have women as friends,) maybe married, maybe not (but if married his wife was younger or older,) and so forth. Thankfully, officers managed to eventually solve the case *sans* profile. Rader was nothing like the FBI suggested. He was married, with children, active in his church and a pillar of the community.

Profiling is one of several psychological techniques, along with investigative hypnosis and the recovery of repressed memories, that gained popularity during the free-wheeling 80's. Although the latter methods have been thrashed for over-promising, under-performing and generally leading investigators astray, profiling lives on, its findings so elastic that they can seldom be disproven.

It's when profilers get specific that the nonsense becomes obvious. On the morning of January 21, 1998, Stephanie Crowe, 12, was stabbed to death in her Escondido (Calif.) home while the family slept. Detectives soon zeroed in on her reticent 14-year old brother, Michael. After relentless interrogation, he confessed and implicated two friends. Both got raked over the coals; one confessed while the other didn't. Police arrested all three. They and prosecutors remained confident in the case even after the coerced statements were suppressed. After all, didn't the FBI profile conclude that the murder was planned? Didn't profilers say that the killer had "familiarity, comfort and knowledge" of the residence and the victim's bedroom?

Months later, while the boys awaited trial, a violent, mentally ill transient whom detectives originally discounted as a suspect (in part because of the FBI profile) was arrested when DNA testing revealed that those spots on his clothes were the victim's blood. Charges against the boys were dropped and the man was convicted and imprisoned.

On November 5, 2003 Gary Ridgway, the "Green River Killer," pled guilty to murdering 48 women in KingCounty between 1982 and 1998. The investigation dragged on for twenty years and several FBI profiles, the first prepared by -- you guessed it -- the celebrated John Douglas. Their conclusions: the killer was likely an unemployed transient who had left the area and was either dead or in prison.

Fortunately, the cops had Ridgway in mind all along. Deputies knew that the married truck driver, a local resident, had a reputation for picking up prostitutes and playing rough. In 2001 new DNA techniques matched Ridgway to four of the victims. He got life without parole.

During the 1996 Atlanta Olympics a bomb exploded in a city park, leaving two dead and more than one-hundred injured. FBI agents immediately focused on Richard Jewell, the security guard who found the device before it detonated and sounded the alarm, undoubtedly saving many. But the FBI didn't see him as a hero. Convinced that the chubby bachelor who lived with his mother fit the profile of a lone bomber, the Feds searched his home and conducted an exhaustive, highly public investigation. Jewell was cleared after two months. But the stain on his reputation never disappeared.

In 2003 police finally caught up with the man responsible. Eric Rudolph had used identical devices to bomb the park and a string of abortion clinics. He confessed and got life without parole.

It's the patina of science that makes profiling so disturbing, lending confidence in conclusions with no more factual basis than the prognostications of a horoscope. Although recent studies seriously challenge the technique's reliability, the FBI's thirty-odd profilers remain on the job, reportedly fielding more than one-thousand requests from local police each year.

More than twenty years after its inception profiling chugs on, the embarrassing detritus of a decade when overburdened police and prosecutors were seduced by the promises of pop psychology. Let's hope it doesn't take us another twenty to rediscover that it's shoe leather, not magic, that solves crime.

Posted 9/20/09

WHAT'S THE D.A. WANT FROM THE SHERIFF?

The DNA lab, of course. Or if he can get it, everything.

By Julius (Jay) Wachtel. Orange County (Calif.) District Attorney Tony Rackauckas is a great fan of forensics. So much so, in fact, that he'd like to run a lab. Wouldn't you know it, there's one next door!

In 2005 Rackauckas got the Board of Supervisors to part with a cool $500,000 so that he could use DNA for property crimes. But rather than going through the Sheriff's lab he contracted with a private forensics firm to do the work. Why? Apparently the Sheriff insisted on controlling the process, something that Rackauckas wasn't willing to give up. Only thing is, CODIS, the FBI's national DNA databank, only accepts profiles from government labs. No problem: Rackauckas entered into an agreement with the Kern County D.A., who runs his own lab, to upload the data.

Two years later, flush with an additional $875,000 in county funds, Rackauckas set up his very own databank. It's accumulated the DNA profiles of several thousand misdemeanants and gang members served with injunctions. One of a smattering of "rogue" repositories around the country, the standalone database isn't bound by State and Federal rules that limit DNA collection to persons arrested or convicted of felonies.

How does Rackauckas get offenders to contribute? Easy -- he "asks." It's an offer that many can't realistically refuse. And now there's an added inducement: going scot-free! Yes, that's right. In exchange for $75 and a DNA sample his prosecutors are dismissing non-violent misdemeanors such as petty theft and drug possession. So

what if a few cops get "demoralized"? As long as petty violators keep coming, what happens to them down the road seems to be of little public concern.

Just like his counterparts in Kern, Sacramento and Santa Clara counties, Rackauckas wants his own lab, or if not the whole enchilada, at least the sexy part, the DNA. His most recent attempt was in June 2008, while the Sheriff's Department was reeling from the resignation of disgraced former Sheriff Mike Carona. Proclaiming his office as "the only organization capable of harnessing the vast potential of forensic DNA technology for our community," he urged Supervisors to place DNA under him.

And he nearly succeeded. Rackauckas' move was temporarily short-circuited, first, by acting Sheriff Jack Anderson, who pointed out that he wasn't consulted, then by the new Sheriff, Sandra Hutchens, who was appalled -- *appalled* -- at the D.A.'s shameless power grab. A transplant from the far more tightly-wound L.A. County Sheriff's Department, her recollection of the experience is almost touchingly naive:

> "I have never experienced anything like it in more than 30 years of law enforcement," recalled Sheriff Sandra Hutchens, who took over the department in the midst of the battle. "I couldn't get my brain around it, and no one I've spoken with could either."

But the struggle wasn't over, not by a long shot. By the time that Hutchens' outrage hit the papers the Supervisors had thrown Rackauckas a consolation prize, appointing him to a newly created Sheriff's lab oversight panel. Its two other members are Hutchens and the County Administrative Officer, the latter clearly there as a referee. (Hutchens was so put off by the whole experience that she memorialized it in the official Orange County Sheriff's Blog.)

Well, why *shouldn't* the D.A. run a lab? In 2005 Orange County resident James Ochoa was arrested for carjacking. Ochoa, who had a drug record, was identified by two victims, and a bloodhound also followed a scent from a baseball cap left in the vehicle to his home. But the O.C. Sheriff's criminalist who processed the cap and other items recovered from the car determined that the DNA wasn't Ochoa's. Her report displeased the head of Rackauckas' DNA program, Deputy D.A. Carmille Hill, who marched into the lab and demanded that Ochoa not be excluded.

Her request was rebuffed. Still, the D.A.'s office wouldn't drop the charges. Threatened by a judge with a stiff prison term if convicted, Ochoa was unwilling to roll the dice. He pled guilty and got two years. Ten months later the DNA was

positively matched to a suspect in another carjacking. Oops! Ochoa got a $550,000 settlement from the cops and $31,700 from the State.

Concerns about such unholy influences prompted a National Academy of Sciences panel to suggest that labs be independent of law enforcement. To their credit, though, accredited labs subscribe to protocols specifically designed to prevent such pressures. But prosecutors who think they're only there to convict could make enforcing safeguards problematic. Knowing just how unyielding D.A.'s can be when they're convinced they're right -- and the Ochoa case is a perfect example -- that's an uncomfortable prospect.

DNA is also an expensive tool. A recent study of its use in property crimes estimates the average per-case cost of typing and entering profiles as $374 in Orange County, which processes DNA in-house, and $1147 in Los Angeles, which uses an external lab. (Evidence collection costs aren't included). When there's a possible hit DNA costs soar, averaging $13,000 per arrest in Los Angeles and nearly $20,000 in Orange County. And that doesn't include the expense of creating and maintaining a DNA facility, nor of training and certifying investigators and examiners.

Supervisors have dumped more than one and a third million bucks into Rackauckas' DNA programs. There's no indication that their generosity was based on a comprehensive review of Orange County's criminal justice needs. Maybe a study would demonstrate that a back-room DNA operation is a good idea. But giving someone money because of their political juice never is.

Ah, your blogger forgot. This is Orange County. *Never mind*.

Posted 11/8/09

WOULD YOU BET YOUR FREEDOM ON A DOG'S NOSE?

Dog scent evidence comes under fire

Click here to link to video

By Julius (Jay) Wachtel. "Jag" and "James Bond" are bloodhounds. They drool a lot but they're nice dogs. And if you believe their caregiver, Fort Bend County (Texas) Deputy Sheriff Keith Pikett, they're also CSI specialists, with a sense of smell so keen and an intellect so refined that, far more than just following a scent, they can match suspects to crime scenes and accurately convey their findings.

Michael Buchanek knows these pooches only too well. One day in March 2006 the retired Texas sheriff's captain answered his door. It was deputies from his old agency, armed with a search warrant. Buchanek's neighbor Sally had been found strangled in a field five miles away, and Pikett's dogs had supposedly followed a scent from the rope used by the killer to Buchanek's home.

Using dogs to track scents is old news. Deputy Pikett and other practitioners of "scent lineups" go it one better. They set up cans in a field. One contains something of the suspect's, say a shirt, while inside the rest are items belonging to others. Dogs are exposed to a scent from the crime scene and then walked around the cans to see if they alert.

Pikett had been running these tests throughout Texas, where his methods were considered good as gold. He did it this time and reported that, yes, a dog alerted on Buchanek's can. Convinced that their former colleague was a killer, detectives

pressed him to come clean. But Buchanek *had* come clean. He didn't kill anyone and wasn't about to falsely confess.

Buchanek went through hell for five months. Luckily for him, police finally found the real murderer, who pled guilty. Victoria County Sheriff Michael O'Connor was unfazed. "We did the right thing, and the wrong person wasn't convicted."

A recent report describes Deputy Pikett's unusual career. A college graduate with an undergraduate degree in chemistry and a master's in sports science, Pikett became interested in bloodhounds. By the early 1990's he was volunteering their services to Texas law enforcement agencies, at first for tracking, then for scent lineups. Although he lacked training in dog handling, followed no protocols and made wild claims of accuracy (his dogs were wrong only once in thousands of trials; they could identify scents many years old) his testimony helped win many convictions. Fort Bend County soon swore him in as a deputy. When a 2002 Texas appeals court opinion declared Pikett a bonafide expert his star rose higher. A Houston citizens' group named Pikett officer of the year.

That niggling little misfire with Buchanek didn't slow him down. In 2007 he helped Houston police arrest Ronald Curtis for a series of burglaries, and Cedric Johnson and Curvis Bickham for a triple homicide. Curtis spent eight months in jail before the real perpetrator was caught. Johnson was incarcerated sixteen months before he was cleared; Bickham, eight.

Pikett's error-plagued sniff-a-thon continued. In early 2009 he gave Yoakum County authorities what they needed to arrest Calvin Miller for rape and robbery. When Miller was quickly cleared by DNA Pikett's reputation finally began to tumble. In June 2009 a judge in Pikett's own county ruled that his methods were unreliable. Bad news traveled fast, and everyone he wrongly fingered wound up suing Pikett and the agencies that used him.

Pikett isn't the only cop charlatan who's touted canines as ID machines. Pennsylvania trooper John Preston testified in more than 100 cases between 1981 and 1984. In 1981 he used a scent lineup to nail Florida murder suspect William Dillon. One year later his dogs linked another Florida man, Wilton Dedge to a rape. Both were convicted at trial. Decades later DNA proved their innocence; by then Dillon had served 27 years, Dedge, 22.

As scent evidence became more popular technology stepped in. Manufactured in California, the STU-100 "scent transfer unit" purports to suck human scent onto a gauze pad that dogs can sniff. This device was used in the investigation of James Ochoa, arrested in a 2005 carjacking after a bloodhound followed a scent from the

vehicle to his home. Threatened with a long prison term, Ochoa pled guilty and got two years. Ten months later DNA proved that another person was the real culprit. Ochoa was released and awarded nearly $600,000. The STU-100 figured in the 1998 arrest of Jeffrey Grant for rape (held four months, he was cleared by DNA and awarded $1.7 million), and the 2003 arrest of Josh Connole for a string of arsons (held briefly, he settled for $120,000 after the real perpetrator was caught.)

Trained canines *can* track scents and detect vapors emitted by drugs and explosives. When the proof is in the pudding -- one either finds dope or a bomb, or not -- false alerts (and they *do* happen) can't lead to a miscarriage of justice. But using a handler's interpretation of their dog's behavior as evidence is extremely risky. Lacking a scientific underpinning and validated performance standards, scent comparisons and lineups are nothing more than voodoo. Dogs aren't calibrated instruments. As living things they are subject to many influencers, yet unlike their handlers they can't be cross-examined. Could they have been affected by subtle, perhaps unintended cues from their handler? Might they simply have alerted in error?

In 2007, after spending two years locked up because he couldn't make bail, Riverside County (Calif.) resident Michael Espalin went on trial for setting twenty-one brushfires. The prosecution's principal witness, junior college biology instructor Lisa Harvey, testified that her bloodhound Dakota tracked a scent from a charred incendiary device to Espalin's home. Dakota also supposedly matched Espalin's scent to fire scene vapors collected with a STU-100. According to Harvey the dog could detect scents eight years old. "I don't know how [scent] stays around for eight years. I just know that it does."

Jurors didn't buy her testimony, hanging 9-3 for acquittal. Harvey wasn't used at the second trial, and Espalin was found not guilty. Taking a cue from Deputy Pikett's victims, he's now suing both Harvey and the authorities. One can only imagine how deeply taxpayers will have to dig into their pockets this time.