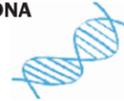
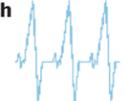
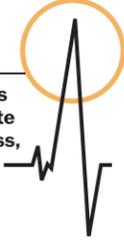
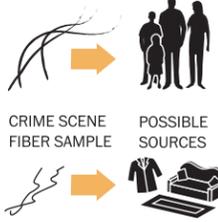
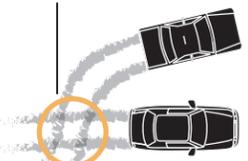
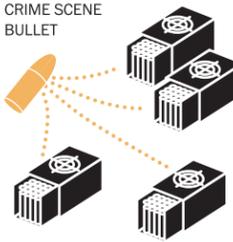


SECRET ERRORS: SUSPECT SCIENCE

How accurate is forensic analysis?

Many forensic techniques were developed in crime labs to aid investigators, and research into their limits or scientific validity was never a priority. Except for DNA, no method has been shown to be able to consistently and accurately link a piece of evidence to a person or single source.

	Scientifically validated	Not yet validated				Abandoned		
	<p>DNA</p>  <p>COLLECTION AND ANALYSIS DNA segments from with sample are compared with DNA profiles collected from convicted felons, crime scene investigations and unknown sources. Scientists calculate the probability that two DNA profiles are from different people.</p>	<p>Fingerprint</p>  <p>A crime scene print is compared with a suspect's print or with those in a database. Analysts compare factors such as ridge count, shape, thickness, creases and scars, and determine matching feature "points."</p>	<p>Handwriting</p>  <p>Handwritten word and letter combinations in a document are compared with those of a known source.</p>	<p>Polygraph</p>  <p>Polygraph equipment measures the variability of a person's heart rate, blood pressure and respiratory rate when the person is asked a series of questions.</p>	<p>Firearm evidence</p>  <p>Bullets and shell casings are measured to determine caliber and examined for striation marks transferred from a gun barrel or for other impressions. Marks are compared with data collected from crime scenes or test firings.</p>	<p>Hair and fiber</p>  <p>Hair-sample characteristics such as color, shaft thickness and length are compared with hairs from a known source. Fibers from clothing, carpet, rope, etc., are analyzed to determine type of material and environmental exposure.</p>	<p>Pattern and impression (tire tracks, bite marks)</p>  <p>Characteristics of a tire impression are compared with the tire suspected of leaving the track. Bite marks are compared with dental casts of a suspect. The method can also be used to exclude people of interest.</p>	<p>Bullet lead composition</p>  <p>A bullet is analyzed to determine the amount of lead or other chemicals it contains. Information is traced to a manufacturer, point of production, distribution or sale.</p>
<p>WEAK POINTS IN RELIABILITY</p> <p>Errors can occur if DNA samples are damaged or contaminated from improper handling. Limited numbers or mixtures of DNA profiles can increase misinterpretation of results.</p>  <p>Damaged DNA sample</p>	<p>Matching and interpreting prints can be subjective and vary between examiners, whose level of training can range from formal programs to informal monitoring.</p>  <p>Matching "points"</p>	<p>Handwriting from the same person can be naturally inconsistent.</p> <p>Sample 1 FROM JOHN DOE</p>  <p>Sample 2 FROM JOHN DOE</p> 	<p>Interpretations of body changes registered by polygraph equipment can be subjective. Such changes can be caused by anxiety rather than guilt.</p>  <p>Heart rate fluctuations may indicate nervousness, not guilt.</p>	<p>Marks on bullets are not necessarily unique to a specific firearm.</p>  <p>CRIME SCENE BULLET POSSIBLE FIREARM SOURCES</p>	<p>Hair and fiber cannot be identified to one source. Hair comparisons must be confirmed by mitochondrial DNA analysis.</p>  <p>CRIME SCENE HAIR SAMPLE POSSIBLE SOURCES</p> <p>CRIME SCENE FIBER SAMPLE POSSIBLE SOURCES</p>	<p>Impression samples degrade quickly.</p>  <p>Visually matching impressions to sources can be subjective and varies between examiners. Skin may not accurately or consistently register bites.</p>  <p>CRIME SCENE BULLET</p>		

Source: National Research Council of the National Academies
CRISTINA RIVERO/THE WASHINGTON POST

U.S. crime lab failures since 2002 *In the past decade, breakdowns have been reported at all levels, including in eight of the nation's 20 largest cities. Errors involved many disciplines, and some went unreported for years.*

FEDERAL LEVEL

Year	Discipline	Agency and type of failure
2012	Hair	FBI: The agency evaluates whether to retest hair evidence in convictions over three decades after reports that agents delivered misleading testimony or erroneous "matches" based on flawed scientific methodology.
2010	DNA	Army: A DNA analyst caught "dry-labbing" — reporting results of tests he did not perform — also committed errors in more than 100 cases over 10 years. An audit faulted management's response and its failure to detect the problem, retain evidence or notify defendants.
2007	Bullet lead	FBI: The agency disclosed all bullet-lead case files over four decades and invited outside review of convictions after it was revealed that it had abandoned the technique of tracing crime scene bullets to manufacturers' batches, or even boxes of ammunition, in 2005 because scientists had discredited its scientific methodology.

STATE LEVEL

Year	Discipline	Agency and type of failure
2011	Toxicology	Indiana Department of Toxicology: An audit of 3,200 tests found errors in 61 marijuana and 272 blood and urine tests. Management notified prosecutors in 2008 but failed to report problems to defendants.
2010	Serology	North Carolina State Bureau of Investigation: A murder exoneration exposed the lab's 16-year practice of reporting positive preliminary test results for the presence of blood but not disclosing later, confirmed test results that were negative.
2008	Toxicology Drugs DNA Firearms	Washington State Patrol: A lab director resigned after news reports of recurring DNA contamination and errors, sloppy drug analysis and failed proficiency tests. Over seven years, a manager signed false statements that she tested breath-test-machine solutions. Also, a firearms examiner made errors in three cases.

LOCAL LEVEL

Year	Discipline	Agency and type of failure
2010	Drugs	Nassau County, N.Y., Police Department: The state inspector general found a history of competency, training and supervision problems. Retesting of drug evidence affected charges in three criminal cases and revealed inconsistencies in over 10 percent of reviewed cases. The lab's drug section was shut. Reviews were recommended for every lab unit.
2009	Drugs DNA	San Francisco Police Department: After a technician was found taking drug evidence for personal use, increased scrutiny exposed systematic evidence storage problems. Instances of DNA samples being switched or not being submitted for database searches were reported.
2009	Toxicology	San Diego County, Calif., contractor: Lab errors by a sheriff's office contractor led to the release of 11 defendants and the review of 675 blood and urine drug tests.
2009	Toxicology	Colorado Springs Police Department: More than 200 errors in DUI blood tests were uncovered in a quality-assurance check.
2009	Evidence	Douglas County, Neb., Department of Corrections: The state crime chief was convicted of fabricating evidence in a wrongful 2006 conviction of two men for murder.
2008	Fingerprint	Los Angeles Police Department: An internal report revealed that false fingerprint matches led to two wrongful arrests, prompting a review of 1,139 cases handled by six agents. Critics faulted training, supervision, facilities, evidence handling and analyst competency.
2008	Firearms	Detroit Police Department: The police lab was closed after errors were found in 10 percent of 200 criminal cases involving firearms tests, prompting several retrials.

Year	Discipline	Agency and type of failure
2008	DNA	Baltimore Police Department: DNA analysts contaminated evidence, a fact uncovered when 12 of 2,500 unknown samples entered into a database belonged to lab workers.
2008	Firearms	Nashville Metro Police: The lab's firearms unit was closed after examiners were found making errors, lacking qualifications or falsifying records.
2007	Drugs	New York Police Department: The state inspector general faulted management's response to examiner misconduct and poor training and supervision, reporting that the lab director knowingly failed to report competency tests and that technicians may have issued lab reports with overstated results.
2007	Fiber Stains	Santa Clara County, Calif., district attorney: The chief of the district attorney's crime lab was replaced after a murder case was dropped and a man was exonerated of an armed-robbery conviction. Both cases involved the methodology and supervision of a 25-year-veteran fiber and stain examiner.
2004	Serology Hair	Cleveland Police Department: Exonerations revealed that an analyst had intentionally fabricated serology evidence and provided false testimony on hair.
2002, 2009	DNA Fingerprint	Houston Police Department: The police lab's DNA division was shut in 2002, remaining closed for several years, because of problems with examiner training, supervision, testimony and evidence storage. Evidence was retested in thousands of cases. In 2009, an audit found irregularities in more than half of fingerprint cases sampled, triggering a review of more than 4,300 cases.

SPENCER S. HSU/THE WASHINGTON POST; SOURCES: NEWS ACCOUNTS AND PUBLIC RECORDS