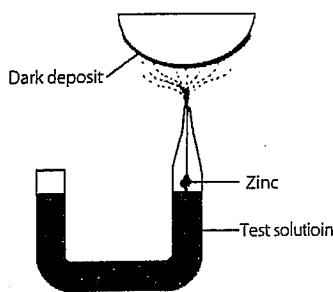


Leeuwenhoek's microscope



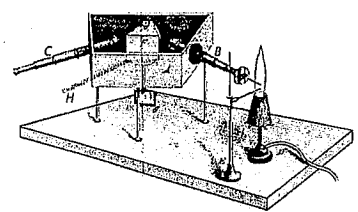
Marsh test apparatus

In 1849 J. W. Webster, professor of chemistry at Harvard, was accused of murdering George Parkman, M.D. The body had been dismembered and the head burned in a furnace, however, blocks of porcelain teeth were found in the ashes. Dr. Parkman's dentist recognized the dentures as some he had made for the victim. Eventually Webster confessed and was hung.

- AD 66 Nero murders his wife and presents her head on a dish to his mistress. She identifies the head as Nero's wife by two discolored front teeth.
- 1149 King Richard I of England creates the job of coroner to investigate questionable deaths.
- 1248 The Chinese book *Hsi Duan Yu* describes how to tell a drowning victim from one who has been strangled.
- 1514 The earliest known use of blood spatter evidence is a trial in London in which the defendant, Richard Hunne, had been jailed for heresy then convicted of suicide, post mortem.
- 1598 Fortunatus Fidelus is the first to practice forensic medicine in Italy.
- 1609 Francois Demelle publishes the first treatise on systematic document examination.
- 1670 The first high-powered microscope is constructed by Anton Van Leeuwenhoek of Holland.
- 1732 Luigi Galvani discovers that the human nervous system transmits information electrically; this is the basis of current lie detection equipment.
- 1776 The body of General Joseph Warren, killed at the Battle of Bunker Hill, June 17, 1775, is disinterred from a mass grave and identified by Paul Revere, who had made his false teeth.
- 1784 The first documented case of physical matching occurs when an Englishman is convicted of murder because the torn edge of a wad of newspaper in a pistol matches a piece remaining in his pocket.
- 1810 The first detective force, the Sûreté, is established in Paris.
- 1813 Mathiew Orfila, considered the father of modern toxicology, publishes his book on the subject. Poisoning was a popular way of dispatching people.
- 1835 Scotland Yard, London's detective force, is the first to use bullet comparison to catch a murderer.
- 1836 James Marsh discovers a very sensitive chemical test to detect arsenic compounds.
- 1840 Forensic toxicology is first used to convict Marie Lafarge, by use of the Marsh test, of poisoning her husband with arsenic.
- 1850 For the first time, a murderer is convicted in the United States based on dental evidence.



- 1856 William Herschel, working in India, uses thumb-prints on documents to identify workers.
- 1859 Gustav Kirchhoff and Robert Bunsen develop the science of spectroscopy.
- 1863 The first presumptive test for blood is developed, using the fact that hemoglobin oxidizes hydrogen peroxide.
- 1879 Frenchman Alphonse Bertillon develops a system to identify people using body measurements.
- 1880 Scotsman Henry Fauld, working in Tokyo, uses fingerprints to eliminate an innocent burglary suspect.
- 1887 Arthur Conan Doyle publishes his first Sherlock Holmes story, *A Study in Scarlet*.
- 1888 American George Eastman invents the first hand-held camera. He calls it the "Kodak" camera and retails it for \$25.
- 1889 Alexandre Lacassagne publishes a text on matching bullets to individual gun barrels.
- 1892 Francis Galton, a nephew of Charles Darwin, publishes his book on fingerprints and their use in solving crimes.
- 1892 Argentina becomes the first country to replace the Bertillon system of measurements with fingerprints when Juan Vucetich solves a particularly gruesome murder using bloody fingerprints.
- 1894 Alfred Dreyfus is convicted of treason in France based, in part, on mistaken handwriting identification by Bertillon.
- 1896 Edward Henry develops the prototype fingerprint classification system now used in Europe and the United States.
- 1900 Scotland Yard adopts the Galton-Henry system of fingerprint identification.
- 1900 Austrian Karl Landsteiner identifies human blood groups. In 1930 he receives a Nobel Prize for this work.
- 1901 Paul Uhlenhuth develops the precipitin test, which distinguishes between human and animal blood. The test was used in the murder conviction of Ludwig Tessnow in the same year.



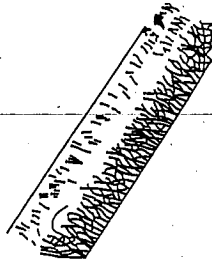
Spectroscopy apparatus

A couple confessed to murdering a man named Gouffe for his money. A body found in a sack in the Rhone River some time later was identified as the victim by Lacassagne through some remarkable detective work. He established that the murder victim had walked with a limp and had suffered inflammation of one ankle and water on the knee. The corpse's height and age were assessed through his bones and teeth. All these details were the same as the murdered man, but Gouffe had had brown hair, and the corpse's was black. Lacassagne had observed in previous studies that hair could change color inside a coffin. When it was learned that the murderers had originally placed the body in the sack in a trunk, which had broken open in the river, the identification was complete.

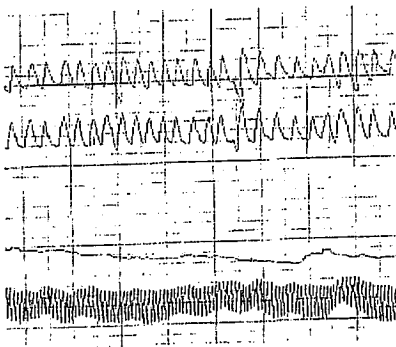
Blood Type	Antigens	Antibodies
A	A	B
B	B	A
AB	A & B	None
O	None	A & B



Edmond Locard
1877-1966



Human hair

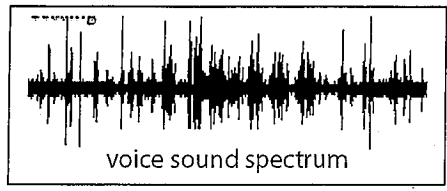


A lie detector polygraph

In ancient India a grain of rice could be used as a lie detector. The suspect was asked to chew a grain of rice then spit it out. A suspect who couldn't because his or her mouth was too dry was declared guilty.

- 1902 Harry Jackson, a burglar, becomes the first Englishman to be convicted solely on the basis of fingerprints.
- 1903 Two convicts with the same name and same anthropometry (Bertillon) measurements are found in Fort Leavenworth prison. Two years later, their fingerprints are found to clearly distinguish between them.
- 1903 The New York City Police Department starts to create fingerprint files of arrested persons. This system is adopted by the New York State Prison system two years later.
- 1904 Edmond Locard formulates his famous principle, "Every contact leaves a trace."
- 1905 President Theodore Roosevelt establishes the FBI.
- 1906 Bite mark evidence is first used in an English court to convict two hungry burglars using teeth marks found in cheese at the scene.
- 1910 The first police crime laboratory is started in Lyon, France, by Edmond Locard.
- 1910 Victor Balthazard publishes the first comprehensive study of human and animal hair. He also uses photographic enlargements of bullets and cartridge cases in an attempt to connect an individual bullet to a particular weapon.
- 1910 American Albert Osborne publishes the seminal treatise *Questioned Documents*.
- 1915 Italian Leone Lattes develops a method for determining the blood group of dried bloodstains.
- 1920s Russian paleontologist Michael Gerasimov develops a method to reconstruct facial appearance from a skull. He is later popularized as the character Andreev in the detective novel *Gorky Park*.
- 1920s German investigator George Popp uses botanical and soil identification in solving a crime.
- 1921 The first lie detector is built by John Larson, a University of California medical student.
- 1922 A Nobel Prize is awarded to Englishman Francis Aston for developing the mass spectrometer.
- 1923 The Los Angeles Police Department establishes the first police laboratory in the United States.
- 1923 In the court case *Frye v. United States*, polygraph test results were ruled inadmissible, bringing about the concept of "general acceptance," or evidence accepted by the scientific community.
- 1932 The FBI crime laboratory is created.
- 1937 Walter Specht finds that the chemical luminol glows in contact with latent blood.
- 1940 Landsteiner and Wiener describe Rh blood groups.

1941 Voiceprint identification is first studied at Bell Labs in New Jersey.

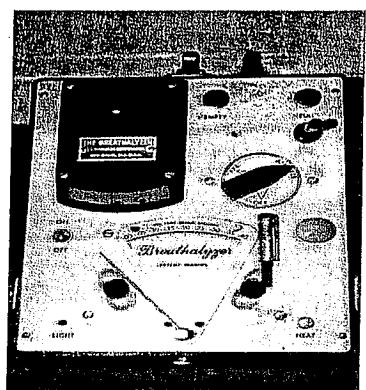


1948 Keith Simpson launches the science of bite mark analysis (forensic odontology) when he examines bite marks on a dead woman.

1950 The American Academy of Forensic Science is founded in Chicago.

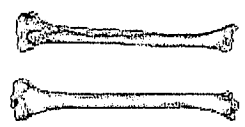
1952 British researchers Martin and Synge receive the Nobel Prize for their invention of gas-liquid partition chromatography, a powerful method of analyzing mixtures of drugs and poisons.

1954 R. F. Borkenstein, a captain in the Indiana State police, invents the Breathalyzer for field sobriety testing.



1955 The murder trial of Dr. Sam Sheppard publicizes blood spatter evidence, as well as inspiring several movies, TV programs, and books.

1957 The growth stages of skeletal bones are identified by Americans Thomas Mocker and Thomas Stewart, forming the basis of forensic anthropology.



1959 James Watson and Francis Crick discover the DNA double helix.

1960 Gas chromatography is used for the forensic identification of petroleum products.

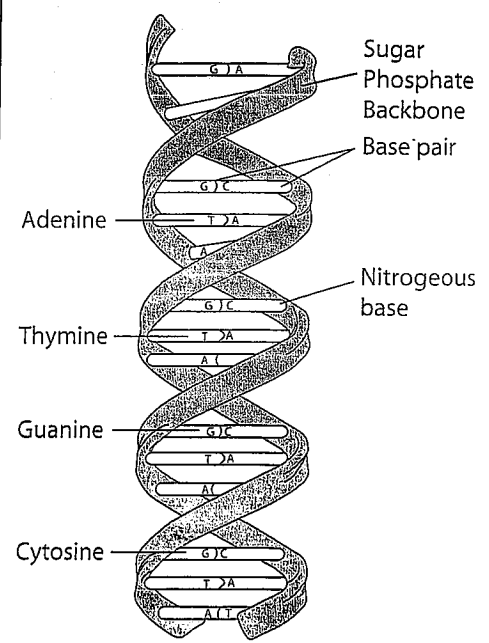
1973 Canada's Royal Canadian Mounted Police (RCMP) finish computerizing their fingerprint files.

1975 The Federal Rules of Evidence are enacted.

1977 In Japan investigators accidentally discover that superglue develops latent fingerprints.

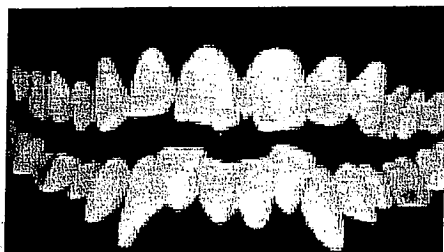
1977 A limited computerized scanning mechanism is first used to develop a database in forensic science by the FBI's Automated Fingerprint Identification System (AFIS).

1978 Britain's Yorkshire Ripper case highlights the value of computers in investigating serial killings and leads to the development of "psychological profiling" techniques in the following decade.

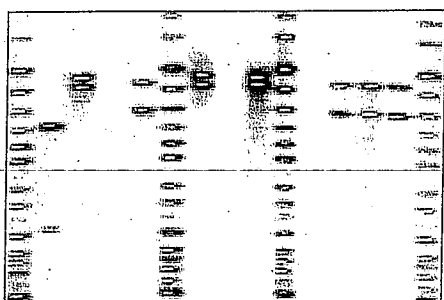


DNA double helix

Peter Sutcliffe, called the Yorkshire Ripper, was arrested in 1981 after killing thirteen women in northern England. He battered his victims with a ball-peen hammer then stabbed them. If descriptive details about Peter Sutcliffe, such as shoe size, blood type, and the like, had been stored on a computer, he probably would have been questioned further when he was picked up the first time, and the detectives working on the case would have known that he had been interviewed before. Thus, a few lives could have been saved.



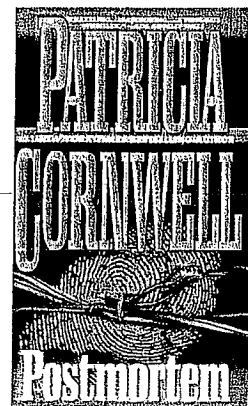
Replica of Ted Bundy's teeth



DNA fingerprint

This list offers a host of possible research topics. What is the story of Archimedes and the gold crown, or was it coinage? How did Bertillon develop the system of body measurements for identification? What is the scope of the FBI databases? Students may choose their own topic for research and make a presentation for the whole class. Each presentation lends itself to the creation of a poster, which can then be placed in or outside the classroom.

- 1979 Bite mark evidence is a key in convicting serial killer Theodore "Ted" Bundy.
- 1984 Professor Alec Jefferies discovers that each human being has unique DNA, except in the case of identical twins.
- 1986 The polymerase chain reaction (PCR) DNA replication technique is developed specifically for forensic use by Cetus Corporation.
- 1987 DNA profiling is used to identify Colin Pitchfork as the murderer of two girls in England and to exonerate someone previously suspected of the murder. Three months later, the same techniques are applied to convict Tommy Lee Andrews for a series of sexual assaults in Florida.
- 1990 Author Patricia Cornwell's first novel, *Postmortem*, is published featuring good forensic science, as do more than ten subsequent books.
- 1991 A computerized, automated imaging system is introduced for comparing marks of bullets and shell casings. It is called the Integrated Ballistics Identification System, or IBIS. The following year, a similar system, called Drugfire, is introduced in the FBI.
- 1993 In the court case of *Daubert v. Merrell Dow*, the court changes the standard of admission of scientific evidence.
- 1996 Computerized searches of the AFIS fingerprint database are implemented by the FBI, using both live scan and card scan devices.
- 1996 Mitochondrial DNA typing is admitted in a U.S. court for the first time.
- 1998 An FBI DNA database, NIDIS, is initiated.



METHODOLOGY

A fundamental principle of investigation for every crime scene comes from Edmond Locard, a forensic investigator in the early 1900s. Locard strongly believed that a criminal could be connected to a crime by trace evidence collected at the crime scene. He stated that:

