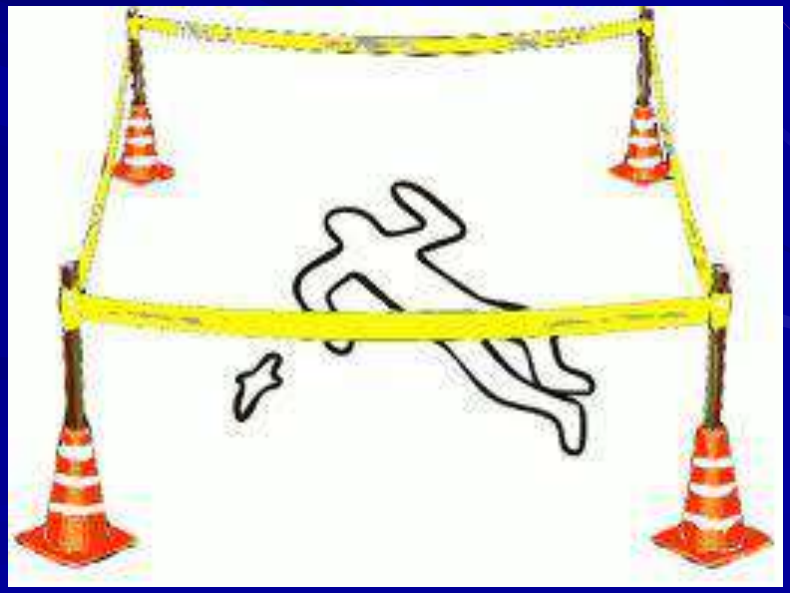
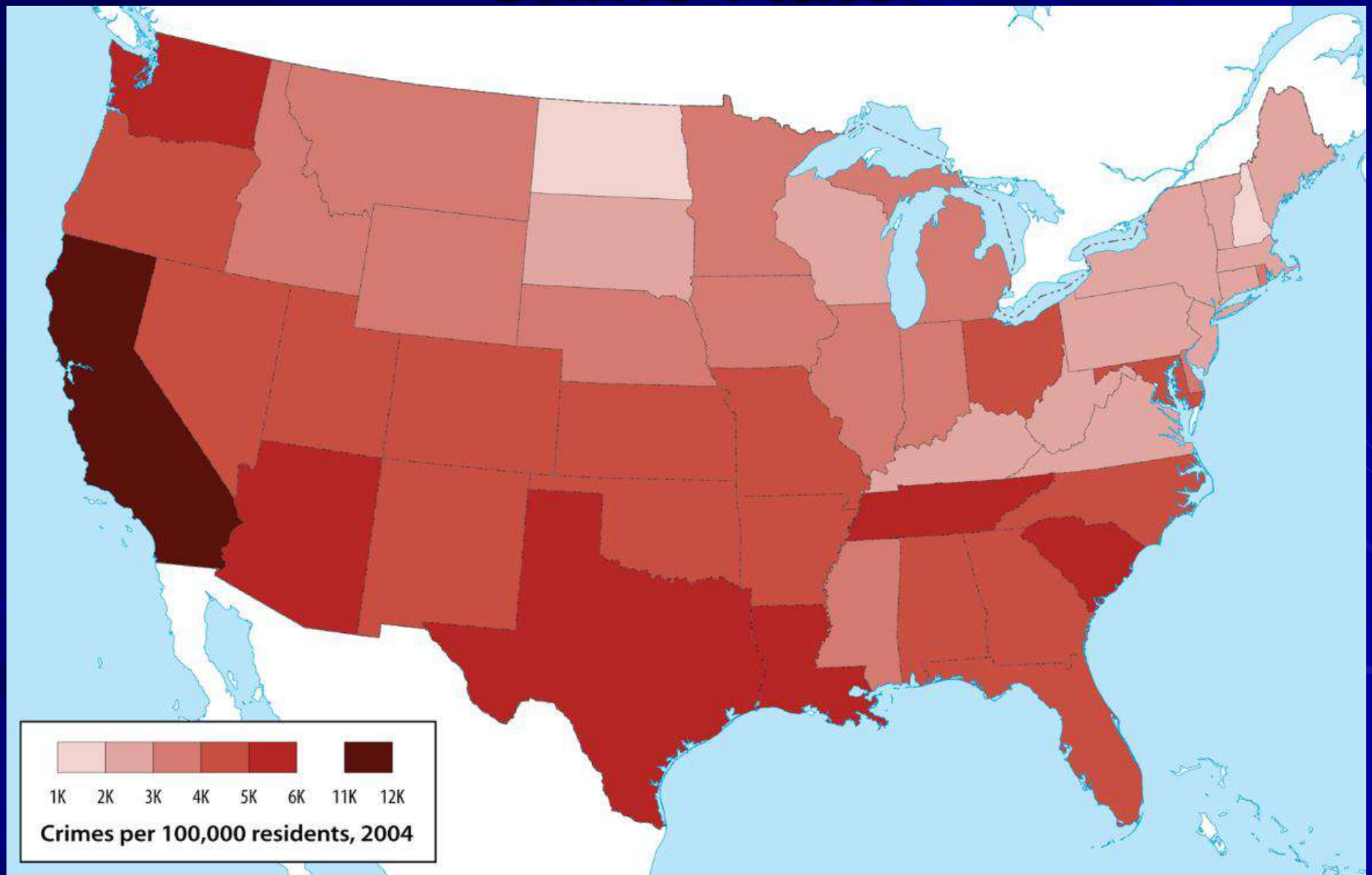
History of Forensic Science

Why do we look to science for assistance in our legal system?

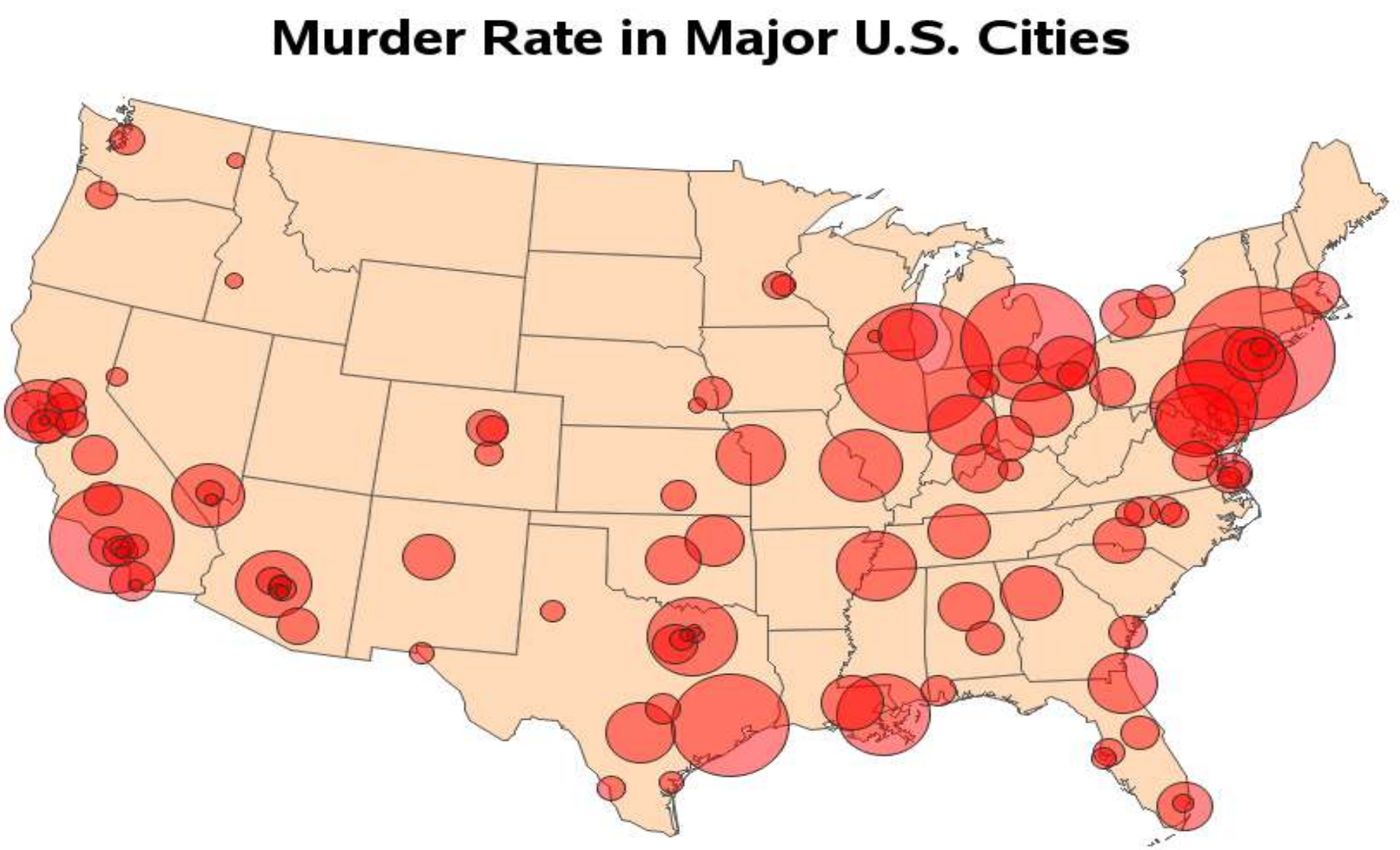
- Increasing Crime Rates
- New or Changed Laws
- New Crimes
- New Weapons
- Response to Public Concerns
- Response to Law Enforcement Concerns



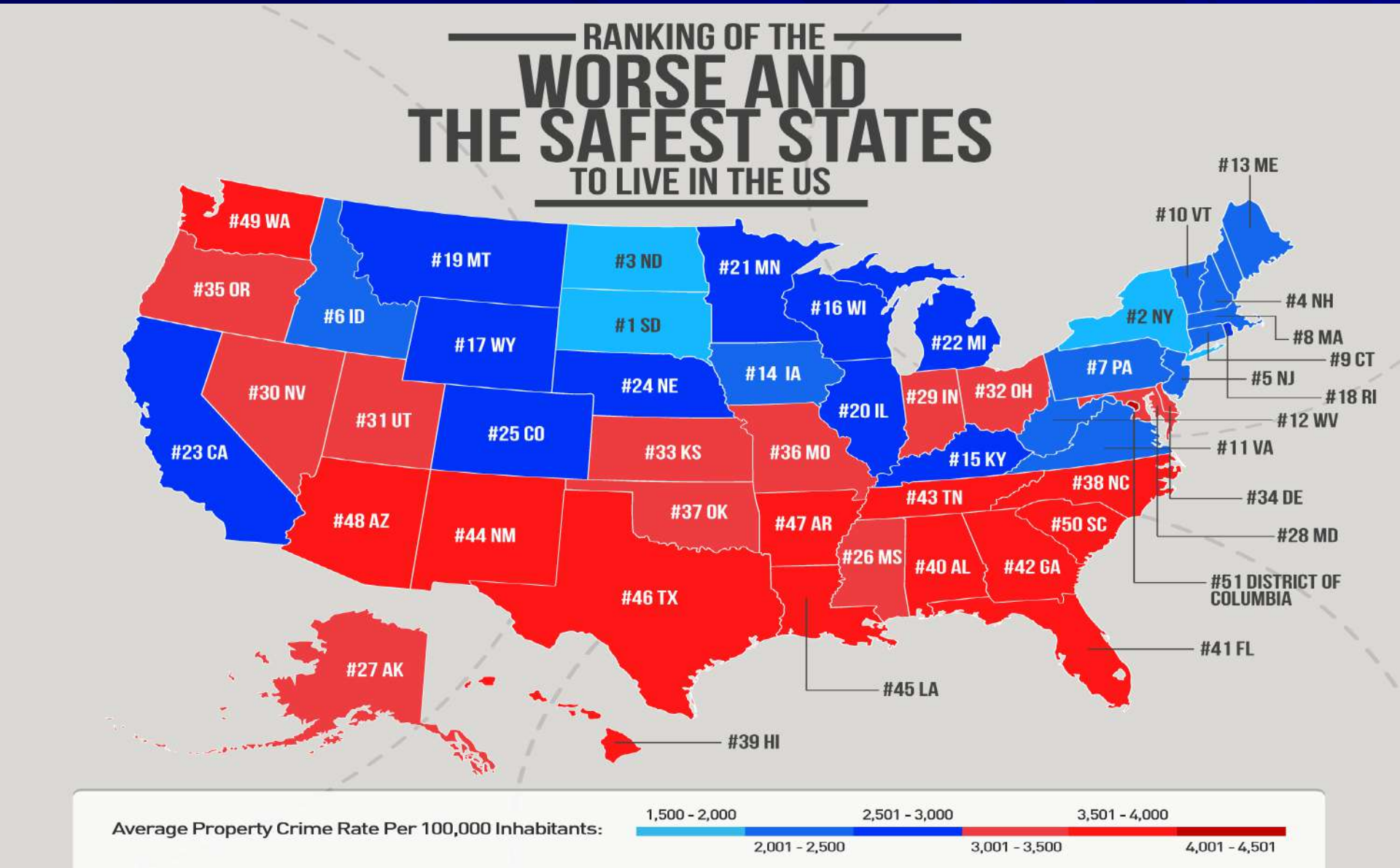
Crime Rate



Crime Rate

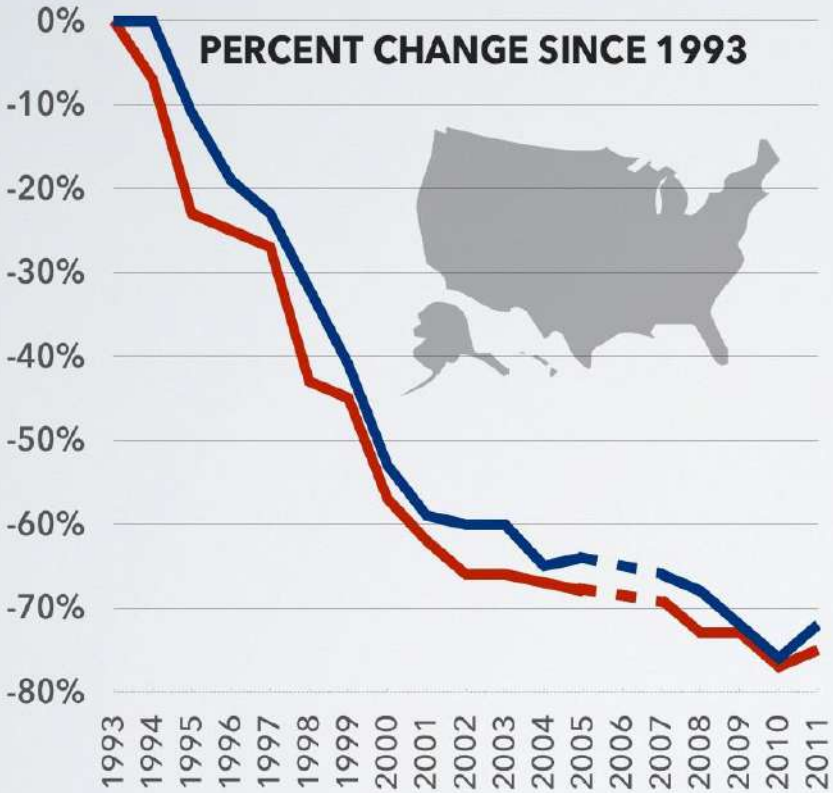

Murder Rate in Major U.S. Cities
Data Source: 2009 data from census.gov

Crime Rate


RANKING OF THE
WORSE AND
THE SAFEST STATES
TO LIVE IN THE US
#49 WA
#35 OR
#6 ID
#19 MT
#3 ND
#1 SD
#21 MN
#16 WI
#22 MI
#17 WY
#24 NE
#14 IA
#20 IL
#29 IN
#32 OH
#2 NY
#7 PA
#13 ME
#10 VT
#4 NH
#8 MA
#9 CT
#5 NJ
#18 RI
#12 WV
#11 VA
#34 DE
#28 MD
#51 DISTRICT OF COLUMBIA
#30 NV
#31 UT
#25 CO
#23 CA
#33 KS
#36 MO
#15 KY
#43 TN
#38 NC
#50 SC
#48 AZ
#44 NM
#37 OK
#47 AR
#26 MS
#40 AL
#42 GA
#46 TX
#41 FL
#45 LA
#27 AK
#39 HI
Average Property Crime Rate Per 100,000 Inhabitants:
1,500 - 2,000
2,001 - 2,500
2,501 - 3,000
3,001 - 3,500
3,501 - 4,000
4,001 - 4,501

Crime Rate

TWO DECADES OF U.S. VICTIMIZATION DECLINES



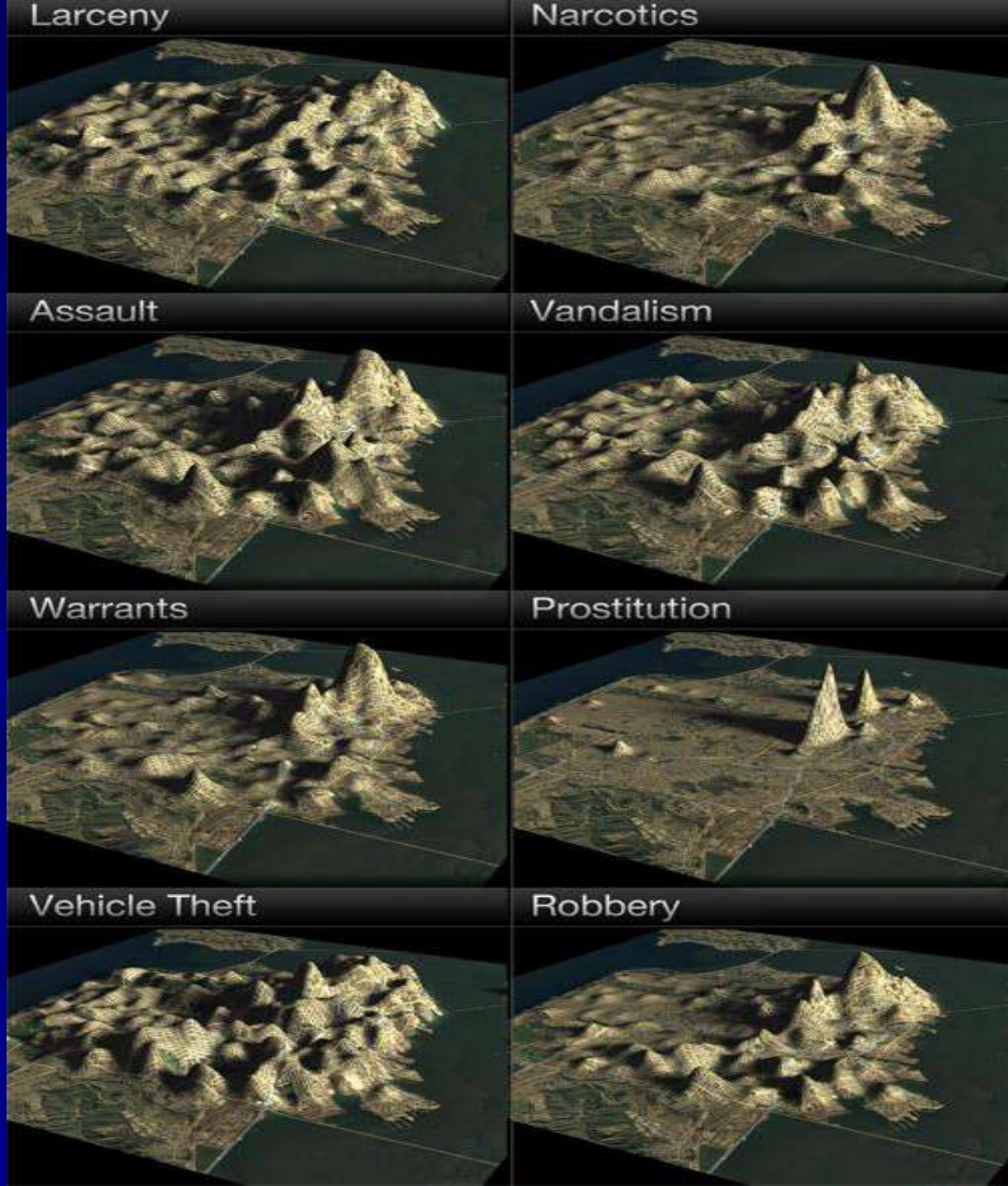
TOTAL VIOLENT VICTIMIZATION
1993: 79.8 per 1,000
2011: 22.5 per 1,000
DOWN 72%

SERIOUS VIOLENT VICTIMIZATION
1993: 29.1 per 1,000
2011: 7.2 per 1,000
DOWN 75%

Source: *U.S. Department of Justice, Bureau of Justice Statistics, Criminal Victimization, 2011*
Note: 2006 break due to methodological changes in the NCVS

RIGHT ON CRIME

- New software has been used as a diagnostic tool to graphically represent the ocurence of different types of crimes around San Francisco.
- How could this be useful to police?

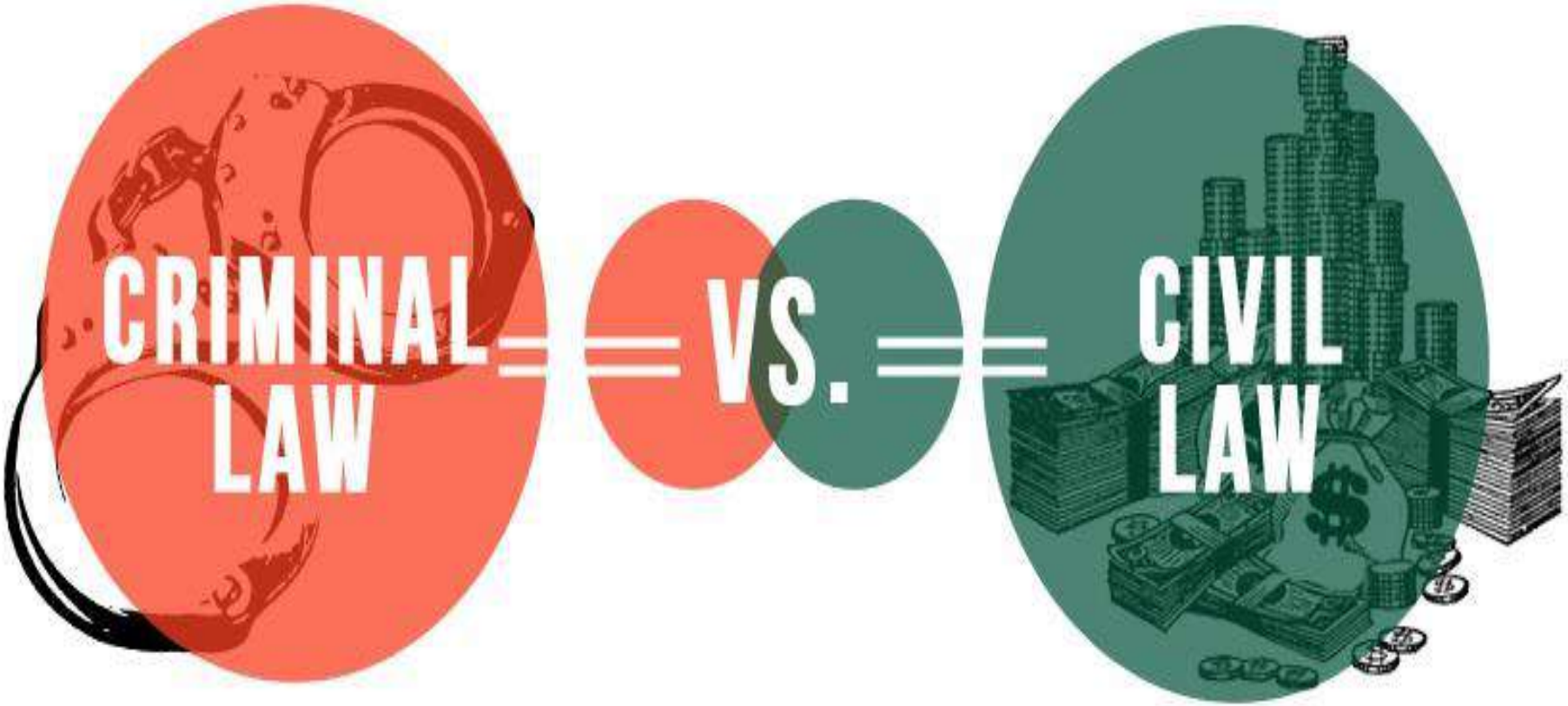


Applying Science to Law

- How well science is applied in the Criminal Justice System depends on a scientist's ability to supply accurate & objective information that reflects the events that have occurred at a crime.
- Accurate = correct.
- Objective = absence of bias.

Forensic Science defined:

- **Forensic Science (or Criminalistics)** is the use of science & technology to enforce civil & criminal laws.
- It is vague & hard to define because it includes so many other areas of science.


CRIMINAL LAW
VS.
CIVIL LAW

Criminal Law vs Civil Law

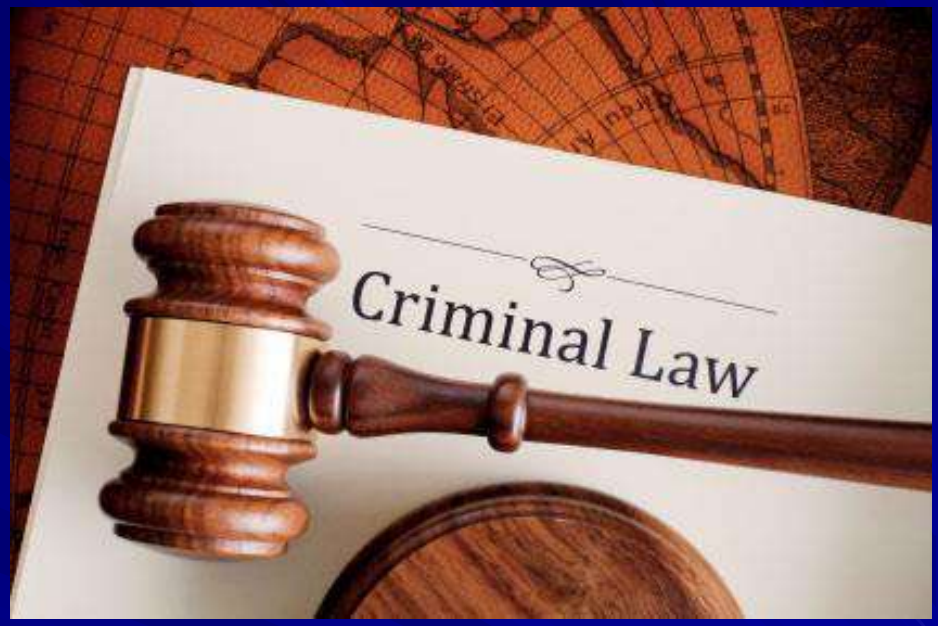
CIVIL LAW

- filed by a private party.
  - a corporation
  - an individual person

- Penalty: a guilty defendant pays the plaintiff for losses caused by their actions.
  - no incarceration

Criminal Law vs Civil Law

CRIMINAL LAW



- filed by the government

- Penalty: a guilty defendant is punished by
  - incarceration (in jail/prison)
  - fine paid to the gov't
  - execution (death penalty)

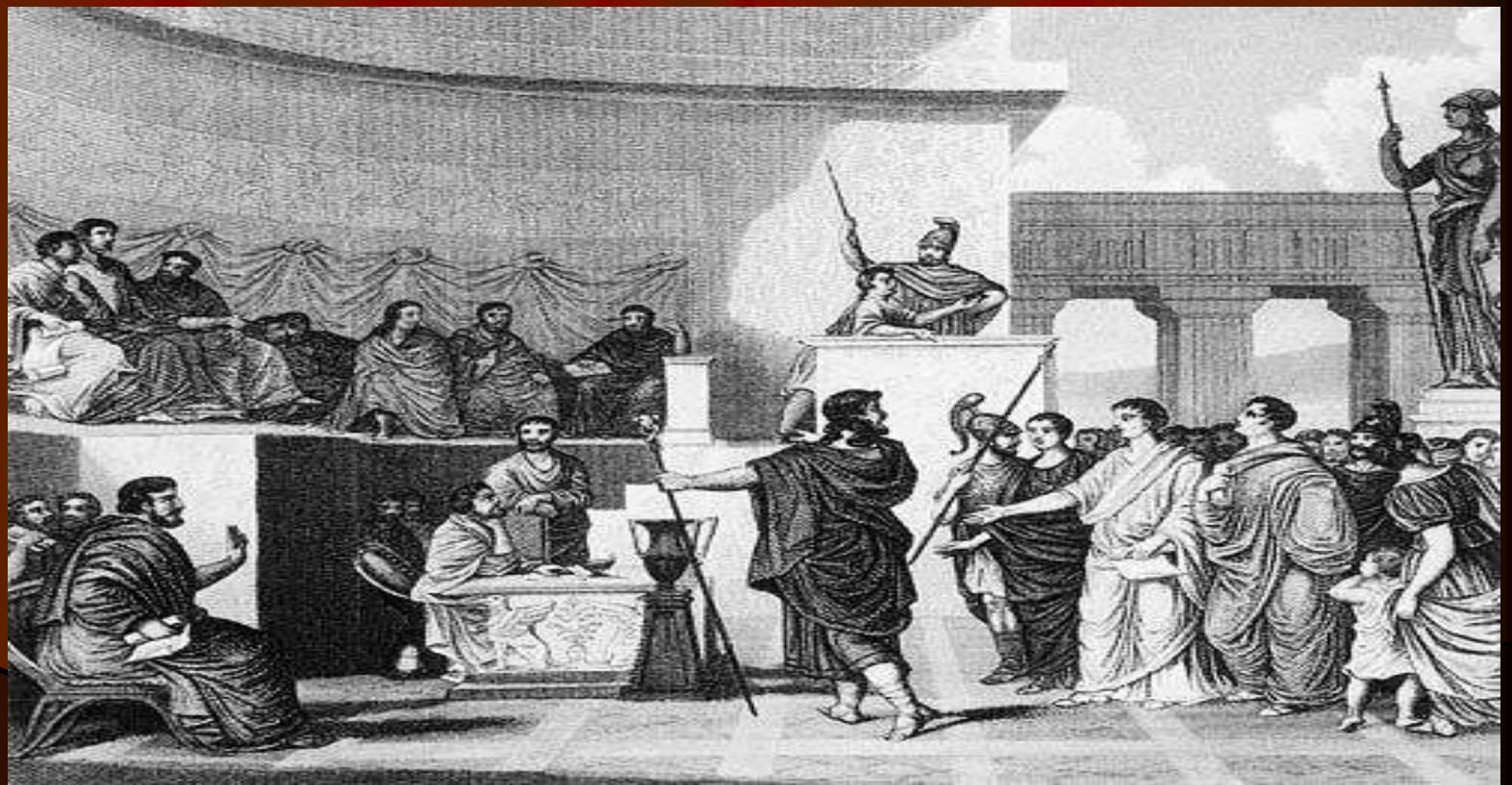
- Crimes are divided into 2 classes:
  - **misdemeanors** - less than 1 year incarceration
  - **felonies** - sentence of 1+ year

History of Forensic Science

- "Forensic" comes from the *Latin* word *"forensis"* meaning forum.
- During the time of the Romans, a criminal charge meant presenting the case before the public.

When in Rome…

- Both the person accused of the crime & the accuser would give speeches based on their side of the story.
- The individual with the best argumentation would determine the outcome of the case.



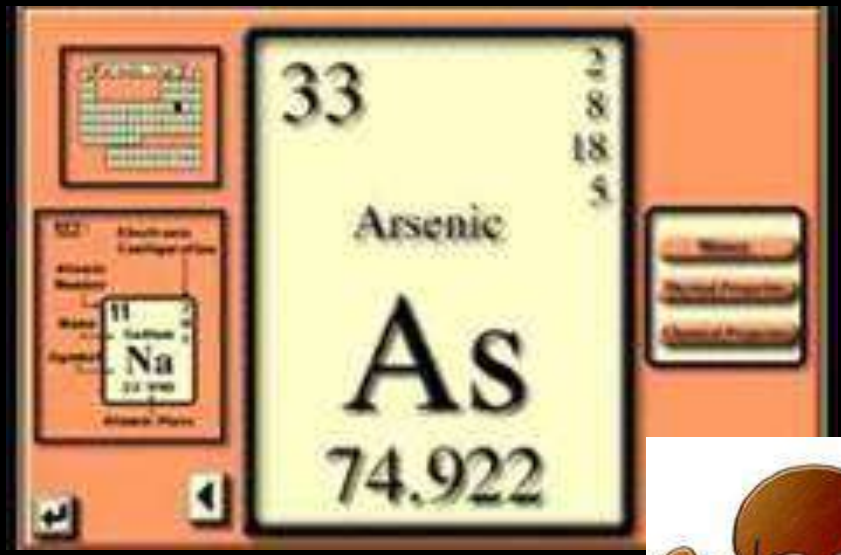
Major Contributors to Forensic Science:

Marcello Malphighi - 1686

- First recorded notes about fingerprint characteristics. However he did not acknowledge their value as a method of identification.

Carl Wilhelm Scheele – 1775

- Devised the first successful test for detecting the poison arsenic in corpses.



Sir Arthur Conan Doyle

- Sci-fi author in late 1800's
- Popularized scientific crime-detection methods through his fictional character 'Sherlock Holmes'.
- Based Holmes on a real person – one of his Med School teachers: Joseph Bell.

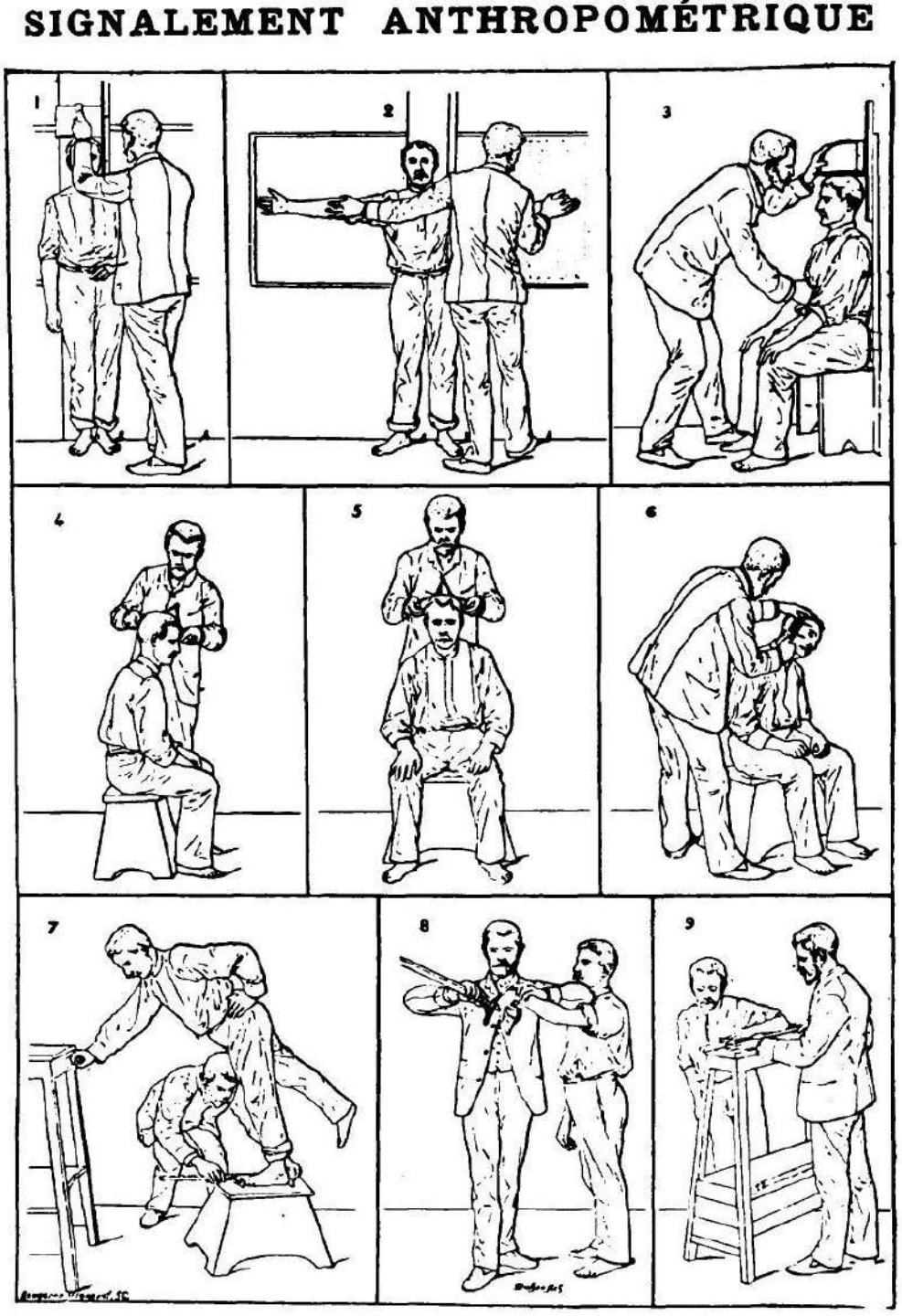
Mathieu Orfila
(1787-1853)

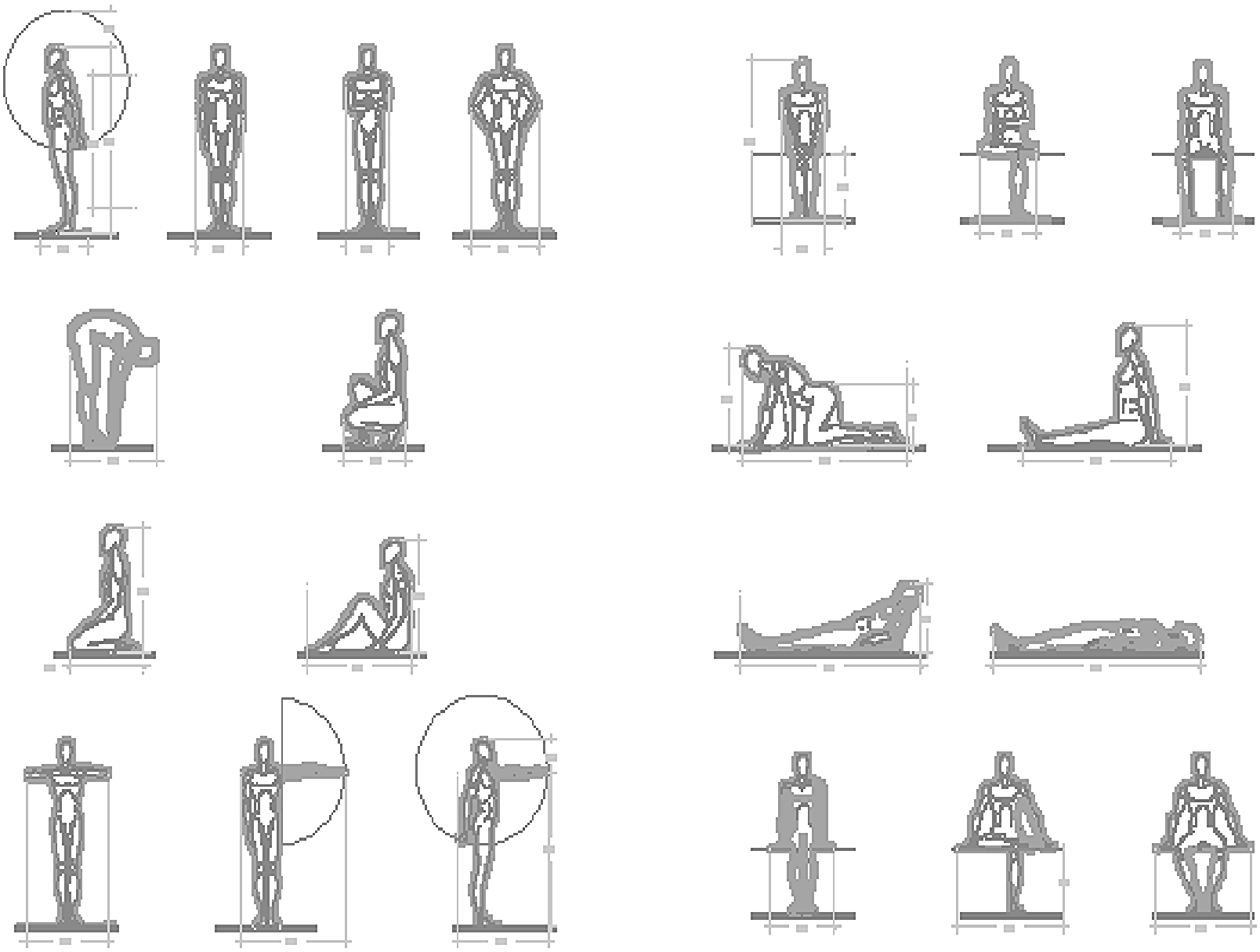
- "Father of Toxicology"
- Wrote about the detection of poisons & their effects on animals.
- 1814 – published the first treatise on detection of poisons and their effects on animals.

Alphonse Bertillon
(1879)

- "Father of Anthropometry"
- Developed a system to distinguish one individual person from another based on certain body measurements.

- Anthropometry is a systematic procedure for taking body measurements as a means of distinguishing one individual from another.

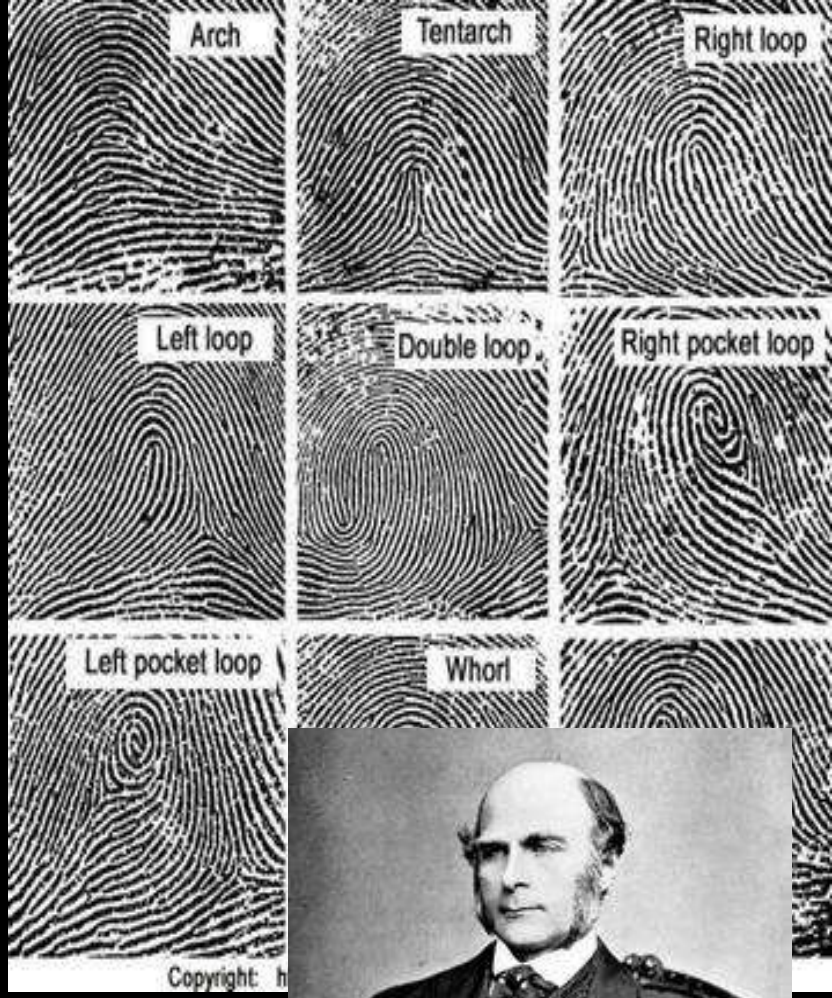


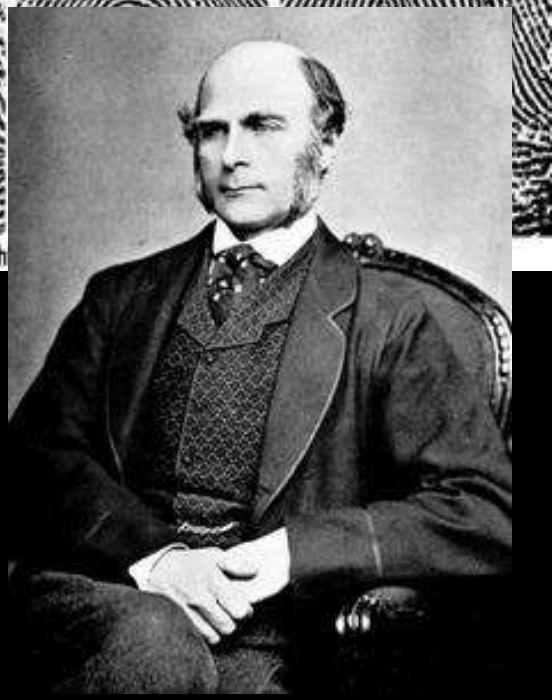


Francis Galton

(1822-1911)

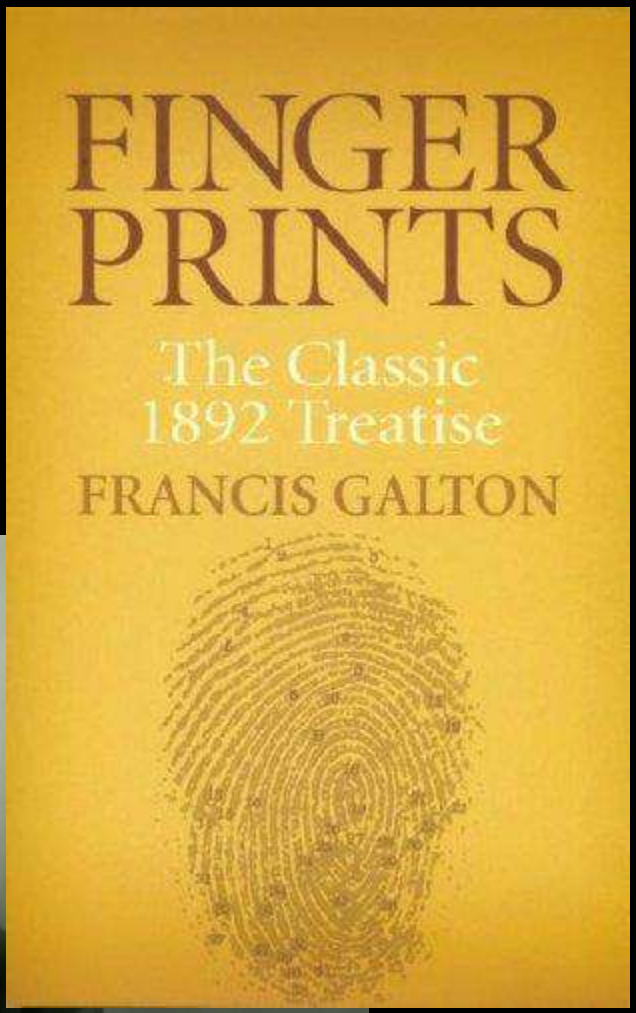
- "Father of Fingerprinting"
- Developed fingerprinting as a way to uniquely identify individuals.

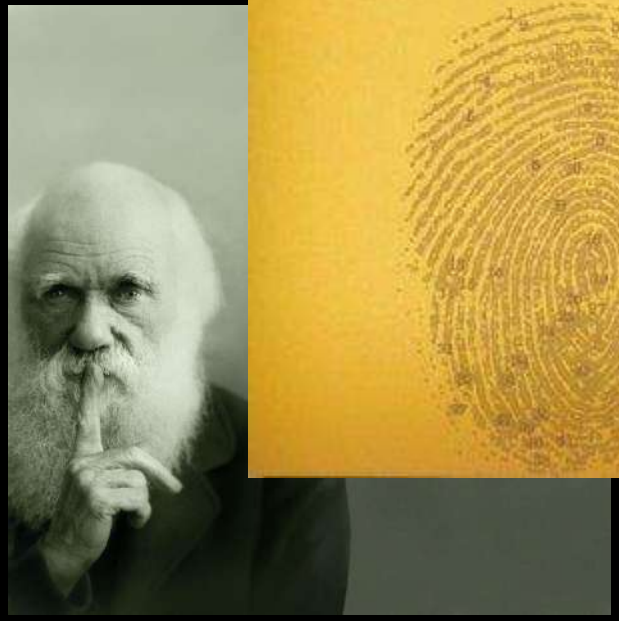




Francis Henry Galton

- In 1892 he published the book, “Finger Prints,” which contained the first statistical proof supporting the uniqueness of his method of identification.
- Cousin of Charles Darwin.



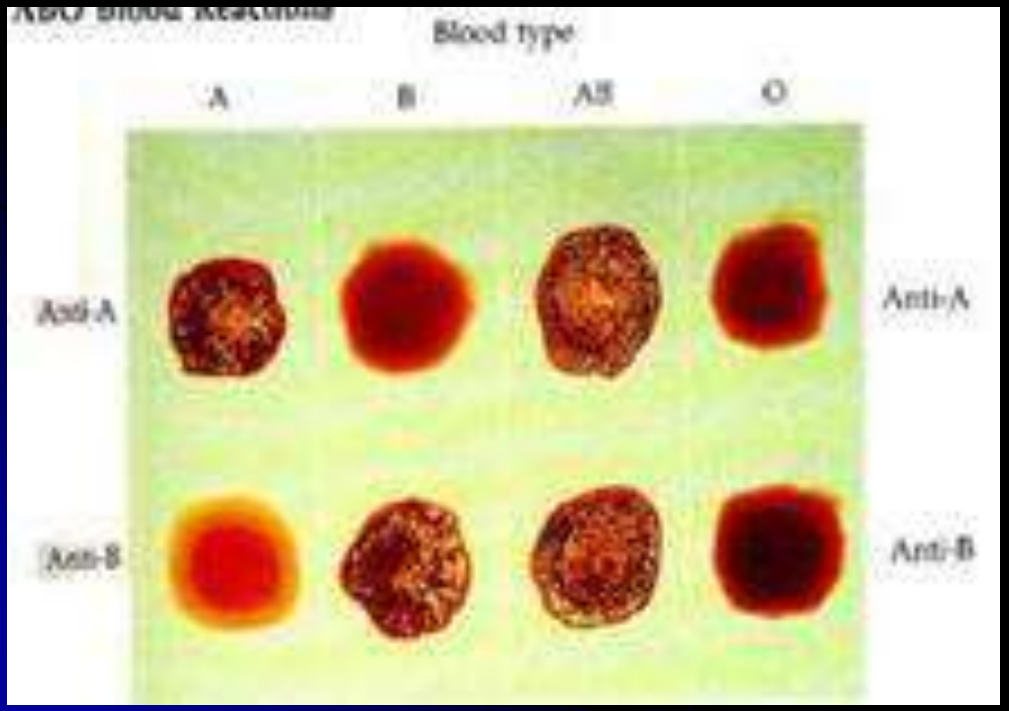


Hans Gross – 1893

- Published the book, “Criminal Investigation,” which detailed how to use microscopy, chemistry, physics, mineralogy, botany, zoology, etc. in crime scene investigation.

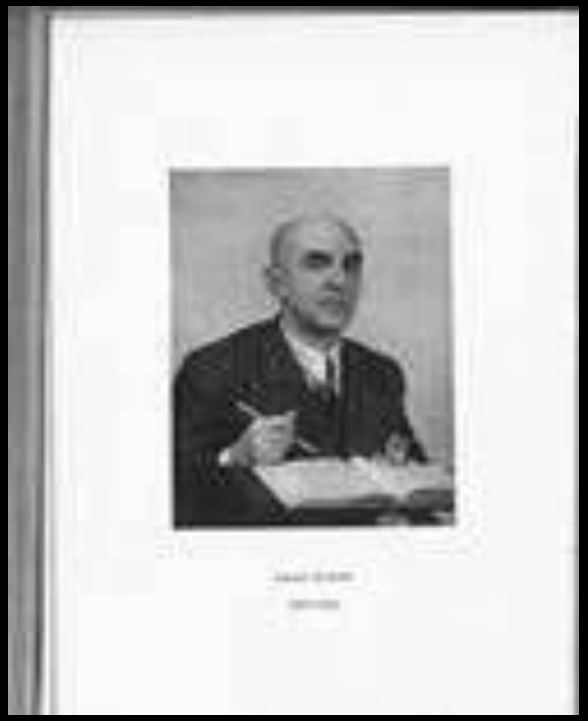
Dr. Karl Landsteiner – 1901

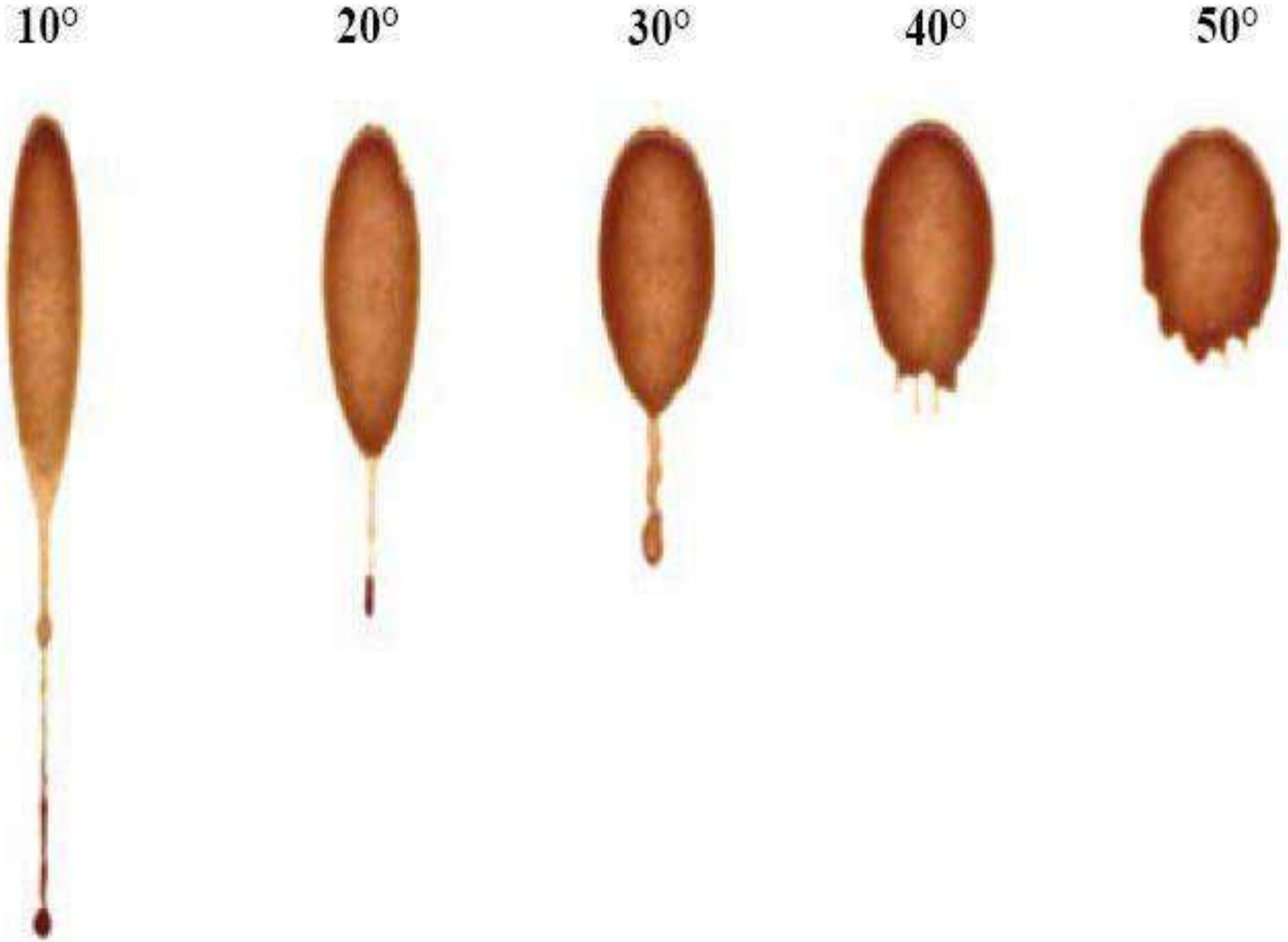
- Discovered that blood could be grouped into different categories (ABO).



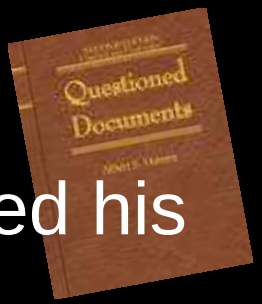
Leone Lattes
(1887-1954)

- "Father of Bloodstain Identification"
- He developed a procedure for determining the blood type (A, B, AB, or O) of a dried blood stain.
- Dr. Leon Lattes – 1915 – Devised a simple test to determine the blood group of dried blood.

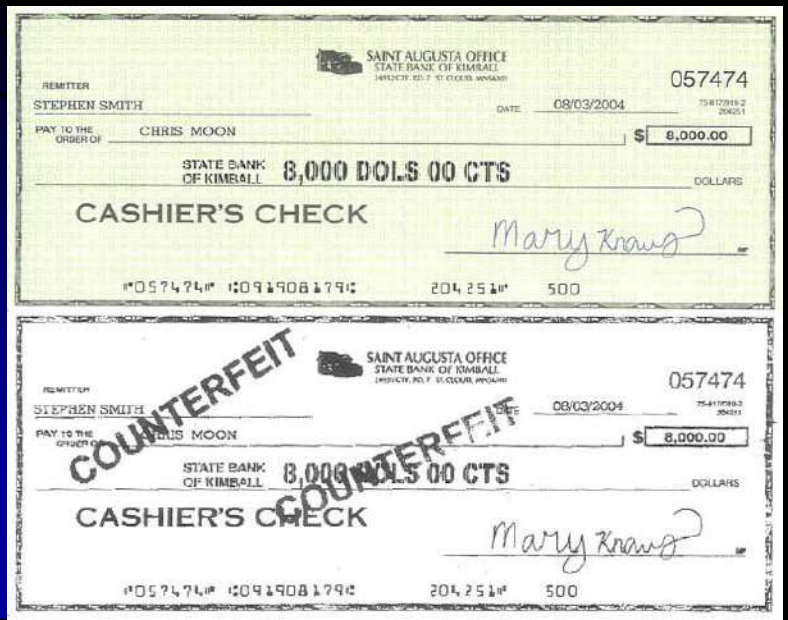


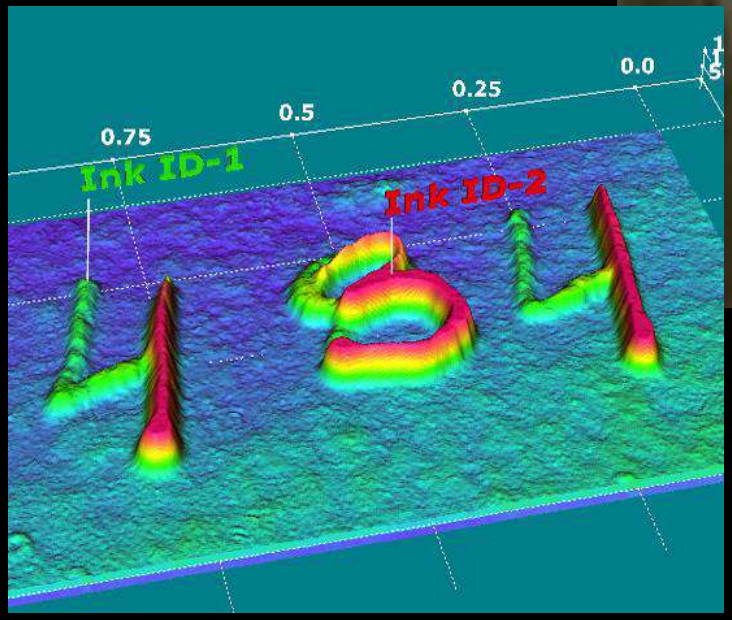

10°
20°
30°
40°
50°

Albert S. Osborn – 1910



- Pioneer in document examination, published his book, “Questioned Documents.”
- His work led to the acceptance of documents as scientific evidence by the courts.





Edmond Locard – 1910

- France: Set up the first crime lab in an attic of a police station.
- With few tools, he quickly became known world-wide to forensic scientists & investigators.
- He eventually founded the *Institute of Criminalistics* in France.

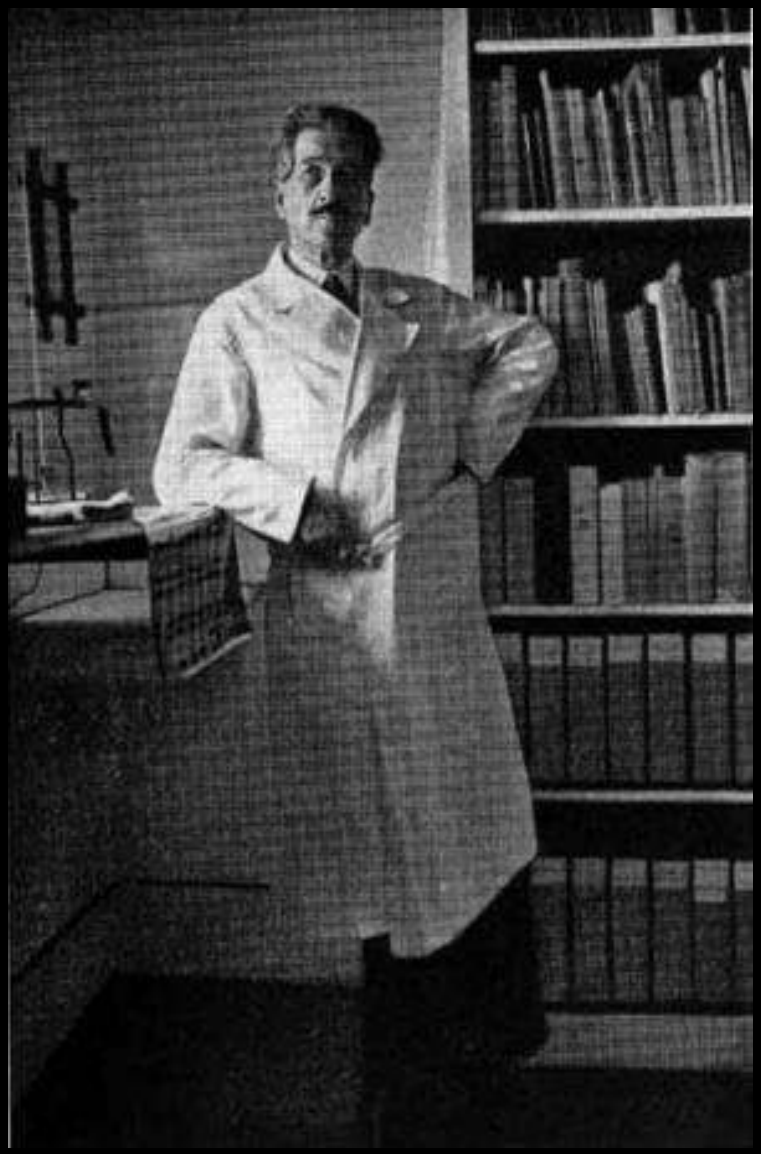
Edmond Locard at work.

Edmond Locard

- His most important contribution was:
- "**Locard's Exchange Principle**"
  - It is impossible for a criminal to enter a crime scene, without leaving a trace.

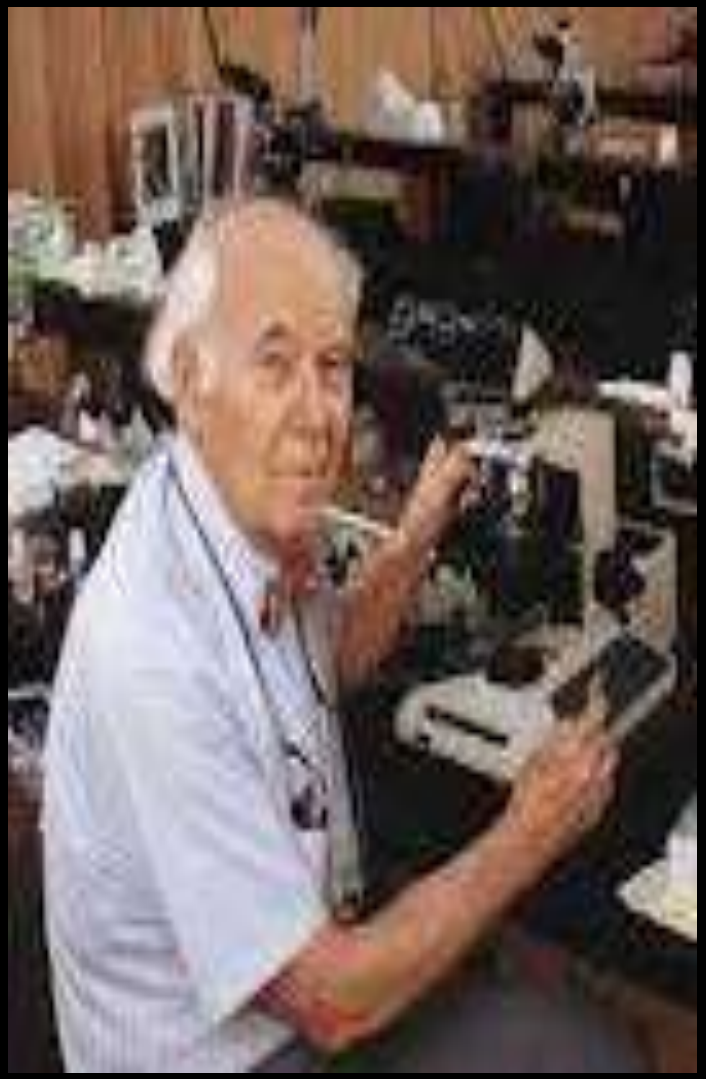
Locard's Exchange Principle

- "Every Contact Leaves a Trace."
- He believed that every criminal can be connected to a crime by particles carried from the crime scene.
- When a criminal comes in contact with an object or person, a cross-transfer of evidence occurs.



Walter C. McCrone **(1916 - 2002)**

- "Father of Microscopic Forensics".
- Became the world's preeminent microscopist.
- Developed & applied his microscope techniques to examine evidence in countless court cases through-out the world.



Calvin Goddard
(1891-1955)

- "Father of Ballistics"
- Developed the technique to examine bullets, using a comparison microscope, to determine whether or not a particular gun fired the bullets.
- Calvin Goddard – Refined techniques of firearms examination including microscopic examination.

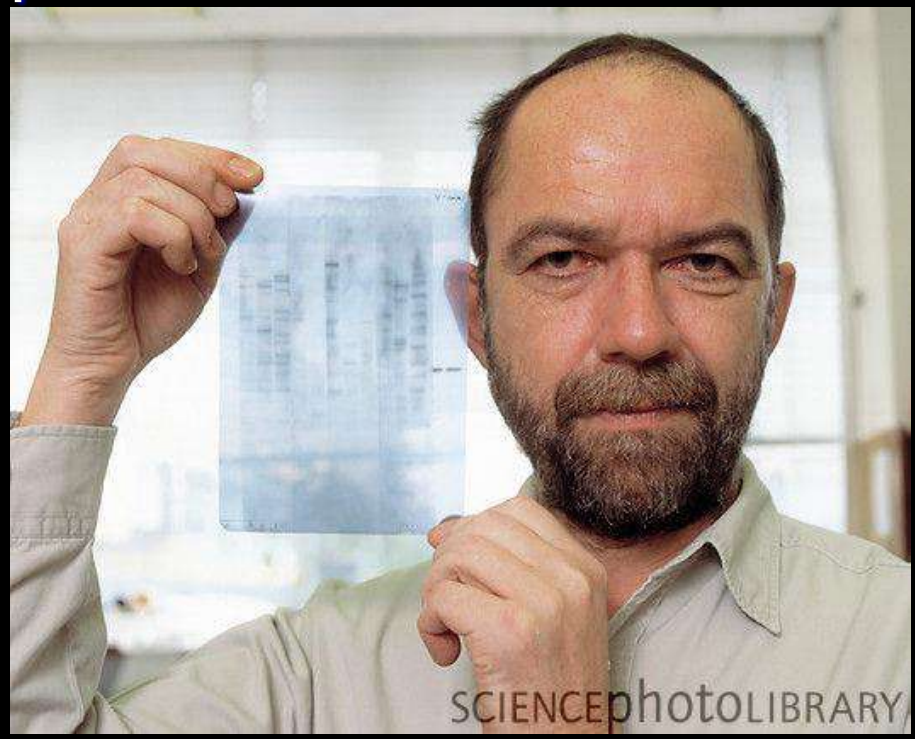
J. Edgar Hoover

- "Father of the FBI" - Director of Federal Bureau of Investigation during the 1930's
- Hoover's leadership spanned 48 yrs & 8 presidential administrations.
- His reign covered Prohibition, the Great Depression, WWII, the Korean War, the Cold War, & the Vietnam War.

- He organized a national laboratory to offer forensic services to all law enforcement agencies in the U.S.
- A VERY CONTROVERSIAL Person
- To name a small portion of the things he did:
  - He exceeded & abused his authority with unjustified investigations & illegal wiretaps based on political beliefs rather than suspected criminal activity.
  - FBI directors are now limited to 10-year terms .

Sir Alec Jeffreys – 1984

- Created the first DNA profiling test.
- English molecular biologist and discoverer of DNA fingerprinting.
- He is holding the original autoradiogram that led to his discovery of the technique in 1984.



Applications of Forensic Science

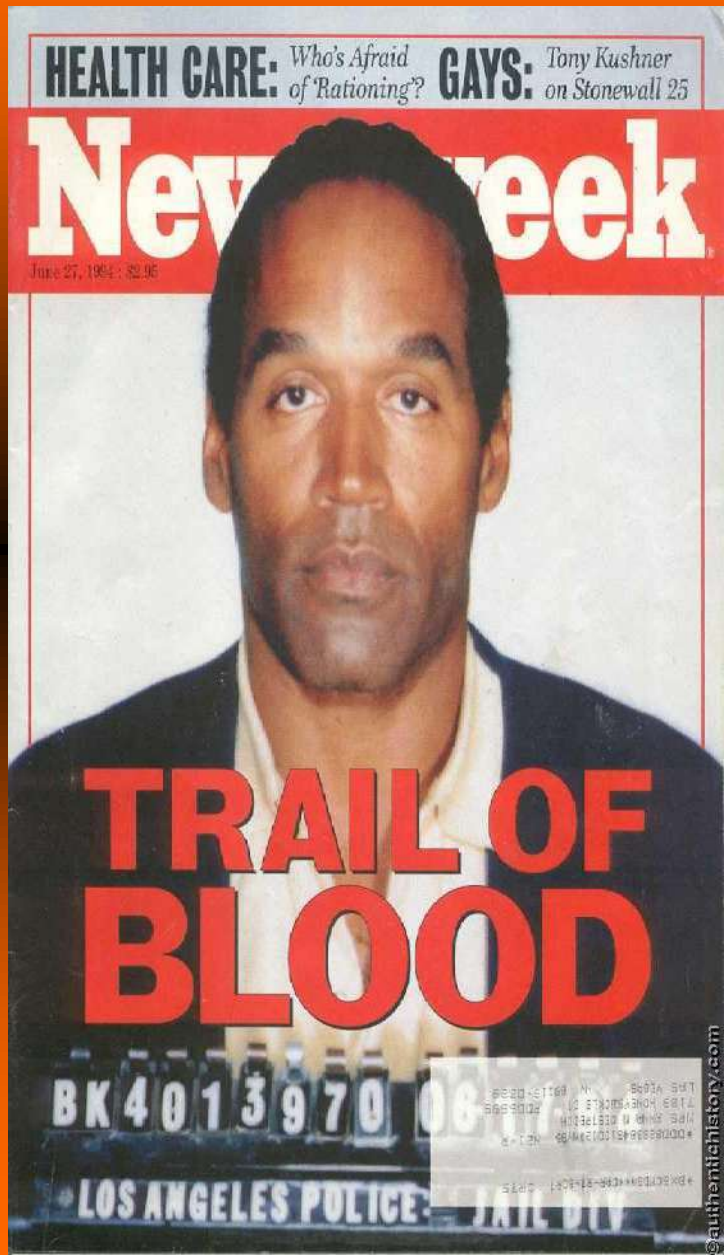
- Identification of Criminals or Victims
- Solving Mysteries
  - Past crimes (unsolved or wrongfully convicted).
  - Cause, Location, Time of Death.
  - Paternity cases.
- Cyber crimes.
- Corporate Crimes (Enron).
- Voice Analysis.

Applications of Forensic Science

- Application of DNA as evidence.
- Prevention of crime vs. Reaction to it.
- Catastrophes & Wars
  - ID remains of victims (either civilian or soldiers).
  - ex. Holocaust or Katrina
- Military & International Forensics
  - Terrorism.
  - The search for WMD's.
  - stockpiled or stored weapons from past wars.

The Trial of the Century

- O.J. Simpson ***was*** a NFL football legend.
- He is now famous for having been tried for the murder of ex-wife Nicole Brown Simpson & her friend Ronald Goldman in 1994.
- He was acquitted in criminal court after a lengthy, highly publicized trial.



What went wrong?

- 1st on the scene, police found evidence of blood & entered the Simpson home without a search warrant, an action permissible b/c the situation was an emergency.
- HOWEVER, the police collected a pair of blood-stained gloves during their search.
- Collection of evidence without proper warrants became the key argument used by Simpson's legal team & ultimately led to his acquital.

What was learned?

- If forensic evidence is to be admissible in court, the highest professional standards must be used at the crime scene!
- He was found liable for their deaths in civil court, but has yet to pay the $33.5 million judgment.