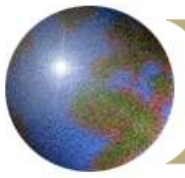




# *Chapter 1*

## *Introduction to Forensic Science and the Law*

- “In school, every period ends with a bell. Every sentence ends with a period. Every crime ends with a sentence.”
  - —Stephen Wright, comedian



# Introduction

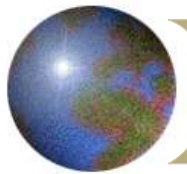


## ***Students will learn:***

- How a crime lab works
- The growth and development of forensic science through history
- Federal rules of evidence, including the Frye standard and the Daubert ruling
- Basic types of law in the criminal justice system

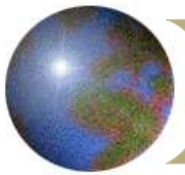
## ***Students will be able to:***

- Describe how the scientific method is used to solve forensic problems
- Describe different jobs done by forensic scientists and the experts they consult.



# *Forensic Science*

- The study and application of science to matters of law.
- Includes the business of providing timely, accurate, and thorough information to all levels of decision makers in our criminal justice system.
- The word forensic is derived from the Latin “forensis” meaning forum, a public place where, in Roman times, senators and others debated and held judicial proceedings.



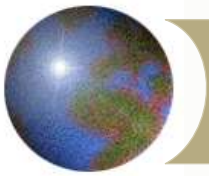
# ***Criminalistics vs Criminology***

## ***Criminalistics***

- the scientific examination of physical evidence for legal purposes.

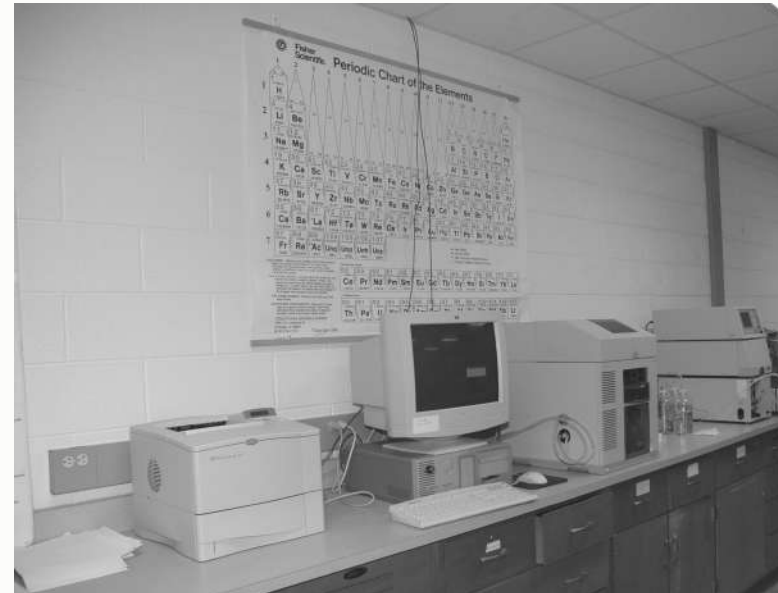
## ***Criminology***

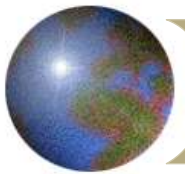
- includes the psychological angle, studying the crime scene for motive, traits, and behavior that will help to interpret the evidence



# ***Crime Lab—Basic Services***

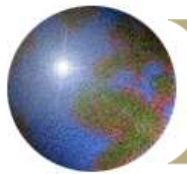
- **Physical Science Unit**
  - Chemistry
  - Physics
  - Geology
- **Biology Unit**
- **Firearms Unit**
- **Document Examination Unit**
- **Photography Unit**





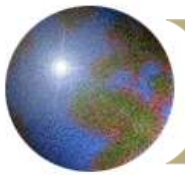
# *Crime Lab—Optional Services*

- **Toxicology Unit**
- **Latent Fingerprint Unit**
- **Polygraph Unit**
- **Voiceprint Analysis Unit**
- **Evidence Collection Unit**



# *Other Forensic Science Services*

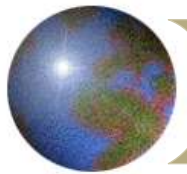
- Forensic Pathology
- Forensic Anthropology
- Forensic Entomology
- Forensic Psychiatry
- Forensic Odontology
- Forensic Engineering
- Cybertechnology



# *Major Crime Laboratories*

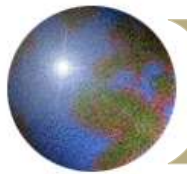
- FBI
- DEA
- ATF
- U.S. Postal Service
- U.S. Fish and Wildlife Service





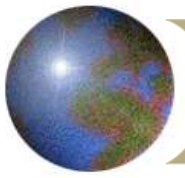
# *Crime Lab History*

- First police crime lab in the world was established in France in 1910 by Edmond Locard
- First police crime lab in the U.S. opened in 1923 in Los Angeles
- The Scientific Crime Detection Lab was founded in Evanston, Illinois in 1929
- The first FBI crime lab opened in 1932



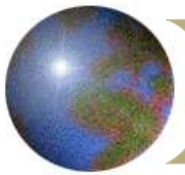
# *Major Developments in Forensic Science History*

- 700s AD—Chinese used fingerprints to establish identity of documents and clay sculptures
- ~1000—Roman courts determined that bloody palm prints were used to frame a man in his brother's murder
- 1149—King Richard of England introduced the idea of the coroner to investigate questionable death
- 1200s—A murder in China is solved when flies were attracted to invisible blood residue on a sword of a man in the community
- 1598—Fidelus was first to practice forensic medicine in Italy
- 1670—Anton Van Leeuwenhoek constructed the first high-powered microscope
- 1776—Paul Revere identified the body of General Joseph Warren based on the false teeth he had made for him
- 1784—John Toms convicted of murder on basis of torn edge of wad of paper in pistol matching a piece of paper in his pocket



# *Major Developments in Forensic Science History*

- 1859—Gustav Kirchhoff and Robert Bunsen developed the science of spectroscopy.
- 1864—Crime scene photography developed
- 1879—Alphonse Bertillon developed a system to identify people using particular body measurements
- 1896—Edward Henry developed first classification system for fingerprint identification
- 1900—Karl Landsteiner identified human blood groups
- 1904—Edmond Locard formulated his famous principle, “Every contact leaves a trace.”
- 1922—Francis Aston developed the mass spectrometer.
- 1959—James Watson and Francis Crick discover the DNA double helix
- 1977—AFIS developed by FBI, fully automated in 1996
- 1984—Jeffreys developed and used first DNA tests to be applied to a criminal case

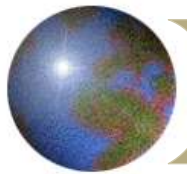


# *People of Historical Significance*



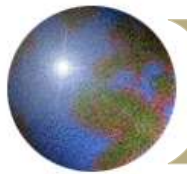
Edmond Locard (1877-1966)

- French professor
- Considered the father of criminalistics
- Built the world's first forensic laboratory in France in 1910
- Locard Exchange Principle
  - Whenever two objects come into contact with each other, traces of each are exchanged.



# *Crime Scene Team*

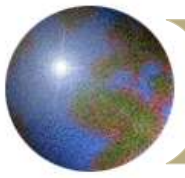
- A group of professional investigators, each trained in a variety of special disciplines.
- Team Members
  - First Police Officer on the scene
  - Medics (if necessary)
  - Investigator(s)
  - Medical Examiner or Representative (if necessary)
  - Photographer and/or Field Evidence Technician
  - Lab Experts
    - pathologistserologist
    - DNA experttoxicologist
    - forensic odontologistforensic anthropologist
    - forensic psychologistforensic entomologist
    - firearm examinerbomb and arson expert
    - document and handwriting expertsfingerprint expert



# ***Scientific Method***

*(as it pertains to criminalistics)*

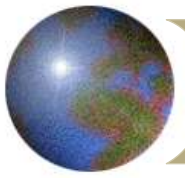
- Ø Observe a problem or questioned evidence and collect objective data.
- Ø Consider a hypothesis or possible solution.
- Ø Examine, test, and then analyze the evidence.
- Ø Determine the significance of the evidence.
- Ø Formulate a theory based on evaluation of the significance of the evidence



# *Complex Reasoning Skills*

Necessary to Work Through and Solve Crimes:

- Deductive and Inductive Reasoning
- Classifying
- Comparing and Contrasting
- Problem Solving
- Analyzing Perspectives
- Constructing Support
- Error Analysis

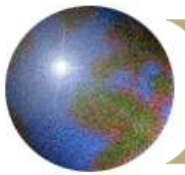


# *Laws that Pertain to the U.S. Criminal Justice System*

- The U.S. Constitution
- Statutory Law
- Common Law or Case Law
- Civil Law
- Criminal Law
- Equity Law
- Administrative Law



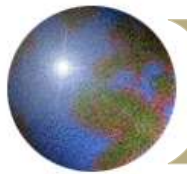




# *The Bill of Rights*

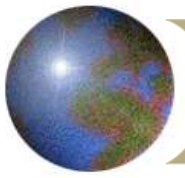
## *Gives individuals the right:*

- To be presumed innocent until proven guilty
- Not to be searched unreasonably
- Not to be arrested without probable cause
- Against unreasonable seizure of personal property
- Against self-incrimination
- To fair questioning by police
- To protection from physical harm throughout the justice process
- To an attorney
- To trial by jury
- To know any charges against oneself
- To cross-examine prosecution witnesses
- To speak and present witnesses
- Not to be tried again from the same crime
- Against cruel and unusual punishment
- To due process
- To a speedy trial
- Against excessive bail
- Against excessive fines
- To be treated the same as others, regardless of race, gender, religious preference, country of origin, and other personal attributes



# *Miranda v Arizona*

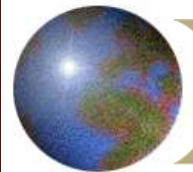
- In 1963, Ernesto Miranda, a 23 year old mentally disturbed man, was accused of kidnapping and raping an 18-year-old woman in Phoenix, Arizona. He was brought in for questioning, and confessed to the crime. He was not told that he did not have to speak or that he could have a lawyer present. At trial, Miranda's lawyer tried to get the confession thrown out, but the motion was denied. The case went to the Supreme Court in 1966. The Court ruled that the statements made to the police could not be used as evidence, since Mr. Miranda had not been advised of his rights.



# *Miranda Rights*

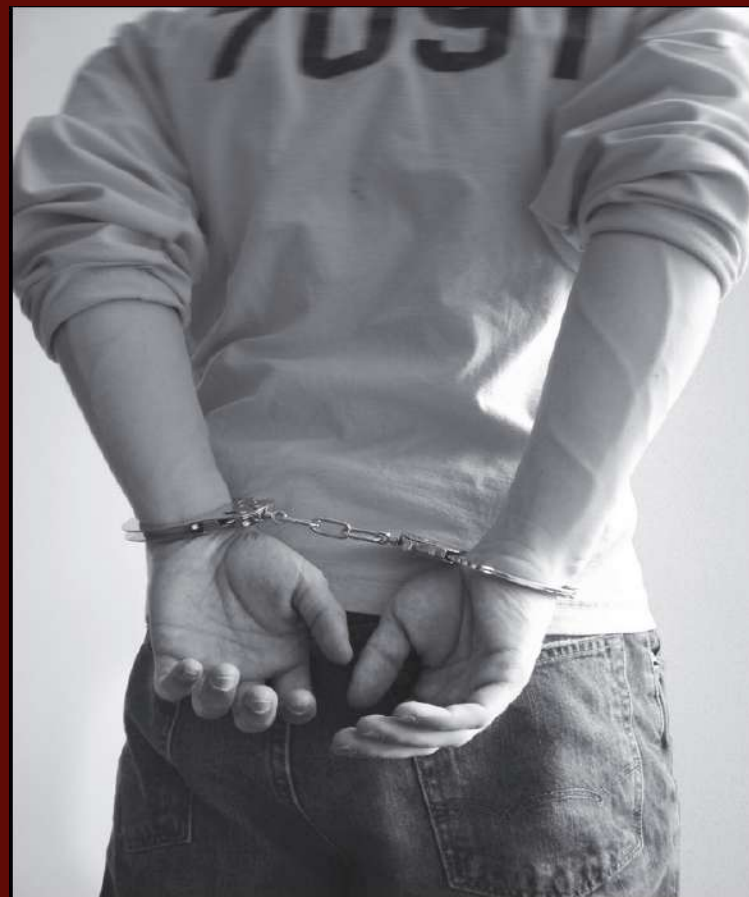
***The following is a minimal Miranda warning:***

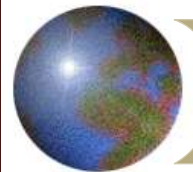
- You have the right to remain silent. Anything you say can and will be used against you in a court of law. You have the right to speak to an attorney, and to have an attorney present during any questioning. If you cannot afford a lawyer, one will be provided for you at the government's expense.



# *Types of Crimes*

- Infraction
- Misdemeanor
- Felony

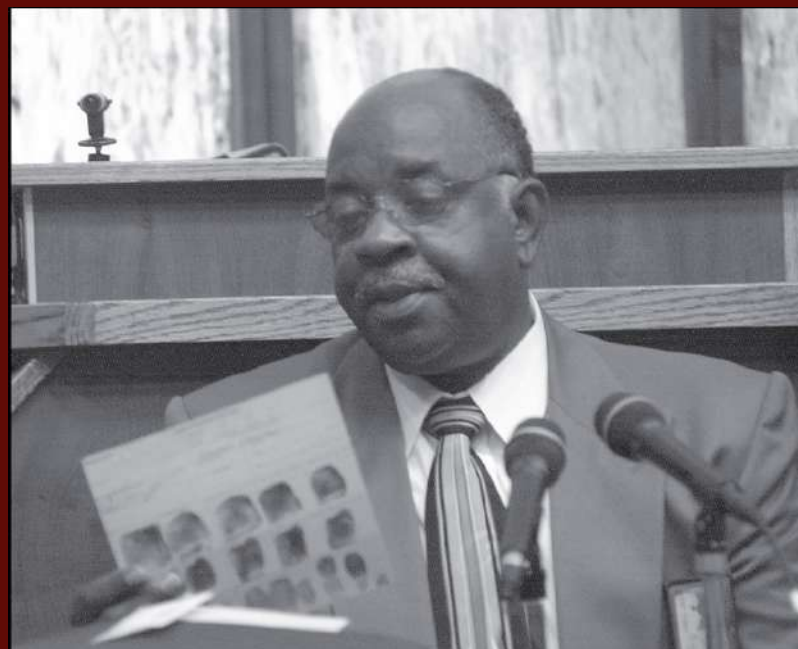


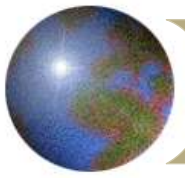


# *Federal Rules of Evidence*

**In order for evidence to be admissible, it must be:**

- **Probative—actually prove something**
- **Material—address an issue that is relevant to the particular crime**





# *Admissibility of Evidence*

## ***1923 Frye v. United States***

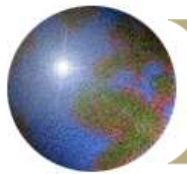
- ☒ Scientific evidence is allowed into the courtroom if it is generally accepted by the relevant scientific community. The Frye standard does not offer any guidance on reliability. The evidence is presented in the trial and the jury decides if it can be used.

## ***1993 Daubert v. Dow***

Admissibility is determined by:

- ý Whether the theory or technique can be tested
- ý Whether the science has been offered for peer review
- ý Whether the rate of error is acceptable
- ý Whether the method at issue enjoys widespread acceptance.
- ý Whether the opinion is relevant to the issue

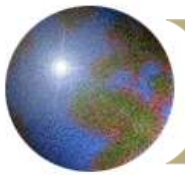
The judge decides if the evidence can be entered into the trial.



# *Facets of Guilt*

Try to prove:

- **Means**—person had the ability to do the crime
- **Motive**—person had a reason to do the crime  
(not necessary to prove in a court of law)
- **Opportunity**—person can be placed at the crime



“If the Law has made you a witness, remain a man (woman) of science.

You have no victim to avenge, no guilty or innocent person to ruin or save.

You must bear testimony within the limits of science.”

—P.C.H. Brouardel