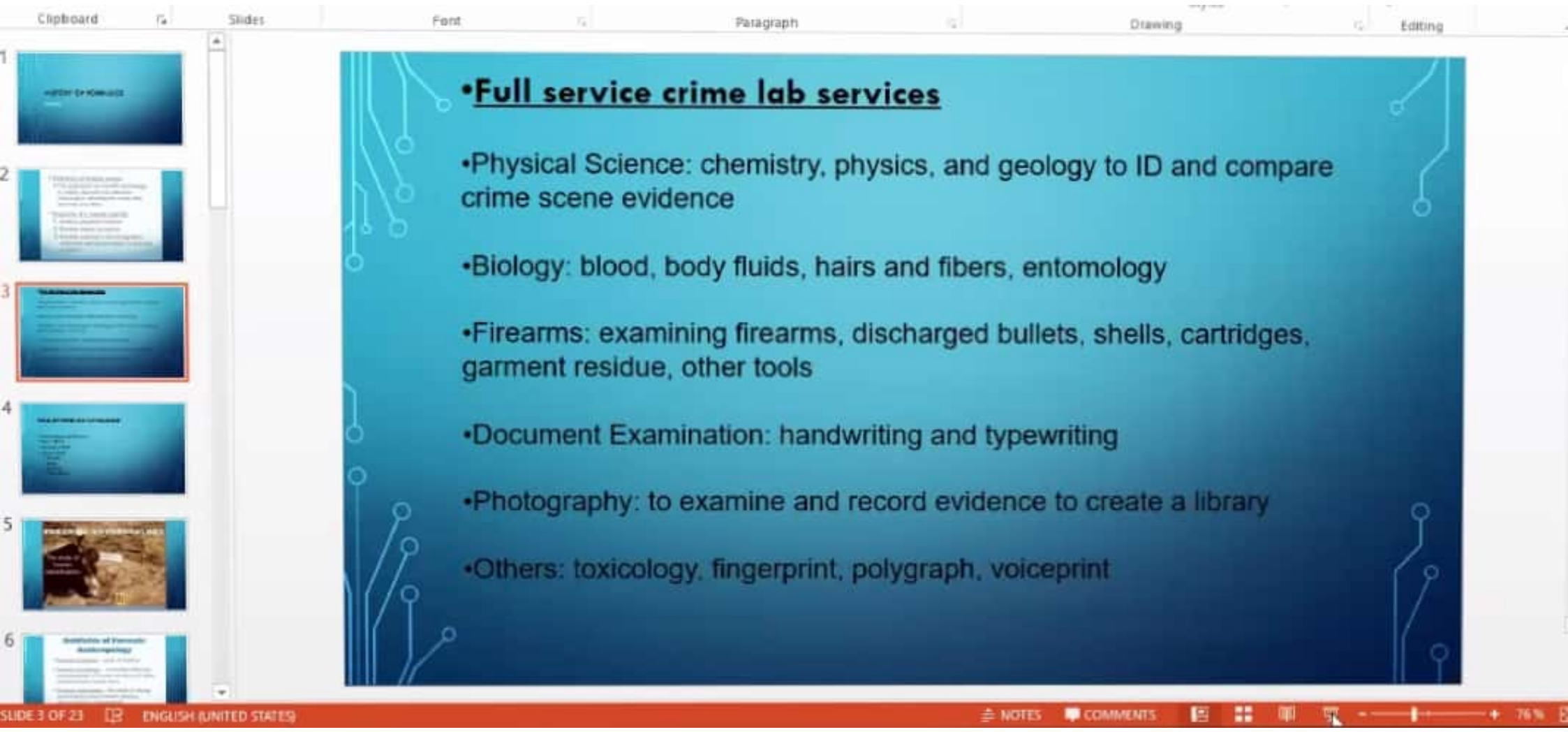
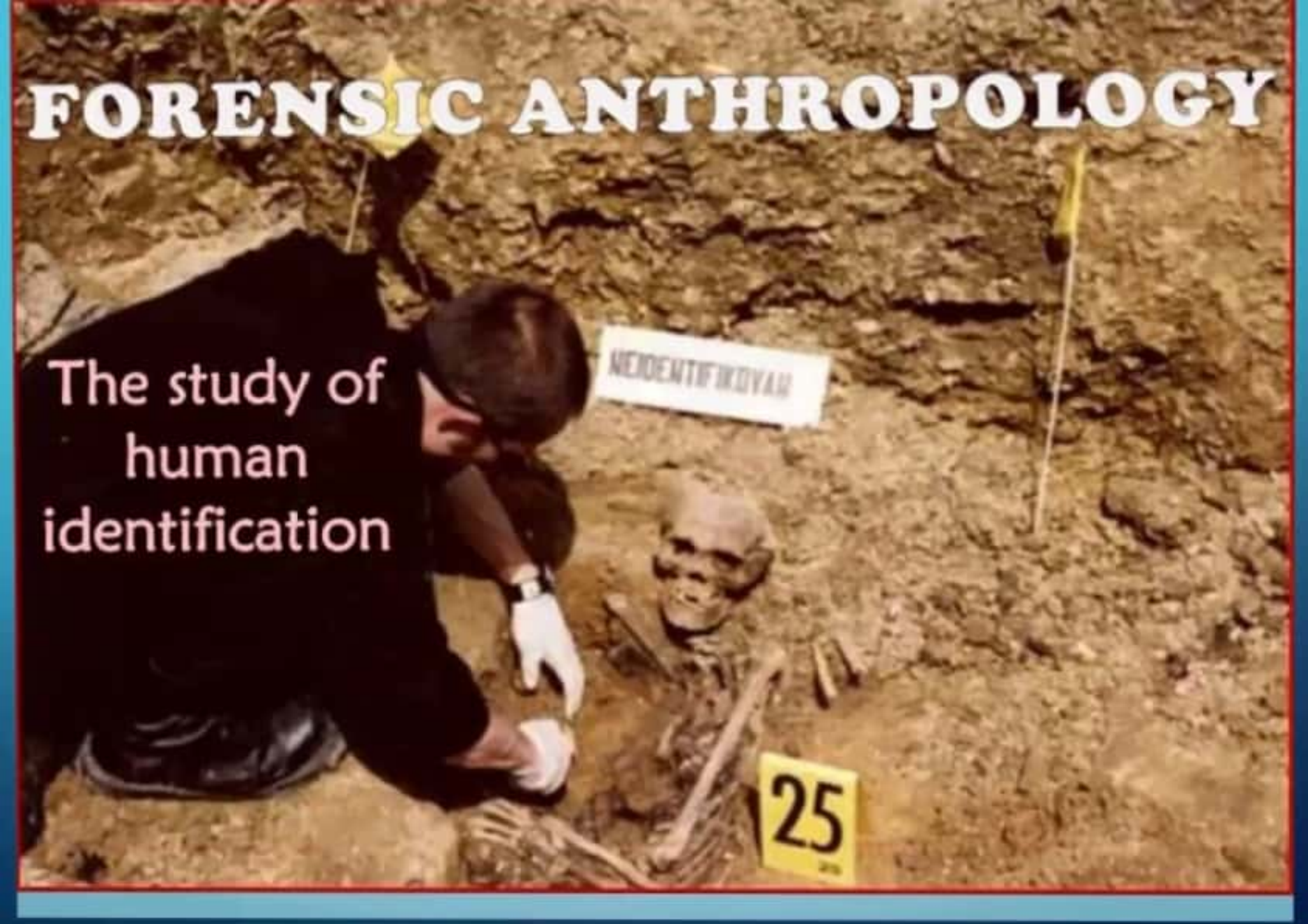

Clipboard
Slides
Font
Paragraph
Drawing
Editing
•Full service crime lab services
•Physical Science: chemistry, physics, and geology to ID and compare crime scene evidence
•Biology: blood, body fluids, hairs and fibers, entomology
•Firearms: examining firearms, discharged bullets, shells, cartridges, garment residue, other tools
•Document Examination: handwriting and typewriting
•Photography: to examine and record evidence to create a library
•Others: toxicology, fingerprint, polygraph, voiceprint
SLIDE 3 OF 23
ENGLISH (UNITED STATES)
NOTES
COMMENTS
76%

ROLE OF FORENSIC PATHOLOGIST

- Perform Autopsy and determine…
- Cause of Death
- Mechanism of Death
- Manner of Death
  - Homicide
  - Suicide
  - Accidental
  - Natural Causes

FORENSIC ANTHROPOLOGY



Subfields of Forensic Anthropology

- Forensic osteology – study of skeleton
- Forensic archeology – controlled collection and excavation of human remains and other evidence from a crime scene
- Forensic taphonomy – the study of change occurring to human remains (trauma, decomposition, environment)

Other fields of study in forensics

- Forensic Odontology
- Forensic Entomology
- Forensic Psychiatry

History and Development of Forensic Science

Early Forensics

- both old and young field
- The "Eureka" legend of Archimedes (287-212 BC) can be considered an early account of the use of forensic science. In this case, by examining the principles of water displacement, Archimedes was able to prove that a crown was not made of gold (as it was fraudulently claimed) by its density and buoyancy.

Washing Away the Wrongs

- The first written account of using medicine and entomology to solve (separate) criminal cases
  - 1235: Sung Tzu solved a murder by instructing all suspects to bring their sickles to one location. Flies, attracted by the smell of blood, eventually gathered on a single sickle. In light of this, the murderer confessed.
  - The book also offered advice on how to distinguish between a drowning (water in the lungs) and strangulation (broken neck cartilage).

- A forensic medical doctor must be serious, conscientious, and highly responsible, and must also personally examine each dead body or that of a wounded person.
- The particulars of each case must be recorded in the doctor's own handwriting. No one else is allowed to write his autopsy report.
- A coroner must not avoid performing an autopsy because he detests the stench of corpse. A coroner must refrain from sitting comfortably behind a curtain of incense that mask the stench, let his subordinates do the autopsy unsupervised, or allow a petty official to write the autopsy report, leaving all the inaccuracies unchecked and uncorrected."
- In addition he also wrote: "Should there be an inaccuracy in an autopsy report, injustice would remain with the deceased as well as the living.

Identification of remains (odontology and anthropometry)

- 1447: Missing teeth of French Duke of Burgandy used to identify body
- 1776: False teeth of US General Warren used to identify his body
- 1849: Bones and teeth used as evidence for murder victim
- 1879: System of measuring people by body measurements developed by **Bertillon** of France
- 1940's: Dental records and teeth from corpse were compared
- 1957: Skeletal growth stages developed by Mocker and Stewart

Early Pathology

In sixteenth century Europe, medical practitioners in army and university settings began to gather information on cause and manner of death.

- Ambrose Paré, a French army surgeon, systematically studied the effects of violent death on internal organs.
- Two Italian surgeons, Fortunato Fidelis and Paolo Zacchia, laid the foundation of modern pathology by studying changes which occurred in the structure of the body as the result of disease.
- In the late 1700s, writings on these topics began to appear. These included: "A Treatise on Forensic Medicine and Public Health" by the French physician Fodéré, and "The Complete System of Police Medicine" by the German medical expert Johann Peter Franck.

Weapons identification

- 1784, in Lancaster, England, John Toms was tried and convicted for murdering Edward Culshaw with a pistol. When the dead body of Culshaw was examined, a pistol wad (crushed paper used to secure powder and balls in the muzzle) found in his head wound matched perfectly with a torn newspaper found in Toms' pocket.
- 1889: Bullets were matched to gun they were fired from, advent of ballistics

Father of toxicology

- 1814: Scientific paper on poison published by Matthieu **Orfila** of Spain
  - the first person to systematise the study and classification of toxic substances when he found traces of poison in the liver of a dead dog.

Father of toxicology

- 1814: Scientific paper on poison published by Matthieu **Orfila** of Spain
  - the first person to systematise the study and classification of toxic substances when he found traces of poison in the liver of a dead dog.

Arsenic Detection: 1836, Marsh

- Arsenic was popular poison since arsenic trioxide is tasteless and easily dissolved.
- suspect fluid would be mixed with sulfuric acid (H_2SO_4) and passed through a U-shaped tube with a piece of arsenic-free zinc at the end. If even a trace of arsenic was present, arsine (AsH_3) gas would result.

  $As_2O_3 + 6\ Zn + 6\ H_2SO_4 \rightarrow 2\ AsH_3 + 6\ Zn(SO_4)_2 + 3\ H_2O$
- When ignited the arsine gas would first decompose into arsenic trioxide and hydrogen. When he held a cold ceramic bowl, the arsenic would form a silvery-black deposit on the bowl due to reduction by carbon

  $2\ As_2O_3 + 3\ C \rightarrow 3\ CO_2 + 4\ As$
- Not only could minute amounts of arsenic be detected (for as little as 0.02 mg), the test was very specific for arsenic.

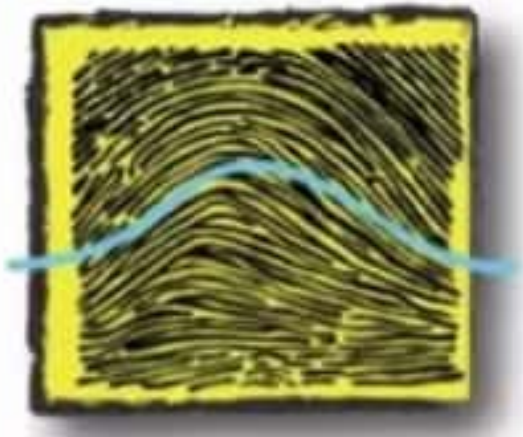
Fingerprinting

- 1628: Birth of Italian Marcello Malpighi, first to notice patterns of skin on fingers is distinct
- 1823: Whorls, ellipses, and triangles identified by Jan Evangelista Purkinjie
- 1880: Fingerprints used by Henry Fauld to identify criminals
- 1892: Scientific classification of fingerprints developed by **Galton**

Fingerprint Patterns

LOOP

Loops have lines entering at one side of the finger and leaving on the same side.



ARCH

Arches have lines entering on one side of the finger and leaving on the opposite side.

WHORL

Whorls have lines entering at the side of the finger and spiraling inward ending at the center.

Fingerprinting (cont'd)

- 1896: System of matching fingerprints to identify people developed by Ed Henry
- 1900: Scotland Yard adopts the Henry system of fingerprinting
- 1902: First person was convicted on fingerprint evidence
- 1903: NYC police began fingerprint files of arrested persons
- 1930: National fingerprint file set up by FBI
- 1960: First laser design to identify fingerprints was developed

Technology

- 1590: Microscope developed
- 1670: First powerful microscope created by Anton Van Leeuwenhoek
- 1732: Luigi Galvani discovered human nervous system transmits information electronically
  - lie detector test
- 1859: Spectroscopy was developed
- 1888: Hand held camera invented by Eastman
- 1921: First lie detector built by Larson, USA
- 1971: Photo-fit software enables witness to piece together facial features
- 1978: ESDA (electrostatic document analysis) developed document impressions

Blood-typing and DNA analysis

- 1901: Human blood groups were identified by Karl Landsteiner
- 1909: Chromosomes discovered to carry hereditary information
- 1980: Method for detecting DNA differences developed
- 1984: Genetic profiling using DNA was developed by Jeffries
- 1987: First time DNA evidence was used to convict a person in the US

Organizations

- 1807: Forensic Science Institute opened at the Univ. of Edinburgh, Scotland
- 1910: First forensic laboratory opened in France by Edmond **Locard**
- 1932: FBI forensic laboratory established
- 1967: FBI National Crime Information Center Established
- 1981: FBI Forensic Science Research and Training Center opened

- **Science - Future of Forensic**
- As history has shown, the forensic sciences and pathology have made substantive contributions to society throughout the centuries.
- We have been, and will continue to be, servants to the continued evolution of the forensic sciences and pathology in our quest to give society the very best that these disciplines have to offer.
- We must continue to strive for the highest standards in the practice of forensic pathology and in the application of the various subspecialties of forensic science in the resolution of cause and manner of death.
- This same principle must be applied to our participation in the clinical forensic medicine.
- It is only through striving to attain these goals that we can best serve society for whom we are forever their servant.