Chapter 1 Notes: History, Development, and Crime Labs

Definition and Scope

- Forensic science is the application of the knowledge and technology of science to the definition and enforcement of our laws.
- It is the forensic scientist’s job to supply accurate and objective information that reflects the events that have occurred at a crime scene.
- Think of forensic science as an umbrella term encompassing a wide variety of professions that aid law enforcement officials in conducting investigations.

History and Development

- The development of forensic science stalled until the late 1600’s.
- Fingerprint characteristics were first noted by Marcello Malpighi in 1686.
- In 1775, Carl Wilhelm Scheele developed a reliable test for arsenic presence in corpses.
- In 1806, a chemist named Valentin Ross developed a more precise method for detecting arsenic in corpses.
- In 1814, Spanish scientist Mathieu Orfila published a treatise on the detection of poisons in the body.
- He is considered the father of forensic toxicology.
- 19th century advances:
  - Polarizing microscope
  - Microscopic sperm detection
  - Toxicological evidence admitted to trial.
- In 1879, Alphonse Bertillon developed a systematic procedure of taking body measurements used to distinguish one individual from another.
- Bertillon’s system was considered the most accurate identification system available until fingerprinting was fully developed in the early 1900’s.
- Forensic science rose to popularity with the fictional character Sherlock Holmes.
- 20th century advances:
  - Blood typing
  - Locard’s Exchange Principle
  - Document examination
  - Widespread Use of the Microscope
- Locard’s Exchange Principle states: When two objects come into contact with each other, a cross-transfer of materials occurs.
- Modern day advances:
  - Chromatography
  - Electrophoresis
  - Spectrophotometry
  - DNA

Crime Laboratories

- Advances in forensic science and technology led to the establishment of facilities dedicated to analysis of criminal evidence, known as Crime Labs.
- In 1932, the FBI organized a national laboratory that offered forensic services to all law enforcement agencies in the country.
- It is now the largest in the world and performs more than one million examinations every single year.
- Most local law enforcement jurisdictions each operate their own independent crime labs.
- With recent advances in science and a staggering increase in crime rate, there has been a rapid increase in the number of crime labs over the last 40 years.
- The most common investigative tool is no longer confessions-it is forensic science.
- There are four major federal crime labs in the U.S
  1. The FBI Crime Laboratory
  2. The Drug Enforcement Administration (DEA) Laboratories
  3. The Bureau of Alcohol, Tobacco, Firearms, and Explosives Laboratories
  4. The U.S. Postal Inspection Service Laboratories.

Services of the Crime Laboratory

| Physical Science Unit | Applies principles and techniques of chemistry, physics, and geology to the identification and comparison of crime scene evidence
|                       | Examines items such as drugs, glass, paint, explosives, and soil. |
| Biology Unit          | Identifies and performs DNA profiling on dried bloodstains and other body fluids, compare hairs and fibers, and identify and compare botanical materials such as wood and plants. |
| Firearms Unit         | Examines firearms, discharged bullets, cartridge cases, shotgun shells, and ammunition of all |
types. Also examines firearms discharge residue and the approximate distance from a target at which a weapon was fired.

Document Examination Unit
- Studies the handwriting and typewriting on questioned documents to ascertain authenticity and/or source.
- Analyzes paper and ink and indented writings, obliterations, erasures, and burned or charred documents.

Photography Unit
- Examines and records physical evidence.

Toxicology Unit
- Examines body fluids and organs to determine the presence or absence of drugs and poisons.

Latent Fingerprint Unit
- Processes and examines evidence for latent fingerprints when they are submitted in conjunction with other laboratory examinations.

Voiceprint Analysis Unit
- Uses voiceprinting, a technique that visually displays sound as a graphic, to tie suspects to telephoned threats or tape recorded messages.

Crime-Scene Investigation Unit
- Collects and preserves physical evidence that will later be processed at the crime laboratory.

Other Forensic Science Services

Forensic Psychiatry
- Examines the relationship between human behavior and legal proceedings.
- Performs tasks such as determining whether an individual is competent to make decisions about preparing a will, settling property, or refusing medical treatment.

Forensic Odontology
- Helps identify victims based on dental evidence when the body is left in an unrecognizable state.

Forensic Engineering
- Completes failure analysis, accident reconstruction, and causes and origins of fires or explosions.
- Answer questions such as: How did this accident occur? Were the parties involved responsible?

Forensic Computer and Digital Analysis
- Identifies, collects, preserves, and examines information derived from computers and other digital devices such as cell phones.
- Work might involve recovering deleted or overwritten data from a computer’s hard drive and tracking hacking activities.

The Functions of the Forensic Scientist

- Analyzing of Physical Evidence
- Determining Admissibility of Evidence
- Judging Scientific Evidence
  - “Gatekeeping” = trial judges assume the ultimate responsibility for judging the admissibility and reliability of scientific evidence presented in court.
  - In *Kumho Tire Co., Ltd. v. Carmichael*, the Supreme Court ruled that the “gatekeeping” role of the trial judge applied not only to scientific testimony but to all expert testimony.
- Providing expert testimony
- Furnishing training in the proper recognition, collection, and preservation of physical evidence.

Review

1. Which of the following people did not make a contribution to forensic toxicology?
   A. Valentin Ross  
   B. Alphonse Bertillon  
   C. Carl Wilhelm Scheele  
   D. Mathieu Orfila

2. Locard’s Exchange Principle states that when two objects come into contact with each other, a ________ of materials occurs.
   A. Cross-transfer  
   B. Contamination  
   C. Destruction  
   D. Disappearance

3. The ______ unit of a Crime Lab performs DNA profiling on dried bloodstains and other body fluids, compares hair and fibers, and identifies and compares botanical materials such as wood and plants.
   A. Physical Science Unit  
   B. Document Examination Unit  
   C. Biology Unit  
   D. Firearms Unit

4. The current system of crime laboratories in the United States can best be described as
   A. Centralized  
   B. Regional  
   C. Decentralized  
   D. National