Criminology Unit 5

Crime Scene Investigation
And
Forensic Science

**CRIMINAL INVESTIGATIONS**

How do you know coming upon a crime scene what physical evidence to collect?

Steps To Crime Scene Investigations:

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
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</table>
| 1.   | ______________________
|      | ☞ _________________________________
|      | ☞ Isolate the Crime Scene
|      | ☞ Barriers and tape
|      | ☞ ________________________________
|      | ☞ ________________________________
| 2.   | ______________________
|      | ☞ ______________________________
|      | ☞ Potential for evidence to disappear or be altered
|      | ☞ ______________________________
|      | ☞ ______________________________
|      | ☞ ______________________________
|      | ☞ Allows members of jury to understand crime scene
|      | ☞ ______________________________
|      | ☞ ______________________________
|      | ☞ ______________________________
|      | ☞ ______________________________
|      | ☞ Measurements of objects and location
| 3.   | ______________________
|      | ☞ Look for ________________________
|      | ☞ ________________________________
|      | ☞ ________________________________
|      | ☞ Objects, weapons, tools involved in crime
|      | ☞ Microscopic Traces
|      | ☞ Fingernail Scraping
|      | ☞ Hair
|      | ☞ Blood
|      | ☞ Fibers
| 4.   | ______________________
|      | ☞ ______________________________
|      | ☞ Record of process
|      | ☞ Separate Containers
|      | ☞ ______________________________
FORENSIC SCIENCE

☞ The application of science to those criminal and civil laws that are enforced by police agencies in a criminal justice system

HISTORY OF FORENSIC SCIENCE

☞ Fictional Character _____________________
☞ 1st Novel in 1887
☞ Inductive and deductive reasoning in investigation
  ☞ Conclusion based on research
  ☞ Non-specific details to infer a specific fact
☞ _______ organizes national laboratory in 1932 under __________________________
  ☞ ____________________________ (BCA)
  ☞ handles most evidence in Minnesota

FINGERPRINTS

☞ What is the purpose of fingerprints themselves?
☞ Collection of crime-scene prints vs. those on record
☞ 3 types of crime-scene prints
  ☞ ___________________________
  ☞ Created by body perspiration
  ☞ ___________________________
  ☞ Contact with colored material (blood)
  ☞ ___________________________
  ☞ Left in soft material (soap or dust)

TYPES OF FINGERPRINTS

☞ All fingerprints are divided into three classes
  ☞ Arch: 60-65%
  ☞ Loop: 30-35%
  ☞ Whorl: about 5%

HISTORY OF FINGERPRINTS

☞ Evidence exists that _____________ had used to sign legal documents 3,000 years ago
☞ 1800’s use increases and is studied
☞ 1897 Englishman Sir Edward Richard Henry proposes classification system adopted by _____________________
  ☞ Most English-speaking countries including U.S. use some form of this system today
☞ 1901 First systematic and official use of fingerprints in the U.S. for personal identification was adopted for New York City civil service applications
☞ AFIS: ____________________________
  ☞ Consists of “known” and “forensic” (those taken at crime scene)
The study of ___________________

Unique: like fingerprints
☞ Each individual has different pattern
☞ 8 Patterns: 5 most common
   ◦ Diamond Grooves, Branching Grooves, Rectangular, Short Vertical, Long Vertical

HAIR
☞ Age
   ◦ Can classify but not specific
☞ Sex
☞ Race
☞ Length
☞ Diameter
☞ Color
   ◦ ROOT attached
   ◦ Tissue = DNA
   ◦ Without root
   ◦ Primitive form inherited from mother

ARSON AND EXPLOSION
☞ Detect and identify relevant chemical materials collected at the scene and to reconstruct and identify
   __________________________
   __________________________
   __________________________
☞ The speed at which explosives decompose varies greatly from one to another and permits their classification as high and low explosives
   ◦ Low explosives such as black powder produces a propelling or throwing action
   ◦ High explosives like dynamite or TNT creates smashing or shattering effect on target

CLOTH AND PAPER FIBERS
☞ _________________________ have devised numerous tests for determining the class of a fiber
   ◦ Compositional differences in dyes that are applied
   ◦ Standard paper includes even minor differences
☞ Chemical tests done to determine type of wood used for paper
   ◦ Lengths, widths, lines, thickness
   ◦ _________________________ also include unique characteristics
   ◦ Carbon, type alignment, spacing, broken or damaged type font

IMPRESSIONS
☞ Teeth
☞ Shoes
☞ Tires
   ◦ Preservation of impression is key; photographed, molds, etc.

PAPER INDENTATIONS
☞ Impressions left due to on the writing instrument
   ◦ Involves paper and _______________________
   ◦ with use of ____________
   ◦ ____________ to identify impressions
HANDWRITING
☞ Unique based on series of samples
☞ Construction of letters and connection
☞ Beginning and ending strokes
☞ Height ratio of letters
☞ Spacing Analysis
☞ Slant
☞ Skill level

VOICEPRINT ANALYSIS
☞ Tie voice to suspect
☞ Telephone threats
☞ Tape recorded message
☞ Transform voice into a visual graphic

FORENSIC TOXICOLOGY
☞ Detecting and identifying the presence of drugs and poisons in body fluids, tissues, and organs
☞ Taken from a wide range of sources
  ➥ Blood
  ➥ Urine
  ➥ Gastric Contents
  ➥ Sudden death due to highly toxic substance
  ➥ Lower presence in blood while large amounts in stomach
  ➥ Vitreous humor (fluid within the eye)
  ➥ Detection of drugs due to slower decomposition
  ➥ May help in establishing time of death
  ➥ Bile and liver (fluid within liver)
  ➥ Hair
    ➥ Drug identification in hair sample is very low
    ➥ Lifetime of drugs in hair is much longer

DRUGS
☞ A natural or synthetic substance that is used to produce physiological or psychological effects in humans
☞ More than ___% of the evidence now being evaluated in crime laboratories in drug-related

Types of Drug Tests
☞ Chemical added; different drugs produce different colors
☞ Chemical is added to create crystal-like formations
☞ Drug is destroyed as it is vaporized with high intensity oven; funneled to determine gases
☞ Infrared light is used to create color spectrum which varies based upon drugs or chemicals

POLYGRAPH
☞ Lie Detector
☞ Interrogation Method: ____________________________
  ➥ Records physiological changes related to ___________
  ➥ ________________
 Cox
  ➥ 16th Century China: _____________________________
    ➥ Suspects questioned and given handful of rice and told to spit it out; salivary glands are inhibited during lying which made it more difficult for those not telling the truth
    ➥ ________________
    ➥ Polygraph in the 20th Century
    ➥ Used in WI in child murder case of the 1930’ s; referred to as the “Lie Box”
Forensic Firsts: Polygraph

What were the results from each of the 4 people tested with the lie detector machine in the Lemberger case?

___________________________________________________________

___________________________________________________________

___________________________________________________________

What was the mapping technique developed by Keeler used to discover the location of the missing murder weapon in the Colorado case?

___________________________________________________________

___________________________________________________________

___________________________________________________________

What role does the lie detector play in criminal investigations today? How can it benefit the investigation even though it is not admissible in court?

___________________________________________________________

___________________________________________________________

___________________________________________________________

CRIMINAL PROFILING

☞ Look at habits based on what is left behind

☞ Suspect captured in 1956 after 16 years of attacks

☞ Psychiatrist working on experimental profiling of criminals identifies suspect with accurate description including age, background, illness, and even what he would be wearing when he turned himself in

FORENSIC

☞ Term used to describe a broad scope of laboratory tests that utilize specific antigen and serum antibody reactions

☞ Questions when examining possible blood samples

1. Is it blood?
2. From what species did the blood originate?
3. If the blood is of human origin, how closely can it be associated to a particular individual?

Stain Patterns of Blood

☞ The location, distribution, and appearance of bloodstains and splatters may be useful for interpreting and reconstructing the events

☞ Examples: NOT INCLUDED ON TEST

☞ Surface texture: the harder and less porous the surface, the less splatter results

☞ When a blood drop hits a hard, smooth surface, it frequently breaks up on impact casting off smaller droplets

☞ It is possible to determine the impact angle of blood on a flat surface by measuring the degree of circular distortion

☞ A drop of blood striking a surface at a right angle gives rise to a nearly circular stain

☞ As the angle decrease, the stain becomes elongated

Additional Facts on Blood Evidence

NOT ON TEST

☞ Unnecessary exposure of blood to heat, moisture, and bacterial contamination will only serve to shorten the survival time of its antigens and enzymes

☞ Before collected, it must be photographed and that the location relative to the entire crime scene is recorded

☞ Blood has great evidential value when a cross transfer has occurred

☞ Wet blood can be typed much more quickly and easily in the lab than dried blood

☞ The entire stained article should be packaged and submitted for examination separately

☞ Dried blood must be scraped off the surface with a disposable scalpel blade onto a clean sheet of paper

DNA

☞ Deoxyribonucleic Acid

☞ Blueprint for the human body

☞ Coded information contained in the nucleus

☞ UNIQUE (Except for identical twins)

☞ Gathered from cell nucleus

☞ Blood

☞ Tissue

☞ Saliva

☞ Semen
DNA FINGERPRINTING
☞ First admissible in court in ______________
☞ Series of techniques using the base sequence of an individual’s DNA for identification purposes
☞ Portions of the DNA molecule contain sequences of letters that are repeated numerous times known as “tandem repeats”
☞ This sequence is used to distinguish one individual from another
☞ ________________________; primitive form with _________ side of family; taken from smaller sample
☞ DNA studies can be used both by the prosecution and defense; prove guilt as well as ______________
☞ As of today ______ post-conviction DNA exonerations
☞ As of September 3, 2015

JUDICIAL SYSTEM
☞ ___________: 1923 Supreme Court case establishes if “experts” testify that the method of research is accepted by scientific community, it is admissible
☞ 1993 Supreme Court case says the Frye Standard is not an absolute prerequisite to admissibility
☞ More responsibility now given to ________
☞ Trial courts serve as “gatekeepers”
☞ Allows for different standards to exist at federal and state levels

FURTHER STANDARDS
☞ Evidence Rule 702 and Daubert Test
☞ Combination of both used at Federal level
☞ Can the technique be tested for accuracy?
☞ Peer review and publication
☞ What is the potential for error?
☞ Standards and Controls
☞ What is the view of the scientific community?
☞ If a witness can establish to the satisfaction of a trial judge that he or she possesses a particular skill or knowledge in a trade or profession that will aid the court in determining the truth, that individual will be accepted as an expert witness