The Power and Processing of Crime Scene Evidence

Funded under NU Award Number 2009-DN-BX-K176

Training Module Workbook

(updated Dec 2020)

NOTE: Hyperlinks in this document may no longer be active. They are included for citation purposes.

Forensic Training Network
info@forensic-training-network.com
www.forensic-training-network.com

Thank you for your participation in this training module. The module is available online and is available 24 hours a day and 7 days a week for 30 days after enrollment. The course is self-paced, which allows you to control the progression of the training. You may pause and resume as often as needed. Simply close your browser to quit and login at http://www.forensic-training-network.com/ pages/st-signin.html to resume *(*This link is no longer active*)*.

Subject Matter Expert

This course content was provided by Sergeant Larry Barksdale. Larry Barksdale has been a police officer with the Lincoln Nebraska Police since 1971. He started as a Uniform Patrol Officer in the Planning and Research Unit before becoming a Detective Sergeant in 1977. Larry worked as a General Assignment Detective until 1995 when he was assigned the role of Case Manager for the Criminal Division. In 1996 Larry became the supervisor of the Crime Scene Tech Unit, which is a position he still holds today.

Mr. Barksdale has an Associate of Arts degree from Dodge City Community College, a Bachelor of Science in Criminal Justice from the University of Nebraska at Omaha, and a Master of Arts degree in Political Science from the University of Nebraska at Lincoln. Larry has also successfully completed additional coursework in chemistry, biology and mathematics from Southeast Community College in Lincoln, Nebraska. He also completed an additional year of graduate study in criminal justice at Sam Houston University in Huntsville, Texas.

Larry is certified by the International Association for Identification as a Crime Scene Analyst. He is also a certified Professional Law Enforcement instructor in Nebraska. Larry is currently an Adjunct Professor of Practice Forensic Science at the University of Nebraska at Lincoln. He was an adjunct instructor for 9 years in the Forensic Science Program at Wesleyan University in Nebraska. Larry has been a guest lecturer for courses at Lagos State University, Nigeria as well at numerous other colleges and schools.

Mr. Barksdale is on the editorial review committee for The Forensic Examiner. He is a member of the TALE committee of the Institute for Linguistic Evidence. Larry is a past president of the International Association of Auto Theft Investigation and the Nebraska Chapter of the International Association for Identification.

Key Course References

- Buckes, Thomas. 2007. *Crime Scene Investigation, Criminalistics, and the Law.* New York: West Legal Studies.
- Platt, Richard. 2003. *Crime Scene: The Ultimate Guide to Forensic Science.* London: Dorling Kindersley Publishing.
- Saferstein, Richard E. 1988. *Forensic Science Handbook, Volume II.* Englewood Cliffs: Prentice-Hall.
- Saferstein, Richard E. 1982. *Forensic Science Handbook, Volume I.* Englewood Cliffs: Prentice-Hall.
- DeForest, Peter E., R. E. Gaensslen and Henry C. Lee. 1983. *Forensic Science: An Introduction to Criminalistics.* New York: McGraw-Hill.
- Saferstein, Richard E. 1981. *Criminalistics: An Introduction to Forensic Science.* Englewood Cliffs: Prentice-Hall.
- FBI. 2007. *Handbook of Forensic Services*. Quantico: FBI Laboratory Publication: https://www.fbi.gov/file-repository/handbook-of-forensic-services-pdf.pdf/view.
- National Forensic Science Technology Center. *A Simplified Gide to Forensic Science:* http://www.forensicsciencesimplified.org/.

Disclaimer

The information presented in this training module is not designed to supersede any agency's policies or procedures. It is important to always follow all agency specific policies and procedures when investigating a crime scene. Applicable local, state and federal laws must also be adhered to.

This project was supported by Award No. 2009-DN-BX-K176 awarded by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice. The opinions, findings, and conclusions or recommendations expressed in this publication/program/exhibition are those of the author(s) and do not necessarily reflect those of the Department of Justice.

Course Objectives

By the end of this course, one is expected to:

- Understand the fundamental meaning and value of physical evidence
- Recognize the importance of proper documentation and evidence handling
- Be familiar with specific types of physical evidence, their value and special handling guidelines
- Apply key concepts learned to crime scene work in the field

Agenda

- Physical Evidence
- Discovery of Physical Evidence
- Documentation of Physical Evidence
- General Evidence Handling Guidelines
  - Collection
  - Packaging
  - Storage
  - Transport
  - Laboratory Submission
- Types of Physical Evidence and Handling Guidelines
  - Latent Prints
  - Impression Evidence
  - Firearm Evidence
  - Trace Evidence
  - Biological Evidence
  - Electronic Evidence
  - Questioned Documents
  - Bodily Injury
  - Entomological Evidence
  - Palynological Evidence
  - Fracture Evidence
  - Drug Evidence

EVIDENCE

Section Objectives

Upon completion of this section, one is expected to:

- Become familiar with the various types of evidence
- Understand the meaning of the term "physical evidence"
- Define various types of physical evidence
- Recognize the value of physical evidence
- Understand the importance of maintaining the integrity of evidence

Evidence

- Refers to anything used in court to determine the truth
- Testimonial evidence
  - Refers to any oral testimony
  - Physical evidence
  - Refers to any material objects
- Circumstantial evidence
  - Indirectly infers a particular account of the crime
- Corroborative evidence
  - Confirms or supports the theory of the crime
  - See the following for in depth information: https://www.nij.gov/topics/forensics/evidence/pages/welcome.aspx , and. https://www.avvo.com/legal-guides/ugc/forms-of-criminal-evidence.

Evidence Questions

A male witness reported that the suspect of a bank robbery drove away in an old, small, green, two-door Ford. A female bank teller described the robbery suspect as a white male of medium build wearing a black ski mask and armed with a small black gun. The black ski mask had a bleach stain located in the chin region. She also said he drove away in small, older, green car.

A suspect was identified who owned a car matching this description. Tire impressions in the mud found at the scene were similar to the tire treads on the suspect's vehicle. Therefore, the owner of this vehicle was contacted by police. At that time, he claimed he had nothing to do with robbery and was never at that bank. A search of the suspect's residence uncovered a bank bag, a small black revolver, and a ski mask with a bleach stain in the chin region. The suspect subsequently admitted to the armed robbery.

Which two items of evidence would be classified as corroborative?

Which two items of evidence would be classified as circumstantial?

Which evidence would be classified as testimonial?

Which evidence would be classified as physical evidence?

Eyewitness Testimony

- Important piece of evidence
- Reliability of witnesses must be determined and documented
- Fact that human memory is fallible must be taken into consideration (Tversky and Fischer)
  - Influenced by others
  - Bias based on audience or purpose of retelling
  - Recollection may be distorted
  - See https://www.google.com/search?q=reliability+of+eyewitness+testimony&rlz=1C1CHBD_enUS894US894&oq=reliability+of+eyewtiness&aqs=chrome.1.69i57j0i13i457j0i13l6.8840j1j7&sourceid=chrome&ie=UTF-8, for additional information.

Crime Scene Investigation and Physical Evidence

*"All criminal investigation is concerned either with people or with **things**. Only people commit crimes, but they invariably do so through the medium of **things**... A balanced approach to criminal investigation must be dual, that is, it must concern itself with people and with the **things** that are involved in the crime... Many investigators have failed in some degree to make the most efficient use of this balanced approach to the investigation of crime. Their failures are often caused by insufficient realization of the enormous potentialities of **physical evidence."*** (Kirk)

Physical Evidence

- Refers to any material objects used to commit a crime or involved in a crime
- Provides objective account of events in court
- Potential roles of physical evidence in criminal investigations
  - Determining motive
  - Identifying or excluding suspects
  - Verifying alibis
  - Determining source of stolen goods
  - Providing investigative leads

Value of Physical Evidence

- Depends on type of characteristics it possesses
- Class characteristics
  - Limit the number of sources
  - Demonstrate an item is consistent with a known source
  - Prevent a source from being excluded as a possibility
  - Exclude a source with complete certainty
- Individual characteristics
  - Uniquely identify the source of an object
  - Exclude a source with complete certainty

Evidence Questions

Three young men went to a fast food restaurant with the intention of robbing the employees. One of these men was a former employee of the target restaurant. The restaurant had closed, and the manager and his wife were the only ones in the restaurant. The robbers entered the establishment through the back door when the manager opened the door to take the trash out. They approached the manager and his wife and used a .44 cal. magnum revolver to threaten them. The robbers got a hold of the bank bag before shooting the manager in the face and his wife in the arm. They then ran from the scene out the front door.

Bullets were recovered from the scene. Numerous bloody footprint impressions were also detected at the scene. Statements from the manager and his wife identified one of the robbers as a former employee. They recognized his voice, build, walk and mannerisms. They were certain he was one of the robbers. Further research of police records put three people, one of whom was named by the victims, together in a previous incident. Investigators went to the last known residences for these three suspects and two of the three individuals were found and taken to police facilities. During an interview, one of the suspects confessed that he was the driver of the car, he and his two friends had robbed the restaurant, and his friend had planned to kill the manager and his wife because they knew him.

Search warrants were prepared, and the third suspect was found and brought in for questioning. The third suspect identified the other two as responsible for the robbery. He claimed that he went along but he did not know there was going to be an armed robbery. Girlfriends, parents, and associates of the suspects were interviewed, and they could not provide alibis for any of the suspects.

As a result of DNA analysis, blood found on the suspect's clothes was determined to belong to one of the victims. The footwear impressions were similar the sole design of suspect's shoes. DNA analysis determined that the suspect 's shoes had the victim 's blood on them. A firearm was recovered, and ballistics examinations concluded that the bullets recovered at the scene were fired from the suspect's firearm. Blood on the suspect's firearm was identified as the manager's blood. A bank bag was recovered containing receipts with the restaurant's name.

List all of the items of physical evidence that provided individual matching characteristics in this case.

_____

_____

What role did the bank bag with store receipts play in this case?

_____

The victim's statements and the suspect's confession would be categorized as which type of evidence?

_____

Probative Evidence

- Goal is to collect evidence that provides proof of a crime or someone's involvement in the crime
- Consider all known facts of the case
- Probative value may need to be determined by an expert and/or laboratory analysis
- Document and collect all potential evidence items

Integrity of Evidence

- Required to present evidence in court
- Required to prevent contamination, destruction, tampering and loss
- Necessary actions to establish and maintain integrity of evidence
  - Maintain scene security throughout processing
  - Wear personal protective equipment (i.e., gloves, masks, footsies)
  - Use sterile equipment
  - Document all items of evidence and actions thoroughly
  - Establish and maintain chain of custody
  - Use appropriate packaging techniques and materials
  - Properly seal and label evidence bags/containers
  - Avoid excessive handling of evidence after detection and collection
  - Properly store and transport evidence
  - Properly submit evidence to laboratory for analysis
  - Generate report detailing all actions taken during the investigation

Personnel in Evidence

See https://www.nist.gov/system/files/documents/forensics/Crime-Scene-Investigation.pdf. For additional information.

- Photographer
- Evidence custodian
  - Log evidence
- Scribe
  - Document
- Crime scene investigator/technician
  - Discover
  - Document
  - Collect
  - Submit
  - Forensic experts

Evidence Processing Equipment

See https://www.nist.gov/system/files/documents/forensics/Crime-Scene-Investigation.pdf. For additional information.

Personal Protective Equipment

Discovery

- UV light
- ALS
- Strong LED light
- Latent print detection powders and reagents
- Presumptive test reagents/kits (blood, GSR, drugs)
- Magnet/metal detector
- Step ladder

Documentation

- Digital camera/filters
- Audio recorder
- Video recorder
- Notebook
- Scale
- Placards
- Chain of custody forms

Collection

- Tweezers
- Decontamination Solution
- Multipurpose tool
- Adhesive tape
- Fingerprint tape
- Casting materials
- Vacuum
- Static dust lifter
- Gel lifter
- Sterile cotton swabs
- Sterile water
- Shovel/hand spades/rake

Packaging

- Plastic containers
- Small boxes
- Butcher paper
- Evidence tape
- Paper envelopes and bags
- Plastic bags
- Evidence tags

DISCOVERY OF PHYSICAL EVIDENCE

Search Methods

Once the crime scene is secured and thoroughly documented, the investigator must search the area to detect physical evidence. It is important to first focus on fragile evidence that may be lost or destroyed. The type of crime scene, location of crime scene and type of potential evidence often dictates how searching is performed. There are some general guidelines that may be applied. Easily accessible areas should be searched first, followed by hidden areas. Start searching for general evidence and then start searching for specific evidence. Search for evidence in the pathway to other evidence. For example, one would not want to step on fiber evidence to get to a pool of blood. While performing the search, it is important to document if it appears as if any evidence has been moved or taken from the scene.

Type of Search Method	Enter Brief Description
Grid	
Strip/Line	
Circular	
Floor Plan	

General Detection Methods

Investigators generally use the human senses for general detection of evidence. Sight, smell, and touch are the most commonly used during the initial walk through and the search. At some point additional techniques may be used for detecting evidence. Some of these techniques are use of alternate light sources, chemicals, and portable instrumentation such as air quality instruments. At scene handheld instrumentation such as handheld RAMAN instruments, FTIR instruments, and portable Mass Spectrometer/Gas Chromatograph instruments are being tested for at scene applications. See Horiba, https://www.horiba.com/en_en/science-in-action/raman-spectroscopy-breakthroughs-make-csi-real/. , and Azom, https://www.azom.com/article.aspx?ArticleID=15963. for information on scene applications of handheld instrumentation.

Alternate Light Sources

- Devices that provide light at wavelengths other than normal visible light
- Darkness may be required to achieve optimal visual enhancement
- Barrier filters or goggles for visualization and eye protection
- Requires special photography techniques and camera filters
- See Horiba, https://www.horiba.com/fileadmin/uploads/Scientific/Documents/Forensics/fls.pdf.,and Sirchie, https://www.sirchie.com/forensics/alternate-light-sources.html., and Spex, https://spexforensics.com/products/forensic-light-source.

Analytical Tests

- Most analytical tests performed at a crime scene are presumptive
  - Indicate evidence is probably the substance it is being tested for
  - Lack specificity
  - Involves the use of specialized chemicals and/or kits
- Most often performed to detect
  - Biological evidence
  - Illegal drugs
  - Gunshot residue

Chemicals

+ Most often used to detect or enhance
  - Luminol, Henastix, or Fluorescein for blood detection
  - Bloodstain dyes for impression enhancement
  - Cuprotesmo/Plumbtesmo, Sodium Rhodizonate for gunshot residue
  - NIK kits for drugs

DOCUMENTATION OF PHYSICAL EVIDENCE

- Physical location where a crime took place
- Where most of the physical evidence associated with the event will be found
- Factors that can affect the crime scene
  - Weather
  - Biohazards
  - Crowds
  - Accessibility
- Scene types
  - Indoor/Outdoor
  - Simple/Complex
  - Primary/Secondary

Section Objectives

- Familiarize with various methods of documentation used to process evidence
- Learn basic guidelines for photographing evidence
- Understand the concept and importance of chain of custody

Documentation of Evidence

- Document items before collection
- Information to document
  - Descriptive details
  - Location of item
  - Location in relation to other items
- Methods of documentation
  - Notes
  - Sketches
  - Photographs
  - Video recording
  - Voice recording

Photographing Evidence

- Photographs may become evidence analyzed in the laboratory
- Clear, focused images without distortion are critical
- Forensic photography course(s) recommended
- General guidelines
  - Capture images at 90-degree angle
  - Capture images (1) without and (2) with a scale
  - Capture images (1) without and (2) with a placard
  - Use a tripod or other means of stability
  - Establish photographic log

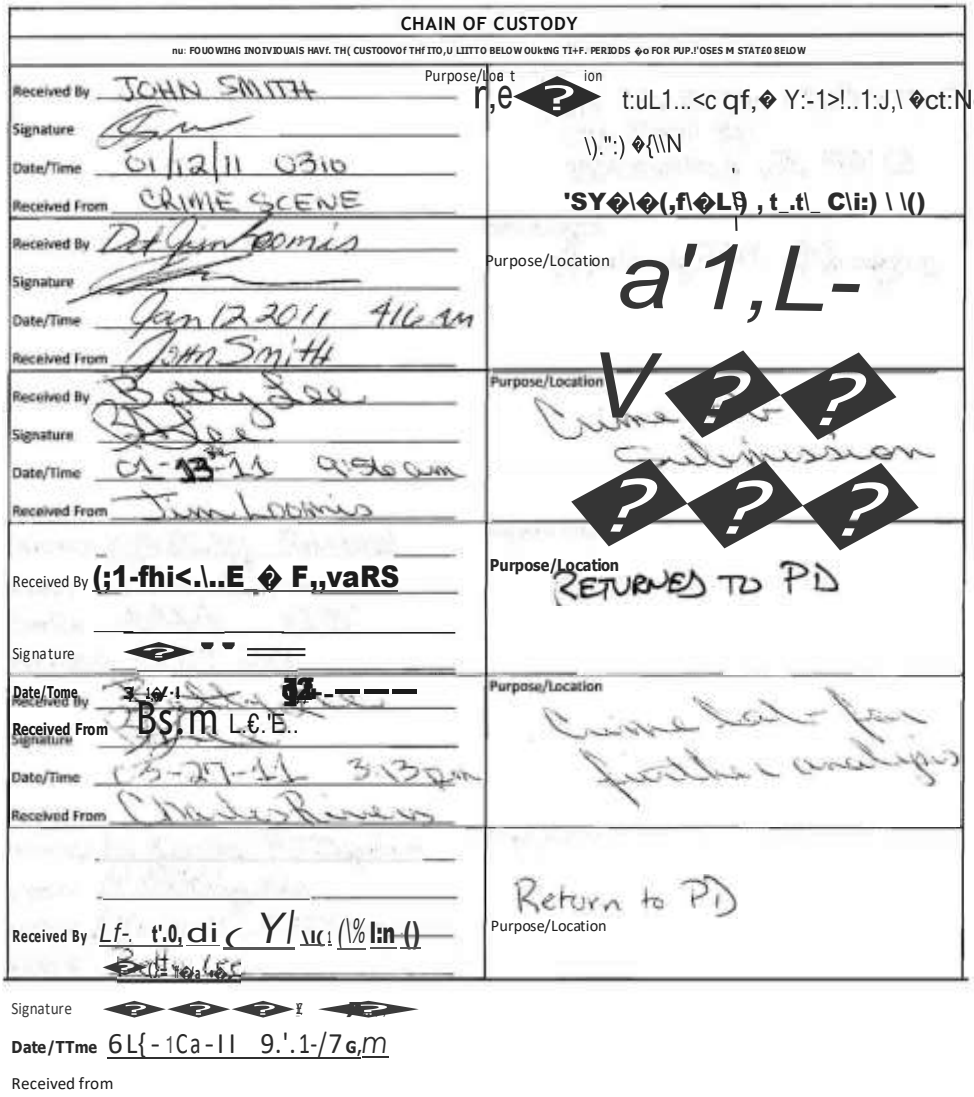
Chain of Custody

- Record documenting the possession of physical evidence
- Begins once physical evidence is recovered at crime scene
    - Item number
    - Date/time of collection
    - Location of recovery
    - Brief description
    - Name of collector
- Continues during laboratory analysis, court presentation and disposition
- Documents transfer of evidence
    - Date/time of transfer
    - Item number
    - Location of transfer
    - Name and signature of individual relinquishing possession
    - Name and signature of individual taking possession
- Required to authenticate evidence in court
- Involves proper evidence handling procedures

See https://www.ncbi.nlm.nih.gov/books/NBK551677/#:~:text=Importance%20of%20the%20Chain%20of,during%20the%20trial%20if%20required., for more in depth information on the importance of chain-of-custody.

Follow the link for an in depth tutorial, Collecting DNA Evidence at Property Crime Scenes, on collecting evidence, documenting evidence, chain of custody, and related processes and techniques: https://projects.nfstc.org/property_crimes/index.htm.

Chain of Custody Example



CHAIN OF CUSTODY

nu: FOUOWIHG INOIVIDUAIS HAVf. TH(CUSTOOVOf THfITO,U LIITTO BELOW OUktNG TI+F. PERIODS ◆o FOR PUP.!'OSES M STATE0 8ELOW

Received By JOHN SMITH
Signature
Date/Time 01/12/11 0310
Received From CRIME SCENE
Purpose/Loa t ion

Received By
Signature
Date/Time Jan 12 2011 416 AM
Received From John Smith
Purpose/Location

Received By
Signature
Date/Time 01-13-11 9:50 am
Received From
Purpose/Location

Received By
Signature
Date/Tome
Received From
Purpose/Location RETURNED TO PD

Date/Time 3-27-11 3:13pm
Received From
Purpose/Location

Received By
Signature
Date/TTme 6L{-1Ca-11 9.'.1-/7G,m
Received from
Purpose/Location Return to PD

Which individual received the evidence from the crime scene?

Which individual submitted the evidence to the crime laboratory?

Which individual did Betty Lee on Jan 13, 2011 receive the evidence from?

Who was in possession of the evidence on March 27, 2011?

Evidence Log

- Lists all recovered evidence items
- Includes:
  - Date
  - Case number
  - Location each item was retrieved
  - Item numbers
  - Individual who collected each item
  - Short description of each item
  - Time each item was collected
- Check prior to releasing a scene to ensure all items are accounted for

GENERAL EVIDENCE HANDLING GUIDELINES

See https://www.in.gov/ilea/files/p56-57%20Rpt%20Wr%20-%20Evid%20Log.pdf. for an example of an evidence log.

Section Objectives

- Learn general evidence handling guidelines
  - Collection
  - Packaging
  - Transportation
  - Storage
  - Submission
- Understand the concept and purpose of collecting
  - Known samples
  - Substrate controls

Collection of Evidence

- Always document before collection
- Wear gloves and change them in between handling items
- Collection equipment must be decontaminated between handling items
- Transportable objects might be collected and submitted to lab in their entirety in some cases
- Transferable objects should be collected before other objects are moved
- Avoid excessive handling of evidence after recovery
- Consider all types of evidence
- Always obtain known samples to be used as standards and/or references

Field versus Lab Processing

Influencing factors:

- Agency protocols
- Type of evidence
- Integrity of evidence
- Type of deposition material
- Type of substrate
- Environmental conditions
- Nature of the case
- Field expertise and equipment
- Field personnel resources
- Laboratory capacity

Known Samples & Controls

- Known Samples
  - Source of sample is of known origin
  - Defined using various terms
    - Exemplar
    - Reference
    - Elimination
- Substrate controls
  - Used to establish a result is not inherent to the substrate

Collecting Known & Substrate Control Samples

Investigators were called to the scene of a reported sexual assault. The victim claimed that a group of acquaintances had been partying in his living room from 10:00 PM until 2:00 AM. At 2:00 AM , the victim reported he went upstairs to his bedroom and went to slee p. At 2:30 AM, he was awakened by someone at the party attempting to have anal sex with him. The victim reported that all parties knew each other and were all of the same gender. The other individuals at the party were able to identify both the victim and the suspect. The victim also reported that he did have consensual sex with other individuals in his bed earlier in the evening.

A picture of the living room is shown on the right. Since all parties knew each other and the crime was not committed in the living room, investigators only took photographs of this location.

Stairway to Bedroom

Doorway to Scene

Images of the stairway to the victim's bedroom and the entrance of the victim's bedroom were also taken. If a stranger was responsible for the sexual assault, investigators would check for trace evidence, foot or shoe prints, fingerprints and or DNA. However, since all parties and the location of the crime were known, investigators were able to focus the investigation on a much more narrow physical space - the victim's bedroom.

From whom should investigators obtain known DNA samples from?

Because the victim reported that the bed sheets came off of the bed during the criminal act, should the sheets be collected?

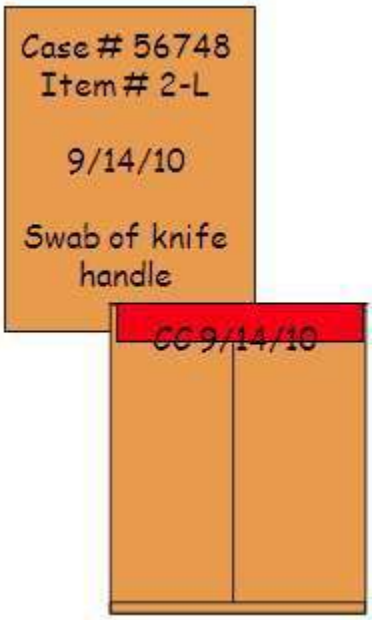
Should the entire mattress be collected and submitted for lab analysis?

Possible semen stains were detected directly on the mattress using a black light. Investigators collected the stains with a moist sterile saw for laboratory testing. What could be used as a substrate control?

One of the key points to prove is that the suspect was in the victim's bed. The detection and identification of the suspect's semen, hair, clothing fibers, and other DNA sources could help support the victim's statement. Samples found directly on the mattress would most likely be collected in the field and submitted for laboratory testing because mattresses are difficult to package and transport. However, the bedding would most likely be packaged and screened for evidence in the laboratory. It is not common practice to lay out the sheets at the scene due to space constrictions and the potential for contamination.

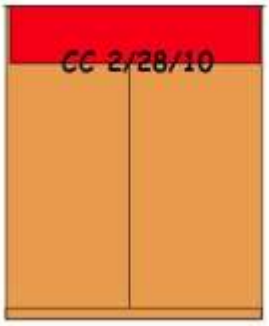
The victim's computer could also provide additional information. It might be used to establish that there was or was not a past relationship between the victim and the suspect.

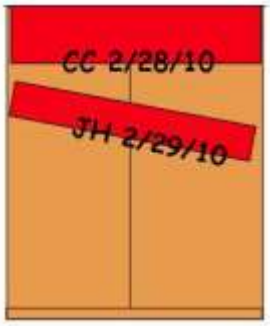
Packaging Evidence



- Package each item of evidence separately
- Dry wet items before packaging
- Paper packages recommended for most types of evidence
- Label packages
  - Case number
  - Item number
  - Date
  - Description of item
  - Seal with evidence tape
- Initial over seal with permanent ink

Evidence Seal





Evidence Storage

- Designated area for evidence storage during investigation
  - Agencies may have lock boxes and/or store evidence in a crime scene vehicle
  - Responsible officer must ensure evidence remains with them or is locked up in a secure area

Evidence Transport

- Police car, plain car and/or crime scene vehicle
- Specialized vehicles with refrigerators and/or temperature controlled environments exist
- Secure evidence in vehicle to minimize movement and prevent damage

Funded by NIJ Award Number 2009-DN-BX-K176

Evidence Submission

- Police Agency
  - Evidence submission form attached to item
  - Chain of custody form is maintained
  - Property number is assigned
  - Performed by evidence clerk or submitting officer
- Crime Laboratory
  - Crime lab personnel signs the existing police chain of custody form
  - New laboratory chain of custody form is initiated and signed by submitting officer
- FBI
  - Follow instructions in the FBI Handbook of Forensic Services

https://www.fbi.gov/file-repository/handbook-of-forensic-services-pdf.pdf/view.

PHYSICAL EVIDENCE PROCESSING BY TYPE

Section Objectives

- Understand meaning of each type of evidence and its potential forensic value
- Learn specific guidelines for handling each type of evidence

Categories of Evidence

- Latent Prints
- Impression Evidence
- Firearm Evidence
- Trace Evidence
- Biological Evidence
- Electronic Evidence
- Questioned Documents
- Bodily Injury
- Entomological Evidence
- Palynological Evidence
- Fracture Evidence
- Drug Evidence

LATENT PRINTS

Latent Prints Overview

- Refers to fingerprints, palm prints and footprints
- Prints are chance impressions of friction ridge skin
- Pattern of friction ridge skin is unique and permanent (Peterson et al)
- Evidentiary prints are compared to known prints from suspects and/or fingerprint data stored within AFIS/IAFIS using biometrics
- AFIS (Automated Fingerprint Identification System)
  - Digital imaging system used to obtain, store and analyze fingerprint data using biometrics
  - Provides list of candidates for examiner to further compare
  - Does NOT determine whether fingerprints match or not

Non-governmental fingerprint examiner courses: https://www.sirchie.com/training.html.

Value of Latent Print Evidence

- Can possess class characteristics and/or individual characteristics
- Can be used to make identifications and exclusions
- May provide information about presence and/or possession
- Does not automatically prove innocence or guilt
- All identifications must be followed up by the investigator in charge

Types of Latent Prints

- Latent
  - Not visible to the naked eye
  - Result of transfer of perspiration, oil and/or dirt
  - Require use of light, powders and/or chemicals to detect
- Patent
  - Visible to the naked eye
  - Result of transfer of blood and grease
- Plastic
  - Impressions on soft surfaces

Funded by NIJ Award Number 2009-DN-BX-K176

Factors Affecting Latent Print Recovery

- Surface
  - Porous versus nonporous

- Fingerprint Residue
  - Blood
  - Sweat
  - Foreign Material
  - Skin Condition
  - Sweaty
  - Dry
  - Gloved
  - Age
  - Wear
- Environmental Conditions
  - Rain and snow
  - Heat and cold
  - Humidity and aridity
- Additional Factors
  - Touched or handled by others
  - Contamination

Latent Print Processing

1. Perform a visual examination
2. Photograph if visible or if contrast between the print and background can be enhanced with photographic/lighting techniques alone
3. Develop, if necessary, using appropriate technique (depends on substrate and deposition material)
4. Photograph detected prints
5. Lift print (if possible)

Latent Print Detection

There are several specific techniques that may be applied when trying to detect and collect latent prints. To be successful, it is important to know what technique works best on what surface. Effective print development also depends on the deposition material, such as blood, sweat or grease. Routinely, photographs are used as a means to document latent prints. .

Prints in blood require additional considerations. First, depending on the reagent formula used, an impression in blood may need to be " fixed" on the substrate prior to the application of some development techniques. The process of "fixing" will secure the water-soluble print to the substrate so that it does not get washed away with the addition of aqueous based chemicals. Examples of fixing agents include 5-Sulfosalicylic acid (SSA), methanol, and the application of heat. Second, it is important to consider the effects the treatments to be discussed have on DNA since it may be necessary to perform DNA testing on the developed prints. These effects are discussed in the following two online resources.

https://oag.ca.gov/sites/all/files/agweb/pdfs/cci/reference/lp_dna.pdf.

https://www.researchgate.net/publication/235785800_Touch_DNA_Collection_Versus_Firearm_Fingerprinting_Comparing_Evidence_Production_and_Identification_Outcomes.

Presented here are some common reagents/methods used to process latent prints.

Additional Resources:

https://archives.fbi.gov/archives/about-us/lab/forensic-science-communications/fsc/jan2001/lpu.pdf.

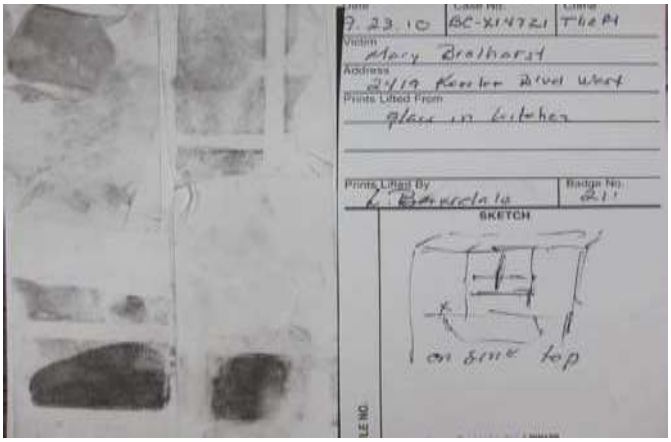
https://www.sciencedirect.com/book/9780128035078/latent-print-processing-guide.

Detection Method	**Enter a Brief Description**
Powder	
Magnetic Powder	
Super Glue Fuming	
Ashley's Reagent	
Ninhydrin	
Coomassie Blue	
Amido Black	
Acid Yellow 7	
Hungarian Red	
WetWop	
SPR	
Lighting Techniques	

Handling Latent Prints

- Lifting fingerprints
  - Lift with fingerprint tape and place on fingerprint card
  - Label fingerprint card with case number, time, date, location and name of collector
- Casting may be performed for prints on textured substrates and curved surfaces
- Collecting objects containing fingerprints
  - Protect surfaces bearing latent prints during handling
  - Dry prints before packaging
- Packaging
  - Non-porous: Glassine envelopes
  - Porous: Paper envelopes or cardboard boxes
- Consider the presence of latent prints when swabbing for DNA evidence

Fingerprint Cards



Known Print Collection

- Collected from victims, suspects and others with access to evidence
- Captured in ink on a ten-print card or scanned electronically
- Click link for more on exemplars: https://www.ncjrs.gov/pdffiles1/nij/225324.pdf.

Fingerprint Case Examples

Night Stalker (Lerner et al, Lyle, Lodi News-Sentinel): See https://www.crimemuseum.org/2011/08/31/early-use-of-fingerprint-technology-anniversary-of-capture-of-night-stalker/.

Omaha Case: https://www.fbi.gov/news/stories/30-year-old-murder-solved.

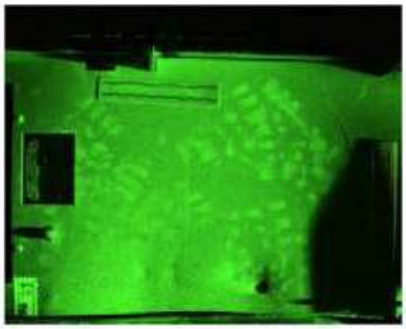
IMPRESSION EVIDENCE

Types of Impression Evidence

Type	Enter Brief Description
Bite Marks	
Tool Marks	
Shoe/Tire Impressions	

Detecting Shoe Impressions

Strong white light or ALS held at an oblique angle



Shoe impressions detected with green light

Handling Tire Impressions

- Dry impressions
  - Impressions left by dust or other dry substances
  - Collection options
    - Lift with static dust lifter
    - Collect entire object
    - Cast (prints with depth)
- Wet impressions
  - Impressions deposited by wet substances
  - Allow to dry before processing if still wet upon arrival to the scene
  - May be brushed with fingerprint powder to enhance impression
  - Collection options
    - Lift using a gel lifter or adhesive material
    - Cast
    - Collect entire object

Lifting Impressions

Lifting an impression allows a two-dimensional residue or dust impression to be transferred to a lifting film. This lifted image can then be submitted to the laboratory for further processing.

Type of Lift	Enter a brief description
Electrostatic	
Gelatin	
Adhesive	

Casting Impressions

- Provides a three-dimensional view of impression
- Accomplished using dental stone, polyvinyl or construction sulfur
- Casts must air-dry for at least 48 hours before cleaning and packaging
- Casts must be packaged in paper and carefully to prevent damage

Exemplar Impressions

Collection methods:

- Ink/butcher paper
- Commercial kits
- Fingerprint powder/lifting material
- Vaseline/fingerprint powder/lifting material

Impression Evidence Case Example (find case in which impression evidence was used in the case, cite your source, and write a brief description).

FIREARM EVIDENCE

Types of Firearm Evidence

Type	Enter a brief description
Firearms	 https://nij.ojp.gov/topics/articles/law-enforcement-use-national-integrated-ballistic-information-network-nibin.
Bullets	
Bullet Holes	
Spent Cartridge Cases	
Unfired Cartridge Cases	
Gunshot Residue	
Silencers	

Find image of unfired cartridge and silencer: _____

Discovering Firearm Evidence

- Interview witnesses
- Inspect surfaces for bullet impacts
  - Presumptive tests for the presence of lead and copper are available
- Inspect area for expended bullets, and cartridge casings
  - A metal detector can be useful

Detecting Gunshot Residue

ALS set at 450 nm

Documenting Firearm Evidence

- Notes
  - Location
  - Measurements
  - Firearm details
    - Position of cylinder
    - Position of bullets
    - Make
    - **Model**
    - Serial number
    - Manufacturer
    - Importer
  - Spent cartridge cases information
- Photographs

Handling Firearms

- Take into possession and secure for safety if necessary
- Care must be taken not to destroy or contaminate other types of evidence (i.e., DNA, latent prints and trace evidence)
  - Tag with identifying information
  - Package in paper

General Guidelines for Rendering a Firearm Safe

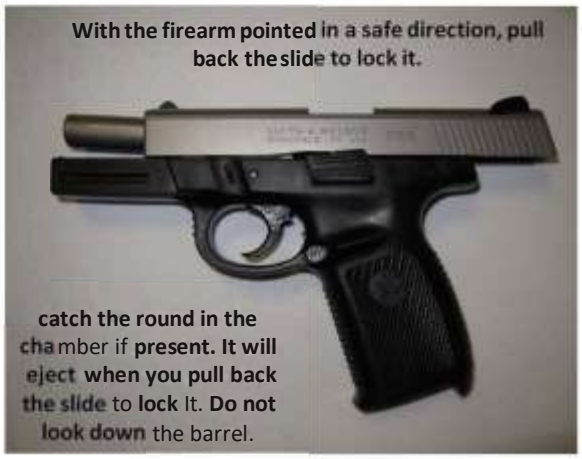
Control for Contamination

Any actions to render a firearm safe should be done while wearing gloves to prevent contamination whenever possible. Leather work gloves should be exchanged for clean rubber gloves or a new pair of disposable gloves.

Documentation

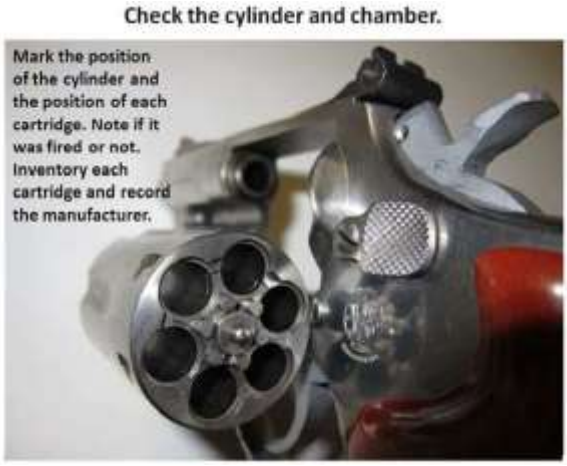
Ideally a firearm should be photographed in place before it is moved. However, safety is the most important aspect to consider in these cases. A firearm may need to be taken off of a person before photographs can be taken. In addition, a firearm taken off of an individual may need to be immediately de-cocked and/or the magazine may need to be taken out. Regardless of what measures are taken, it is important to thoroughly document all related actions in a report.

Guidelines for a Pistol



After clearing the weapon of all ammunition, the firearm should be secured in the lock back position with a plastic tie.

Guidelines for a Revolver



Processing a Firearm

- Perform in secure area
- Check the frame and handle for fingerprints
- Swab the trigger, hammer, handle and slide of automatic for DNA
- Check the barrel for hair, fiber, tissue and blood
- Collect unfired bullets and place each in a separate container (note if bullet was ready to be fired)

Follow link for issues collecting firearm evidence: http://www.fpd-ohs.org/sites/ohs.fd.org/files/training/2015%20CJA%20CLE%20Event%20Wilmington%20Ohio/Gun%20Presentation%20-%20vickers.pdf.

Handling Bullets and Cartridges

- Collect all recoverable bullets and cartridge cases found for lab analysis
- Package individually in a secure container
  - 35 mm film canister
  - Envelope
- Never wrap in cotton since it can leave behind fibers

Handling Gunshot Residue

- Commercial GSR presumptive field tests are available
  - Indicates possible presence of components found in gunshot residue

- Collection guidelines
  - Perform as soon as possible
  - Clean hands- and put-on gloves
  - Cover work surface with clean paper
  - Concentrate on suspect's thumb, index finger and the webbed area in between

Processing Bullet Holes

- Be sure to measure above ground level if found on a vertical surface
- Scales needs to be placed straight up and down
- Camera needs to be level
- Collect entire object when possible
- Use caution not to alter morphology
- Do not use cotton balls, swabs, or swatches
- Bullets are retrieved in bodies by medical personnel
- Bullets in objects are carefully retrieved by digging and cutting

Probing Bullet Holes

- Be sure to measure above ground level if found on a vertical surface
- Scales needs to be placed straight up and down
- Camera needs to be level
- Collect entire object when possible
- Use caution not to alter morphology
- Do not use cotton balls, swabs or swatches
- Bullets are retrieved in bodies by medical personnel
- Bullets in objects are carefully retrieved by digging and cutting

Firearm Case Examples

Follow the link for the official Department of Justice report on the shooting of Michael Brown: https://www.justice.gov/sites/default/files/opa/press-releases/attachments/2015/03/04/doj_report_on_shooting_of_michael_brown_1.pdf.

TRACE EVIDENCE

Types of Trace Evidence

Trace evidence analysis must be done by a qualified examiner in the laboratory and it will only reveal class characteristics. Evidentiary items can be compared against known samples when available. Some manufacturers maintain databases for gunshot powder, fiber, paint, white powders, wood and crystals which are used for additional comparisons. The ATF maintains a database for explosives and the Secret Service maintains a database on ink. Agencies may also submit samples to private laboratories that specialize in trace evidence analysis.

Type	Enter Brief Description
Hair	 Follow links for more information on hairs as evidence: https://www.mccrone.com/mm/the-science-of-forensic-hair-comparisons-and-the-admissibility-of-hair-comparison-evidence-frye-and-daubert-considered/., and https://archives.fbi.gov/archives/about-us/lab/forensic-science-communications/fsc/july2000/deedric1.htm.

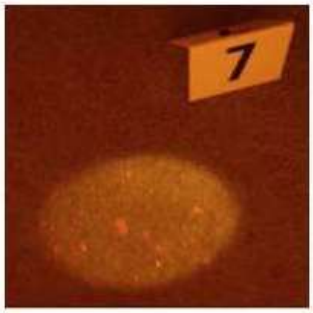
Fibers	
Paint	Follow the link for information on paint analysis: https://www.sas.upenn.edu/~carrolld/SpecProjectPages/Paints.html.
Glass	
Soil	
Wood chips	

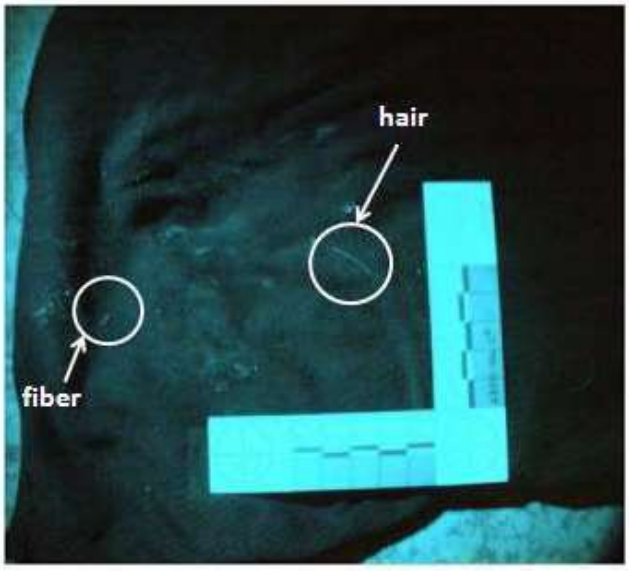
Detecting Trace Evidence

- Potential locations
  - Clothing
  - Hair
  - Skin
  - Wounds
  - Crime scene
  - Vehicles
- May be difficult to see with the unaided eye
- Oblique lighting recommended
- ALS may cause certain items to "glow"

Trace Evidence Detection with ALS

Synthetic fibers often glow red, orange, or green when illuminated with a blue light and viewed through a deep yellow filter





Blue light with deep yellow filter

Collecting Hair and Fiber Evidence

- Tweezers
- Gel lifter
- Low adhesive masking tape
- High adhesive masking tape
- Vacuum

Packaging Hair and Fiber Evidence

- Loose items can be placed in paper bindles with druggist fold
- Do not place loose items directly in plastic
- Tape lifts can be placed on plastic sheets or in plastic bags
- Prevent items from transferring from one part of object to another

Handling Paint and Glass

- Paint
  - Collect paint chips and samples from all chipped/suspected sources
  - Tweezers or blades may be used
  - Collect all layers
  - Package in a paper druggist bindle
- Glass
  - Collect loose fragments and samples from all broken/suspect sources
  - Spatula, small shovel or vacuum may be used
  - Package in plastic containers (i.e ., film canisters, pill bottles)
  - Do not use paper or glass containers

https://archives.fbi.gov/archives/about-us/lab/forensic-science-communications/fsc/april2009/review#:~:text=A%20forensic%20glass%20analysis%20is,end%20use%2C%20or%20glass%20provenance.

Handling Soil

- Collection
  - Collect as soon as possible
  - Collect from immediate crime scene area and from access and escape routes
  - Collect from areas with noticeable changes in color, texture and composition
  - Collect from a depth consistent with questioned soil
  - Collect from alibi areas
- Create a map to identify all soil-sample locations
- Air- dry soil or items containing soil before packaging in plastic

Soil as Evidence: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcseprd1429417.

Trace Evidence Case Examples

-Forensic Geology Cases: http://faculty.uml.edu/nelson_eby/forensic%20geology/Case%20Studies.htm.
-Forensic Palynology Case: https://www.theatlantic.com/science/archive/2015/11/fighting-crime-with-pollen/416259/.
-Forensic DNA and Fiber Case: http://www.exploreforensics.co.uk/forensic-cases-murder-leanne-tiernan.html.

BIOLOGICAL EVIDENCE

Types of Biological Evidence

Biological evidence is defined as physical evidence originating from a living organism, such as a human. There are various types of biological evidence and within each type there may be more than one form. Many types of biological evidence may be used to perform DNA analysis for the purposes of identification and exclusion. DNA testing results in what is known as a DNA profile. The DNA profile obtained from the evidence is compared against suspect DNA profiles and/or criminal offender profiles stored within a DNA database known as CODIS (Combined DNA Index System).

The identification obtained by a DNA profile match will provide conclusive evidence of an association between a person and the evidence. Keep in mind that this association may not be directly related to the crime (for example, a cigarette butt found at the crime scene may have been left behind prior to the crime occurring); therefore, all the facts must be considered when making case conclusions based on DNA profile matches.

In addition to identification, biological evidence can provide other valuable information about the crime.

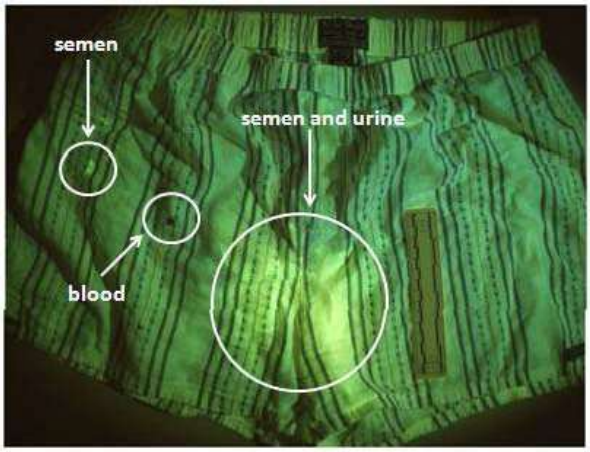
Type	Enter Brief Description
Blood	
Semen	

Saliva	
Bones/Teeth	
Hair	
Epithelial Cells	
Tissue	

Detecting Biological Evidence

- Strong white LED light recommended to detect visible items
- UV light
- Alternative Light Source (ALS)
- Luminescent/Fluorescent Tests (Blood)

ALS Biological Stain Detection



- Semen and urine glow
- Blood appears dark

Funded by NIJ Award Number 2009-DN-BX-K176

Blood Detection Tests

Presumptive Tests

Lacks specificity since other substances can give a positive result (may be performed at crime scene)

- Chemiluminiscent and fluorescent tests
  - Luminol
  - Fluorescein
  - Color Tests
  - TMB (Tetramethylbenzidine)
    - Hemastix®
    - Hemident
  - Phenolphthalein and others

Confirmatory Tests

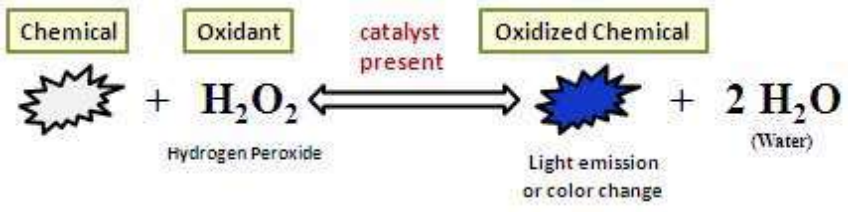
Offers specificity since no other substance can give a positive result
(not often performed at crime scene)

- ABAcard® HemaTrace Test
- Hexagon OBTI Test

Presumptive Blood Tests

Requires the use of a catalyst to produce an oxidation reaction

- Catalyst
  - Chemical that initiates or accelerates a reaction
    - Iron found in human hemoglobin acts as a catalyst
- Oxidation reaction
  - Charge of chemical increases when combined with an oxidant in the presence of a catalyst
  - Hydrogen peroxide is typically used as an oxidant
  - New oxidized chemical is produced resulting in color change or release of light



Presumptive Blood Tests

As previously mentioned, presumptive blood tests are not specific for blood. Other catalysts and chemical oxidants might be present such as metals and bleach, which could cause a false positive result for blood. Plant and vegetable peroxidases such as in horseradish, garlic, cabbage, and tomato may give false positive reactions for blood. In addition, other substances of animal origin could result in positive reactions. These catalytic tests are performed by mixing a specific reagent with an oxidant and exposing it to a sampling of the stain in question or an area suspected to contain blood. Most catalytic test results are read immediately and are not considered valid after about a minute.
Follow the link for references on confirmatory, presumptive, and discovery tersts: http://www.abacusdiagnostics.com/references.htm.

Test	Enter Brief Description
Luminol	
Fluorescein	
Leucocrystal Violet (LCV)	
Phenophthalein	
TMB	

Handling Biological Evidence

- Personal protective equipment must be worn to prevent contamination
- Collection
  - If item cannot be transported, biological stains should be...
    - cut
    - tape lifted
    - transferred with a sterile swab
  - Bones, teeth, hair and tissue should be collected with sterile instruments
- Packaging
  - Stains must be dry before packaging
  - Always package in paper (except tissue samples)
  - Large items should be wrapped in butcher paper to avoid transfer of stains
  - Be careful not to crush teeth and bones
  - Each item must be packaged separately.

Describe necessary PPE when processing a scene involving a suicide via shotgun to the head. The person was sitting in a chair in the living room at the time of the gunshot:

-Describe the possible physical evidence and how you would document it.

-How would you package each item of the physical evidence?

DNA Case Example

"The Green River Killer was responsible for a rash of murders -- at least 48 but possibly close to 90 -- along the Green River in Washington state in the '80s and '90s. Most of the killings occurred in 1982-83, and the victims were almost all prostitutes. One of the suspects that police had identified as early as 1983 was Gary Ridgway, a man with a history of frequenting and abusing prostitutes. However, although they collected DNA samples from Ridgway in 1987, the technology available didn't allow them to connect him to the killings. It wasn't until 2001 that new DNA techniques spurred the reexamination of evidence that incriminated Ridgway. He was arrested and later confessed. Ridgway pleaded guilty to 48 murders -- later confessing to even more, which remain unconfirmed -- in exchange for being spared the death penalty. He was sentenced to 48 life sentences without the possibility of parole." There are many internet sources for information on this case.

Follow the link for famous trials. The link includes case information, photographs, and evidence from many of the cases. https://famous-trials.com/.

DIGITAL EVIDENCE

Digital evidence has become extremely important in modern crime scene investigations: http://www.forensicsciencesimplified.org/digital/how.html., and https://www.iacpcybercenter.org/investigators/digital-evidence/understanding-digital-evidence/. There are special management issues since there are restrictions on who can view certain digital evidence (child pornography as an example), and who can have knowledge of digital evidence do to right to privacy issues.

- Cell phone/PDA
  - Call history
  - Text messages
  - Emails
  - Contacts
  - Appointments
  - Photographs
  - Voice mails
  - Audio/video recordings
  - GPS tracking
- Pager
  - Contact
- Landline telephone
  - Call history
- Computer
  - Emails/biogs
  - Social networking
  - Appointments
  - Contacts
  - Financial records
  - Photographs
  - Online history/transactions
- Audio recording
  - Contact
  - Events of crime
  - Identify suspect
- Video recording
  - Events of the crime
  - Identify suspect

Handling Digital Evidence

- Secure electronic evidence first when possible
- Be aware of other types of evidence (DNA and fingerprints)
- Send preservation letter to cell phone carrier
- Wrap cell phones in aluminum foil three times
- See

https://nij.ojp.gov/library/publications/forensic-examination-digital-evidence-guide-law-enforcement., for additional information, and https://www.iacpcybercenter.org/wp-content/uploads/2015/04/digitalevidence-booklet-051215.pdf

Computer Evidence Case Example

"The BTK ("Bind, Torture, Kill ") Killer was a serial killer who terrorized the Wichita, Kansas area between 1974 and 1991, murdering 10 people over the span. The killer craved media attention and sent letters to local newspapers and TV stations, taunting investigators. It's this egotism that led to his capture, however. When he resurfaced in 2004 with a series of communications, he chose to send a computer floppy disk to the *Wichita Eagle.* Forensic analysts traced the deleted data on the disk to a man named Dennis at the Christ Lutheran Church in Wichita. It didn't take long for the police to arrest Dennis Rader, who confessed and was sentenced to nine life terms in prison." There many internet sources on this case. Here is a brief description of the role of computer forensics: https://eforensicsmag.com/digital-forensics-hall-of-fame-episode-1-the-btk/.

Voice Analysis Case Example

"In 1970, authors Clifford Irving and Richard Suskind concocted a scheme to forge an autobiography of notoriously eccentric and reclusive billionaire Howard Hughes. Assuming that Hughes would never come out from hiding to denounce the book, they felt that their plan was fool-proof. Irving went to publisher McGraw-Hill claiming that Hughes had approached him to write his life story and that he was willing to correspond with only the author. As proof, Irving produced forged letters that he claimed were from Hughes. McGraw-Hill agreed, paying $765,000 for the right to publish the book. When word of the book was made public, however, Hughes contacted reporters to denounce it as false. Not wishing to appear in public, the billionaire would talk to reporters only via telephone. Thus, a "spectographic voiceprint analysis," measuring tone, pitch and volume, was conducted to determine if the speaker was indeed Howard Hughes. Although a handwriting expert had previously been fooled by the notes that Irving had forged, the voice analyst correctly identified the speaker as Hughes. Irving was exposed and confessed before the book was published. He spent 17 months in prison, while Suskind spent five. Irving later wrote a book about the scheme, *The Hoax,* which became a major motion picture in 2008. Like many forensic applications, there are limitations to voice analysis. Here is a link that discusses the use of voice analysis: https://www.scientificamerican.com/article/voice-analysis-should-be-used-with-caution-in-court.

QUESTIONED DOCUMENTS

Document Evidence

- Types of documents
  - Journals
  - Diaries
  - Suicide notes
  - Ransom notes
  - Checks
  - Written statements
  - Letters/Envelopes
  - Faxes
  - Photocopies
- Value
  - Authorship
  - Threat
  - Authenticity
- Handle with care to avoid contamination and preserve potential fingerprint/DNA evidence.

+ Comparison of Physical Characteristics in traditional questioned document examinations
+ Comparison of language usage in Forensic Stylistics.
+ Comparison of language usage, characteristics, and statistical relationships in Forensic Linguistics

Questioned Documents Case Example: Traditional

"On March 1, 1932, Charles Lindbergh Jr., the 20-month-old son of the famous aviator, was kidnapped, and although a ransom of $50,000 was paid, the child was never returned. His body was discovered in May just a few miles from his home. Tracking the circulation of the bills used in the ransom payment, authorities were led to Bruno Hauptmann, who was found with over $14,000 of the money in his garage. While Hauptmann claimed that the money belonged to a friend, key testimony from handwriting analysts matched his writing to that on the ransom notes." The Lindbergh baby kidnapping case is one that included questioned document examination, voice identification, eyewitness identification, toolmark examinations, human remains examination, and linguistic examinations. Over 300 pieces of evidence were introduced in court. It is a classic forensic science evidence case. Here is a link to an official New Jersey government file: https://nj.gov/state/historical/it-happened-here/ihhnj-er-lindbergh.pdf.

Questioned Document Case Example: Statement Analysis

Statement analysis has undergone many court challenges. It seems to be more of an investigative tool than probative information. See the following for insight into the technique: https://www.statementanalysis.com/cases/.

Questioned Document Case: Forensic Stylistics

Forensic stylistics has been admitted into court. It has been used in civil cases and criminal case. Typically forensic stylistics focuses upon word choice, sentence structure, punctuation, spelling errors and such language measurements as readability index, lexical density, average word length, average sentence length, unique word density, and long word density. It has traditionally focused mostly on authorship issues. See the following for additional information: https://www.tandfonline.com/doi/full/10.1080/13600860600580785.

Questioned Document Case: Forensic Linguistics

Forensic Linguistics is a more in depth and statistically sophisticated analysis of language. It has been admitted into court as an identification technique for identifying authorship. It has been used to evaluate the credibility of documents such as a suicide note, threatening note, and child sexual predator language. Forensic linguistics relies on statistical relationships among parts of language such as ratio of fricatives to total words. See the following for information on forensic linguistics: https://aliastechnology.com/case-examples/.

BODILY INJURY

Bodily injury and wound analysis generally fall within the area of specialty of medical doctors and health care practitioners. It is particularly important that forensic science personnel recognize the importance of bodily injury analysis and employ techniques for credible documentation of injuries. Injury can appear and then go away from the body. Bruises as an example can quickly change appearance. Bodily injury can lead to identification of objects and can contribute to the story of what took place. Follow the link for a classic article on forensic analysis of bodily injury: https://www.sciencedirect.com/science/article/pii/S1353113196900413. This is an older article and somewhat outdated. It gives an idea of what is at stake in wound analysis. Follow this link for an up to date look at the thought behind wound analysis: https://www.slideshare.net/amomtan/wounds-in-forensic-medicine.

- Types
  - Bruises
  - Penetrating
  - Scratches
  - Sharp force
  - Blunt force
  - Burns
- Value
  - Statement corroboration
  - Object identification
  - Sequence of events

ENTOMOLOGICAL EVIDENCE

Forensic entomology is one of the forensic science areas that is underutilized in most areas of the world. It can provide valuable information when approximately collected and analyzed, and many times "saves the case." It goes along with Palynology (pollen analysis), and others specialized areas that do not come up that often but can be important.

- Types
  - Flies
  - Beetles
  - Mites
  - Moths
  - Wasps
  - Ants
  - Bees
  - Maggots
- Value
  - Time of death
  - Post-mortem interval
  - Presence of drugs/poisons (toxicology)
  - Identification of individual (DNA)
  - Location(s)

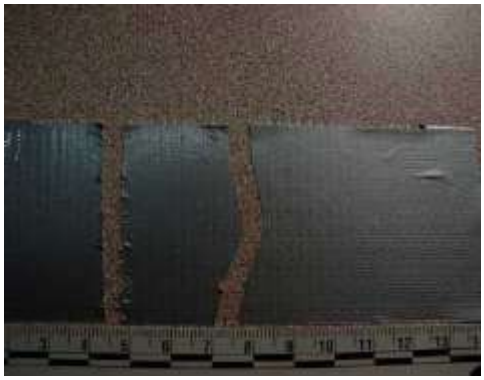
Follow the link for information on forensic entomology cases: http://benecke.com/pdf/forensic_entomology_special_issue_benecke_wells_goff_klotzbach_wolff_klotzbach_carvalho_turchetto_oliva_campobasso.pdf.

Briefly describe a case in which entomological evidence was important to the case:

FRACTURE EVIDENCE

Fracture matches, also known as physical matches, are an area of great importance, and not all that prevalent in forensic investigations. There is considerable research in this area. Here is a link to a thesis looking at popsicle sticks: https://scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=1057&context=themis. When a successful physical match is performed it is very powerful evidence. The sense of touch is an important sense when matching broke and torn objects.

- Refers to any object that is broken or torn
- Value
  - Class and individual characteristics
  - Fractured glass
    - Direction of impact
    - Force of impact
    - Sequence of impacts
- Handle with care not to alter morphology



Handling Glass Evidence

- Collect large pieces with gloved hands or large tweezers/forceps
- Small pieces can be scooped into envelope or plastic container
- Mark each side of glass if known
- Package to prevent breakage

DRUG EVIDENCE

- Value
  - Establish trace-drug presence, identity and quantity
  - Corroborate cause of event or death
  - Packaging may provide information about source

  - Possession, use and distribution are crimes.
- Collection
  - Collect existing packaging
  - Dry before packaging
  - Package in container or plastic.
  - Appropriate PPE is very important. Meth lab investigations are extremely dangerous.
  - Michael Jackson case: https://www.nytimes.com/2011/11/08/us/doctor-found-guilty-in-michael-jacksons-death.html.

Key Message

"Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as a silent witness against him. Not only his fingerprints or his footprints, but his hair, the fibers from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen he deposits or collects. All of these and more, bear mute witness against him. This is evidence that does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only human failure to find it, study and understand it, can diminish its value.,,

- Dr. Paul L. Kirk

Special Thanks

Forensic Training Network extends a special thanks to our crime scene investigation subject matter expert, **Sergeant Larry Barksdale.** In addition to supplying valuable training content, he showed extreme patience, dedication and cooperation throughout the entire development process.

We are grateful to **Chief Tom Casady** and the **men and women of the Lincoln Nebraska Police Department** for their gracious support of this project. All crime scene images used in this training were provided by the Lincoln Nebraska Police Department.

We would also like to thank the **National Institute of Justice** (NU) for supporting our effort to develop this training module and for their collaboration.

References

Buckes, Thomas. 2007. *Crime Scene Investigation, Criminalistics, and the law.* New York: West Legal Studies.

Platt, Richard. 2003. *Crime Scene: The Ultimate Guide to Forensic Science.* London: Darling Kindersley Publishing.

Saferstein, Richard E. 1988. *Forensic Science Handbook, Volume II.* Englewood Cliffs: Prentice-Hall.

Saferstein, Richard E. 1982. *Forensic Science Handbook, Volume I.* Englewood Cliffs: Prentice-Hall.

DeForest, Peter E., R. E. Gaensslen and Henry C. Lee. 1983. *Forensic Science: An Introduction to Criminalistics.* New York: McGraw-Hill.

Saferstein, Richard E. 1981. *Criminalistics: An Introduction to Forensic Science.* Englewood Cliffs: Prentice-Hall.

FBI. 2007. *Handbook of Forensic Services.* Quantico: FBI Laboratory Publication.

Tyversky, Barbara and George Fisher. 1999. The Problem with Eyewitness Testimony. *Standford Journal of Legal Studies* 1(1) 25-30.

Kirk, Paul L. 1953. *Crime Investigation.* New York: lnterscience Publishers, Inc.

Lerner, Lee and Brenda Lerner. 2006. *Alternate Light Source Analysis.* eNotes.com. http://www.enotes.com/forensic-science/alternate-light-source-analysis (accessed July 15, 2010).

Peterson, Peter E. et al. 2009. Latent Prints: A Perspective of the State of the Science. Forensic Science Communications 11(4).

Federal Bureau of Investigation. 2000. Processing Guide for Developing Latent Prints.

Chesapeake Bay Division IAI. 2007. Latent Fingerprint Processing Techniques- Selection & Sequencing Guide. CBD-IAI Website. http://www.cbdiai.org/Reagents/main.html (accessed September 23, 2010).

Lerner, Lee and Brenda Lerner. 2006. *Fingerprint Analysis {Famous Cases).* eNotes.com Website. http://www.enotes.com/forensic-science/fingerprint-analysis-famous-cases (accessed April 22, 2010).

Lyle D.P. 2009. *On This Day: Richard Ramirez: The Night Stalker.* The Writer's Forensic Blog Website. http://writersforensicsblog.wordpress.com/2009/08/31/on-this-day-richard-ramirez-the-night-stalker/ (accessed July 21, 2010).

Lodi News-Sentinel. 1985. *New State Computer Finds the 'Night Stalker' Suspect.* Google News Website. http://news.google.com/newspapers?nid=2245&dat=19850904&id=axYzAAAAIBAJ&sjid=RzlHAAAAIBAJ&pg=6907,202419 (accessed April 23, 2010).

10 Famous Criminal Cases Cracked by Forensics. Disorderly Conduct Website. http://www.criminaljusticeschools.org/blog/10-famous-cases-cracked-by-forensics (accessed April 24, 2011).