

Physical Evidence

Module 3 Part 1

Dr. Tom Brettell
FSC-101
Forensic Science in Criminal Investigation

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The Crime Scene

Most Important & Major Source of Physical Evidence.

Each Crime Scene:

**Unique
Highly Dynamic
Fragile
Frequently requires special handling**

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Physical Evidence

“Encompasses any and all objects that can establish that a crime has been committed or can provide a link between a crime and its victim(s) or a crime and its perpetrator(s)”

- 1. Recognize.**
- 2. Selective.**
- 3. Preserve.**

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The Crime Scene

- 1. Secure & Isolate Scene.**
- 2. Recognition of Evidence.**
- 3. Record the Scene.**
- 4. Systematic Search for Evidence.**

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The Crime Scene

5. Collection of Evidence.

**May Require different collection methods.
“Control?”**

**Negative Control.
Standard (Traceable).
Comparison Sample.**

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The Crime Scene

6. Marking of Evidence.

- 1. Collector’s Initials.**
- 2. Case #, Specimen #.**
- 3. Date of Collection.**
- 4. Location of Evidence.**
- 5. Identify Evidence.**

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The Crime Scene

7. Packaging of Evidence.

“Proper Seal”

Preservation:

Tampering.	Lost- Negligence.
Contamination.	Deterioration.
Breakage.	Scratching (Bending).
Evaporation.	Re-Examination.

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The Crime Scene

8. Chain of Custody.

“A record documenting who had possession of an item at every stage in the collection, handling, and transferring of evidence.”

1. Collector’s Initials.
2. Case# (Specimen #).
3. Date of Collection.
4. Location of Evidence.
5. Identify Evidence.

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Case #: 8

CHAIN OF CUSTODY

Specimen # 1
Footprint on White Paper

Date	Time	Description	Initials
12/2/16	5:17pm	collector of the footprint at crime scene - 47 inches from east wall	H.P.
12/2/16	5:20pm	packaged evidence	P.P.K.
12/2/16	6:30pm	locked in safe	B.H.
12/16/16	4:05pm	picked up evidence	P.K.

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Case #: 8
Location of Crime: Nursing Room # 101
Date: December 2, 1995

Physical Evidence Log

SPECIMEN #	ITEM	LOCATION	TIME	COLLECTOR INITIALS
1	White piece of paper with a blue imprinted footprint	44.5 inches from door 47 inches from east wall	5:17 pm	
2	Bloody Knife	78.5 inches from wall 36 inches from back wall	5:29 pm	
3	White piece of paper with blood droplets	9.5 inches from front wall 102 in from East wall	5:33 pm	
4	Latex glove with a piece of the pointer finger missing	10 inches from back wall 104.5 inches from east wall	5:35 pm	
5	Piece of fabric	46 inches from front wall 75 inches from East Wall	5:36 pm	
6	Button	53.5 inches from front wall 69 inches from east wall	5:38 pm	
7	Bathroom cup with a lipstick ring	24 inches from back wall 36.5 from East wall	5:40 pm	
8	Drug in pill form	31 inches from East wall 20 from back wall	5:41 pm	
9	Matchbook	20 inches from front wall 29 inches from east wall	5:43 pm	

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The Crime Scene

9. Submit Evidence to Laboratory.

1. Investigator.
2. Brief History of Case.
3. List of Specimens.
4. List of the Exams Requested.

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The Crime Scene

10. Crime Scene Safety.

Infectious Diseases.

PPE.

Sharps.



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Physical Evidence

Module 3 Part 2

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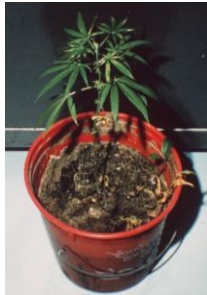
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TYPES OF EVIDENCE

1. Testimonial Evidence.
2. Real Evidence.
3. Documentary Evidence.
4. Demonstrative Evidence.

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Real Evidence



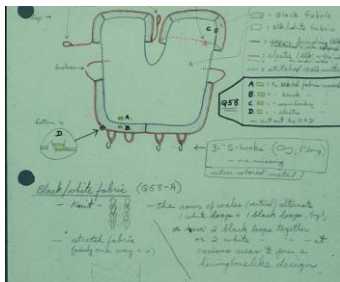
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Common Types of Real Evidence

Blood	Organs and physiological fluids
Semen	Paint
Saliva	Petroleum products
Documents	Plastic bags
Explosives	Plastic, rubber and other polymers
Fibers	Powder residues
Fingerprints	Soil and minerals
Firearms and ammunition	Toolmarks
Glass	Vehicle lights
Hair	Wood and other vegetative matter
Impressions	Tiremarks

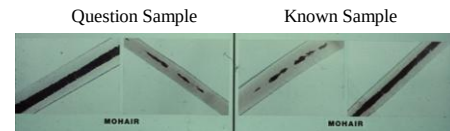
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Documentary Evidence



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Demonstrative Evidence



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Jurisprudence in Forensic Science -

II. Admissibility of Forensic Evidence

- 1923 - Frye v. US
- 1958 - People v. Williams
- 1968 - Coppolino v. Fla.
- 1993 - Daubert v. Merrell Dow Pharm.
- 1997 - General Electric Co. v. Joiner
- 1999 - Carmichael v. Kumho Tire Co.

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Daubert v. Merrell Dow Pharm.

Rules of Evidence (Rule 702)

1. Can the technique be tested?
2. Peer Review (published).
3. Error Rate.
4. General Accepted.
5. Existence of Standards.

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What Do Forensic Scientists Do?

A. IDENTIFY - What is the Evidence?

Examples:

The Powder contains heroin.
The blood contains 0.100% ethanol.
The fiber is cotton.
The fiber is a hair from a deer.

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What Do Forensic Scientists Do?

B. COMPARE - Could (Does) the evidence have a common origin with the known control?

Examples:

The hair could have come from the suspect.
The fingerprint is that of the suspect.
The defendant cannot be ruled out as a source of the stain.

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Value of Physical Evidence?

- Prove that a crime has been committed (Establish Key elements).
- Link suspect(s) with victims(s)/Crime Scene.
- Identity of a person.
- Exonerate the innocent.
- Corroborate the victim's testimony.
- Confirm or disprove alibis.
- Provide investigative leads.
- Reconstruct events.

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Value of Physical Evidence?

- Confession/Admission of guilt by Suspect.
- More reliable than eyewitness to crimes.
- Court: "*Physical Evidence is Important*".
- Juries: Expect Physical Evidence!
- Negative or Lack of Evidence.

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Significance of Physical Evidence

Identification vs. Individualization
of Physical Evidence

Identification
Individualization
Class Evidence

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Significance of Physical Evidence

- Validated Methods

Identification:

1. Specific Standard.
2. Identify a substance sufficiently to exclude all other substances.
3. Test Methods.

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Significance of Physical Evidence

- Validated Methods

Comparison:

Two steps:

1. Test Properties.
2. Draw a conclusion (Scientific Method)

Class Characteristics - places into a group with same properties.

Individualization - **UNIQUE** i.e. one source.

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Testing Properties of Physical Evidence

- Physical Property –
eg. Color, weight, volume, size, shape
texture, bp., mp.
Density, RI. (*Intensive Physical Properties*).
- Chemical Property –
eg. Heroin + Marquis Reagent → Purple
Methamphetamine + Marquis Reagent → Orange

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Cocaine



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Physicochemical Methods

- Depend upon the observation or measurement of a physical property
– i.e. absorption of infrared radiation by an organic compound. (no chemical Rxn.)



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Chemical Property Tests



Unknown white powder suspected to be heroin.



Heroin rxn with Marquis reagent, a presumptive test for heroin.

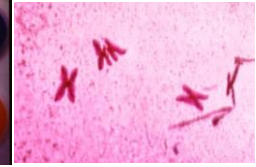
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Chemical Properties



Various drug reactions with the Marquis Reagent

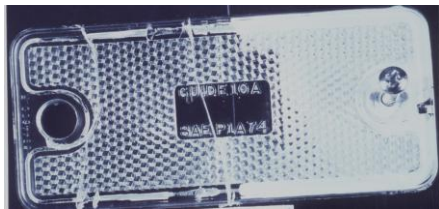


Phencyclidine (PCP) microcrystals in KMnO_4 reagent

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Individualization (“Physical Fits”)



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Individualization (“Physical Fits”)



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Value of Evidence with Class Characteristics

- A preponderance of evidence.
- A preponderance of identifying features within such evidence.
- Elimination Specimens
- Other Evidence where class characteristics are in some way unique.

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Value of Evidence with Class Characteristics

- A preponderance of identifying features within such evidence.

eg. Paint with many layers, all matching.
Building materials – including brick, mortar, plaster, paint, insulation, and glass.

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Value of Evidence with Class Characteristics

- Elimination Specimens
 - Soil from where suspect claims he was or where he claims a car was.
 - Soil from surrounding areas to show that a variation does exist.
 - Paint or other materials from source mentioned in alibi.

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Criteria for Determining Evidentiary Values

- 1) Mathematical Probability (Statistics).
- 2) Uniqueness.
- 3) Inconsistency.
- 4) Physical Match.

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SIGNIFICANCE OF PHYSICAL EVIDENCE

Probability = Frequency of Occurrence.

	<u>Property</u>	<u>F.o.O.</u>	<u>Conclusion</u>
1.	X	50%	1 of 2
2.	Y	50%	1 of 2 (y only) 1 of 4 (x + y)
3.	Z	50%	1 of 2 (z only) 1 of 4 (x + z) 1 of 8 (x + y + z)

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Chain of Custody

1. Collector's Name/Initials.
2. Date of Collection.
3. Agency Case #(Specimen #).
4. Type of Crime.
5. Location of Evidence.
6. Identify Evidence (Brief Description)
7. Victim/Suspect's Name.

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Scientific Issues -

Collection & Preservation of Physical Evidence

- 1. Storage of Evidence.**
- 2. Sufficient Sample.**
- 3. Known/Control Sample.**
- 4. Blank Sample.**
- 5. Handle as little as possible.**
- 6. Contamination.**

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Packaging of Evidence

- Preservation
 - Tampering. Lost-Negligence
 - Contamination. Deterioration.
 - Breakage. Scratching (Bending).
 - Evaporation. Re-Examination.
- Submit evidence in tact when possible.
- Separate Containers.
- "Druggist Fold"
- Proper Seal – What does your lab define that as?

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Evidence Submission General Packaging Guidelines

- Dry all evidence before packaging
- Refrigerate whole blood samples
- Package all items of evidence separately
- Use clean and UNused containers
- Label all containers properly
- Seal all edges with tape
- Use proper seal (DO NOT USE STAPLES)

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Collection of Trace Evidence

- Vacuum Cleaners
- Scraping (Shaking/Sweeping)
- Taping
- Picking

Alternate Light Source

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