



## Activity

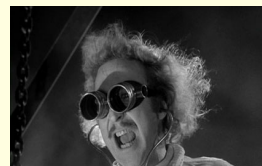
- With a partner
  - 1) List as many types of forensic evidence as you can
  - 2) Write down what a forensic scientist does

## What is Forensic Science?

- Science in service to the law
  - “...the application of science to those criminal and civil laws that are enforced by police agencies in the criminal justice system.”

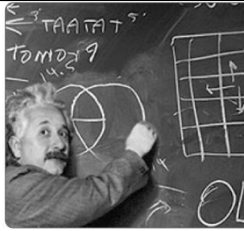
*R. Saferstein*

- Forensic Science draws on many sciences to reconstruct the who, what, where, when and how of events using the tools of science and the logic of scientific inquiry.
- To be a good forensic scientist, you must first be a good scientist.



**• Good Science**

- Is transparent
  - Results are published and available for scrutiny (peer review)
- Asks important questions
- Hypothesizes logical answers based on facts
- Tests hypotheses using experiments
- Controls variables
- Uses empirical data
- Interprets data correctly
- Revises hypotheses, experiments and theories when new data requires
- Remains objective throughout process
  - Observations and results are verified externally
  - Without ego or attachment to a particular outcome
  - Without personal opinion, belief, or internal influence
  - Without an "agenda"



**Pseudoscience**

- A body of knowledge, methodology, belief, or practice that is claimed to be scientific or made to appear scientific, but does not adhere to the scientific method, lacks supporting evidence or plausibility, or otherwise lacks scientific status
- Cannot be tested
- Cannot be externally verified
- Has an agenda!

**Forensic Science draws on many branches of Science**

- |                |                    |
|----------------|--------------------|
| • Chemistry    | • Psychiatry       |
| • Biology      | • Entomology       |
| • Physics      | • Odontology       |
| • Anthropology | • Computer/Digital |
| • Engineering  | • Pathology        |
| • Toxicology   |                    |

**Functions of a Forensic Scientist**

- Analyze Physical Evidence
  - BS in science required (bio or chem)
  - Follow established scientific protocol
  - Techniques must rest on firm scientific ground
  - Techniques must satisfy criteria of the court
- Provide Expert Testimony
  - 'Expert' status determined by the court
  - Explain scientific data and conclusions clearly, concisely and logically to nonscientists (jury)
  - Remain impartial (not working for either side)
- In some labs, Forensic Scientists will also train crime scene personnel

## Not Functions of a Forensic Scientist

- Kicking in doors
- Chasing suspects
- Tackling suspects
- Arresting suspects
- Reading *Miranda* rights
- Interrogating suspects
- Checking alibis
- Shooting people
- Inventing or using maverick analytical methods
- Having psychic intuition
- Solving cases alone
- ETC.

## Investigative Personnel

**POLICE OFFICERS** are typically the first to arrive at a crime scene. They are responsible for securing the scene and detaining persons of interest in the crime. They also interview witnesses and take statements.

The **CSI** may also secure the scene. Their primary duties are to document the crime scene in detail and collect, package and transport physical evidence to the crime lab.

The **FORENSIC SCIENTIST** receives evidence in the crime lab and conducts biological, chemical, pattern or trace analysis.

**INVESTIGATORS** interview witnesses and consult with the CSI unit and the forensic lab. They investigate the crime by following leads provided by witnesses and physical evidence.

The **CORONER'S DEPUTY** (if a homicide) collects personal property of the deceased and transports the body to the Coroner's Office.

The **MEDICAL EXAMINER** or **FORENSIC PATHOLOGIST** conducts the autopsy and determines cause and manner of death.

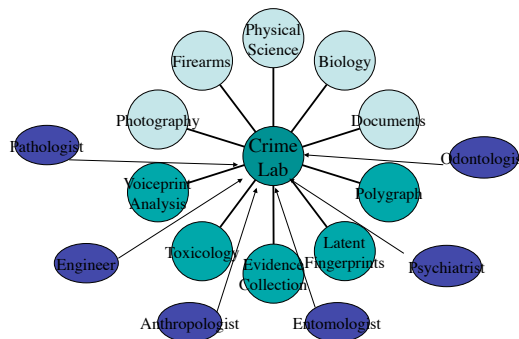
**SPECIALISTS** (entomologists, anthropologists, forensic artists, etc.) may be called in if the scene or evidence require expert analysis.

## Field Mice & Lab Rats



- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• <b>CSI</b> <ul style="list-style-type: none"> <li>- Investigates crime scenes</li> <li>- Locates, documents, preserves physical evidence at scene</li> <li>- Testifies in court</li> <li>- Required: AA or AS with training in photography, fingerprints, CSI</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• <b>Criminalist</b> <ul style="list-style-type: none"> <li>- Analyzes physical evidence in a lab using scientific techniques and analytical instruments</li> <li>- Testifies in court</li> <li>- Required: BS in chemistry, biology, or forensic science</li> </ul> </li> </ul> |
|---|---|

## The Crime Lab



## Crime Labs in the US

- Federal, state, county and city levels (prosecution)
- Private labs (defense)
- Many different models of organization
- Varied staff and services dependent on
  - Local crime rates
  - Funding
  - Capabilities of lab & staff

## The number of crime labs in the US has grown rapidly since the 1960s

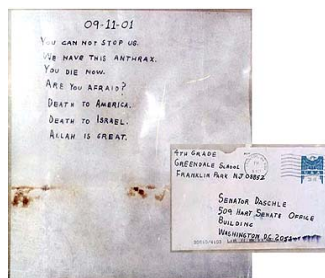
- Supreme Court decisions in the 60s placed more emphasis on physical evidence
- Increase in crime rates
- Increase in drug use, trafficking and seizures
- Advent of DNA profiling and substantial backlog of unanalyzed samples



## Activity

- Assign each of the items in your evidence list to the proper department in the crime lab
- Feel free to add more types of evidence

## Activity: Anthrax Letters



5 dead  
17 sickened  
Beginning  
9/18/2001

What types of evidence would you look for?

## Anthrax Letters

- Trace hair and fibers in envelope
- Ink analysis may reveal manufacturer
- DNA from stamp or envelope seal
- Cellophane tape ends match over four letters
- Paper examination may identify manufacturer
- Fingerprints
- Photocopier toner may reveal manufacturer
- Handwriting analysis shows four letters written by same person
- Indented writing
- Bar codes for mail handling

## A Brief History of Forensic Science

- *Mathieu Orfila* (1787-1853) - father of toxicology, studied effects of poisons in animals
- *Alphonse Bertillon* (1853-1914) – anthropometry, first system of personal identification
- *Sir Francis Galton* (1822-1911) - wrote 'Fingerprints', which contained statistical proof on their uniqueness

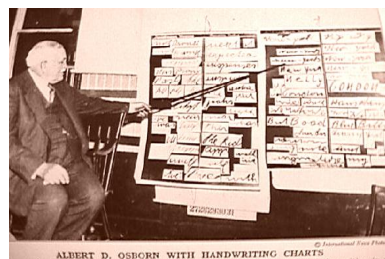
## History of Forensic Science

- *Leone Lattes* (1887-1954) - devised procedure for typing blood groups from dried stains
- *Calvin Goddard* (1891-1955) - used comparison microscope to study bullets



## History of Forensic Science

*Albert Osborn* (1858-1946) - authored 'Questioned Documents', still a primary reference in the field



ALBERT D. OSBORN WITH HANDWRITING CHARTS

## History of Forensic Science

- *Hans Gross* (1847-1915) - prosecutor & judge in Austria, wrote book detailing the use of many different sciences for criminal investigators
- *Paul Kirk* (1902-1970) - head of 1st school of criminology at UC Berkeley, 1948

## History of Forensic Science



### Edmund Locard (1877-1966)

Started the world's first crime lab in Lyons, France, in an attic room of the Lyons PD

#### Locard Exchange Principle

*Whenever two objects come into contact with one another, there is an exchange of materials between them*

## History of Forensic Science

### Locard Exchange Principle

*Every Contact Leaves a Trace*

Why is this principle important?

What does it mean?

## If you want to be a Forensic Scientist, a Latent Print Examiner, or a CSI...

- Visit <http://www.aafs.org/choosing-career>
- Join professional organizations *now* (student membership, scholarships, jobs, connections training)
  - International Association for Identification (IAI)
  - American Academy of Forensic Sciences (AAFS)
  - California Association of Criminalists
  - Forensic Science Students Group
  - Etc.