What Can the Bones Tell Us?

- **DNA samples** can be collected from bone, teeth, and hair to provide clues to a person's identity.
- Scientists may also be able to gain clues as to a person's past, recent **injuries**, or the **cause of death** based on bone fractures and other signs of trauma.

Effects of Death on the Body

- Stomach and Intestinal Contents
  - Time of death can also be estimated by looking at the digestive tract and its contents.
  - It takes about:
    - 4–6 hours for the **stomach** to empty its contents into the small intestine
    - **12** hours for the food to leave the small intestine.
    - 24 hours from the time a meal is eaten until all undigested food is released from the **large** intestines
  - The location of food in the digestive tract helps scientists estimate how long after a person **ate**, that they died.

Effects of Death on the Body

- Changes in the Eye
  - Following death, the surface of the eyes **dry out**
  - If the eyes were open at death, a thin **film** will appear on the eyes in 2-3 hours. If the eyes are closed, it takes about **24** hours for this film to appear.

Post-mortem changes in the eye: "tache noire".

Forensic Entomology

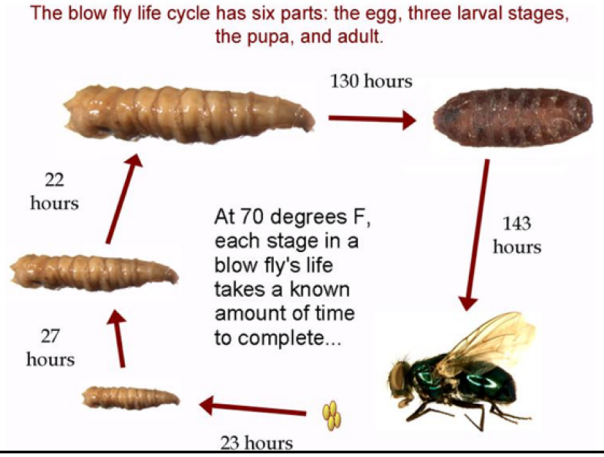
- Insects are so useful in crime investigation there is a whole branch devoted to it called forensic **entomology**
- Duties of a forensic entomologist are to:
  - Record detailed crime scene **conditions** (temperature, moisture, wind)
  - Collect **insect** evidence on, above, below, and surrounding the corpse
  - Determining an estimate for the postmortem interval or PMI (the time between death and the discovery of the body)

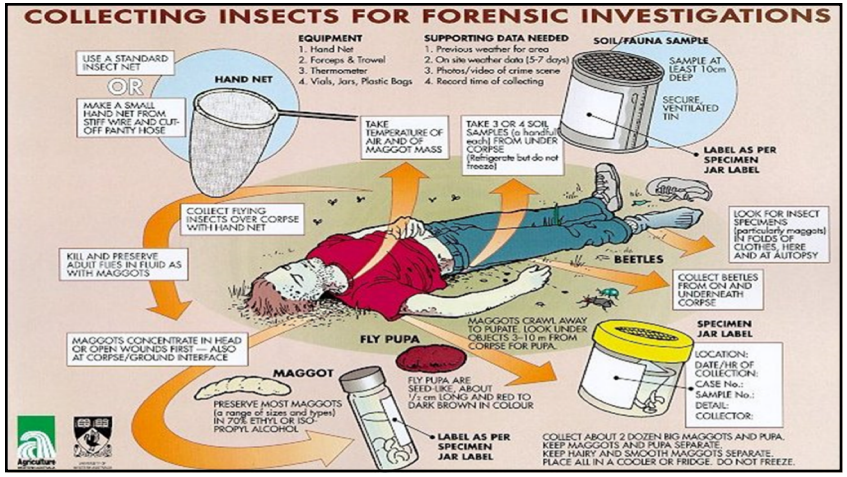
Forensic Entomology

- If insects from another region are found on a corpse, it suggests that the corpse may have been **moved** and provide important evidence to determine a **primary** crime scene.
- **Testify** in court to explain insect-related evidence found at the crime scene

Forensic Entomology

- The first stages of decomposition give off an **odor** which attracts insects to lay their **eggs** on the body within minutes od death
  - Ex. **Blow flies** are one of the first insects to arrive at a body
  - Their four stages of development are:
    - **Egg**
    - **Larva**/instar1→ larva/instar 2 → larva/instar 3
    - **Pupa**
    - **Adult**



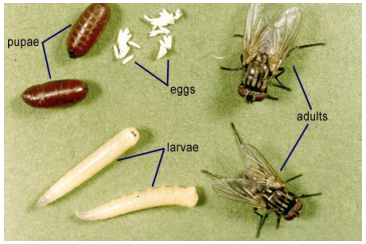


Why are Insects Used in Forensic Science?

- In most seasons and environments, insects **colonize** a dead body almost immediately after death
- Their **rate of development** and species dynamics over time can be used to accurately determine time since death.
- After **72 hours** entomological evidence is the most accurate method to determine the elapsed time since death.

Why are Insects Used in Forensic Science?

- Scientists have collected information on **stages** of development at given temperatures for all types of insects known to feed on corpses. This allows forensic entomologists to estimate **time of death** based on insect evidence gathered at a crime scene.



What Can Insects Tell You?

- **Post mortem** interval
- Whether the body was **moved** after death
- Whether the body was **disturbed**
- Presence and position of wound sites
- If the victim used **drugs** or was **poisoned**
- Length of time of abuse or neglect in living victims

Succession wave	Principle insect fauna	State of corpse	Age of corpse
1	Flies (blow flies)	Fresh	First 3 months
2	Flies (blow flies and flesh flies)	Odour	
3	Dermestid beetles	Fats are rancid	3-6 months
4	Various flies		
5	Various flies and beetles	Ammonia fermentation	4-8 months
6	Mites		6-12 months
7	Dermestid beetles	Completely dry	1-3 years
8	Beetles		3+ years

Body Farm

- The University of Tennessee Anthropological Research Facility, nicknamed the **"Body Farm"** investigates human decomposition. Bodies are placed in different settings throughout the facility and left to decompose. The bodies are exposed in a number of ways in order to provide insights into decomposition under **varying** conditions.

What are the Stages of Decomposition?

- Bodies begin to decompose shortly after death and do so in five predictable stages:
  - **Fresh**
  - **Bloat** or Putrefaction
  - **Active Decay** or Black Putrefaction
  - **Advanced Decay**
  - **Dry Remains** or Skeletonization

Stages of Decomposition: Fresh

- Begins almost **instantly** after death.
- Livor, rigor, and algor **mortis** occur.
- Autolysis, or self-**digestion** begins as lysosomes break down and release their digestive **enzymes** into the cell.
- Visible changes caused by decomposition are limited during the fresh stage, although autolysis may cause **blisters** to appear at the surface of the skin.

Stages of Decomposition: Bloat/Petrification

- This stage of death is mostly due to the activities of **microorganisms**; first intestinal flora, then saprophytic bacteria and fungi.
- Characterized by the production of **gases** which gives rise to the **bloated** appearance of the decomposing body and strong **odor**
- Skin turns a **greenish** color as blood decomposes.
- Skin may break apart and **fluids** can flow out from the openings.

Stages of Decomposition: Active Decay

- This stage is recognizable by a great loss in **mass**, due largely to feedings by **maggots** and other insects. Parts of flesh may be **black** and corpse gives off an even stronger odor.
- As gases escape and the body leaks decomposition fluids, the body may **collapse**
- The end of this stage is marked by the **dispersal** of the maggots from the body.

Stages of Decomposition: Advanced Decay

- The body begins to **dry** and preserve itself; most of the **flesh** is gone.
- Odor and insect activity **decrease**
- Body may form a **wax** layer known as the adipocere.

Stages of Decomposition: Dry Remains

- Final stage
- Recognizable by a loss of everything on the body but dried up **bone**

What Effects the Speed of Decomposition?

- **Age**
  - Young decompose faster than elderly.
- **Size** of body
  - Overweight people decompose faster than average.
- **Clothing**
  - Naked decompose faster than clothed.
- **Health**
  - Sick decompose faster than healthy.
- **Environmental** Conditions
  - Bodies decompose fastest in **70-99** °F