

Time of Death



Death usually occurs after the breathing stops and the heart stops pumping blood through the body.

Death is a process, not an event. The decomposition process after death has 5 stages.

- 1. Initial decay**
- 2. Putrefaction**
- 3. Black putrefaction**
- 4. Butyric fermentation**
- 5. Dry Decay**

Initial Decay 0-3 days after death

- The outside of the body appears fresh.
- Bacteria in the intestines start to feed on the intestines themselves
- The bodies own digestive enzymes start to break down the organs
- Insects arrive

Putrefaction 4-10 days after death

- **Bacteria breaks down tissues and cells, releasing body fluid into cavities.**
- **Bacteria also produce gases as waste products.**
- **People find these gases to be foul smelling but insects are attracted to them.**

Black Putrefaction 10-20 days after death

- The bloated body collapses and large volumes of fluid drain from the body attracting more insects.
- Flesh takes on a creamy consistency and exposed skin turns black.
- Insects and bacteria continue to eat flesh

Butyric Fermentation 20-50 days after death

- The remaining flesh is removed and dries out, the body produces butyric acid.
- The part of the body in contact with the ground gets moldy as the body ferments.
- The cheese fly consumes any moist flesh left as beetles feed on skin and ligaments.

Dry Decay 50-365 days after death

- The body is now dry and decays very slowly
- Eventually the hair disappears and leaves only the bone.

Time of Death

If an investigator can determine the time of death, they may be able to place a suspect at a particular crime scene during a particular time slot.

There are several ways investigators can establish time of death.



Time of Death

Algor Mortis- After death the body cools from it's normal internal temperature of 98.6 degrees to the surrounding environmental temperature.

Average cooling rate of a dead body is 1.5 degrees/hour.

Variables that effect algor mortis

Body Fat

Clothing

Air Temperature



Time of Death

Rigor Mortis- the muscles of the corpse become stiff and the body is frozen in position.

- *Initial onset- 3-4 hours after death
- *Starts in the jaw, neck and spreads down the body
- *Complete rigor- 12-18 hours after death
- *Rigor ends- 24-36 hours after death

Variables that effect Rigor mortis:

Heat Changes Rate

Individual Muscular development

Time of Death

Livor Mortis – After the heart stops the blood, pulled by gravity, sinks to the lowest part of the body. This causes purplish discoloration.

Starts 2 hours after death -
remains for 12 hours

Clothing can restrict
movement of blood

Can be used to determine
what position the body
was in upon death and if it
was moved.

Time of Death

Stomach Contents - The stomach empties at regular intervals. Analysis is preformed at autopsy.

Light Meal - 2 hours

Medium Meal - 3-4 hours

Heavy Meal - 6 or more hours

Small Intestines empty every 12 hours or more

Time of Death

Ocular Changes - Cells in the eyes release potassium after death. Causes eyes to cloud over.

Release of potassium occurs at a constant rate

Measuring potassium in ocular fluid can determine when death occurred

Performed at the time of the autopsy

Time of Death

Forensic Entomology- use of insects to aide in legal investigations. Forensic entomology can help to determine time of death.

Variables that effect Insects:

- *Weather - Cold can slow or stop life cycle
- *Location - Different areas might have different insects

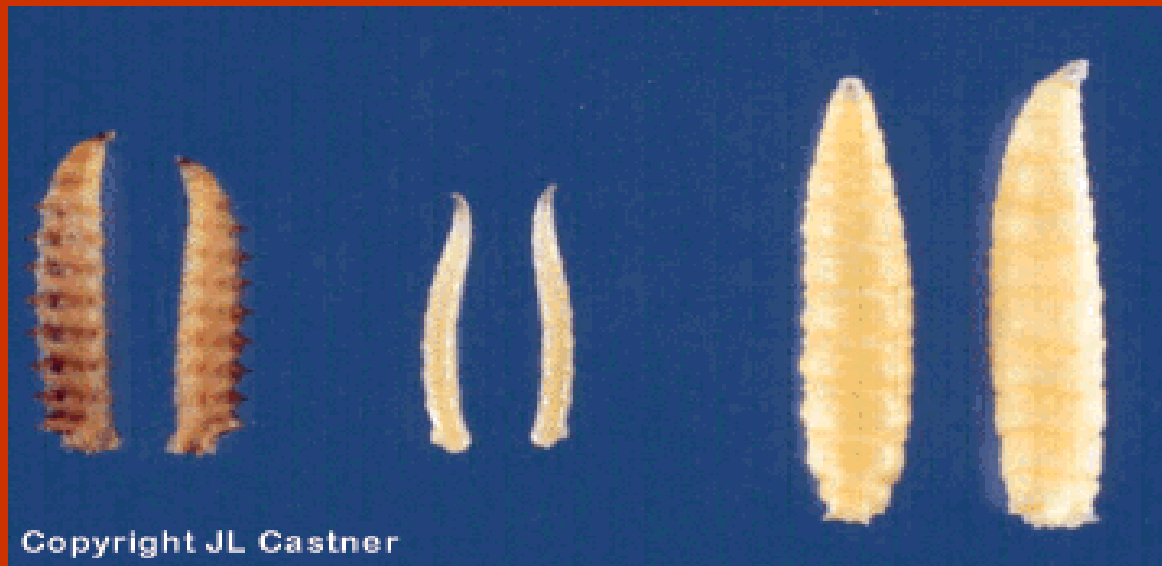
Forensic Entomology

Upon death the first insects to arrive are Calliphorids or blow flies.



Blow flies lay eggs on corpse as soon as minutes after death. They lay their eggs in natural (mouth, nose, eyes) and mechanical (gunshot, knife wound) orifices. These flies are only active in the day.

After about 24 hours the Calliphora eggs hatch into larvae (maggots). They go through several stages then turn into a pupa (7-11 days).



About 12 days after the pupa stage the adult fly emerges and flies away.

Once putrefaction starts other insects such as flesh flies appear.



Flesh-fly



Sexton Beetle



**American
Carrion Beetle**

Beetles now arrive. The flesh-fly larvae and beetles are predacious, meaning they feed on eggs and larvae of other insects.

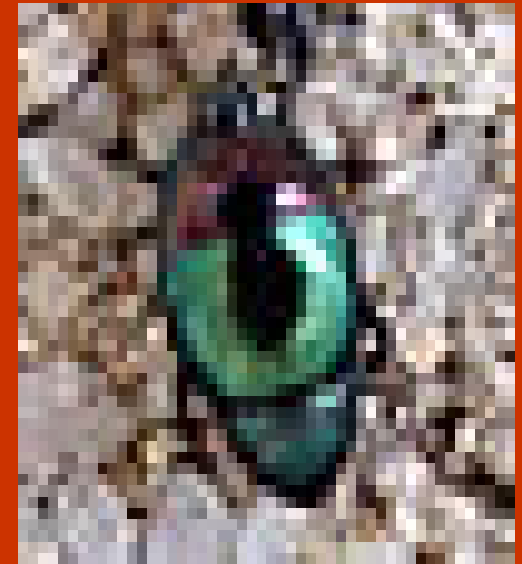
During Black putrefaction is when the majority of necrophagous insects arrive. These include Phoridae (coffin fly), Muscidae (house fly), Sepsidae (black scavenger fly), and Histeridae (Hister beetle).



Coffin Fly



House Fly



Hister Beetle

During Butyric Fermentation the body becomes drier making conditions less conducive to rearing young insects. Insect activity and presence decline.



Hide Beetle



Clothes Moth



Mites

Dry decay leaves mostly hair and bone. This attracts insects such as Dermistidae (Hide beetle), Acari (mites), Tineidae (clothes moths), and roaches.

Knowing insect life cycles and growth rates can help to determine Time of Death.



Eggs

18-24 Days



Adult fly

For example if you find Blow-fly pupa on the corpse and you know it takes about 12 days for the eggs to mature to that stage, you can estimate the time of death to be 12-14 days. This includes a two day error factor.