

**Plant protection**  
**Elective - Forensic insects**  
**Stage- 4<sup>th</sup>**  
**Lecture 4**  
**20/10/2021**



Dr. Gazang Tahier Omar

# Decomposition process:

The decomposition process divided into five stages depending on the basis of physical appearance of carcasses, internal temperatures and characteristic insect populations.

## 1-Fresh stage: characters of the stage

1-Blowflies have detected the cadaver

2-Eggs are being laid, often around the eye, nostrils, mouth, followed by anus or genital openings.

3-The estimation of the time of death by entomological data after 24 hrs.

4-Estimation based on the soft tissue examination.

5- Cellular breakdown occurs during this stage without morphologic alterations.

6-The chemicals released from the cellular breakdown attracts insects even in this early stage .



## 2. Bloated stage (Days 2-7):

1-Putrefaction begins at this stage.

2-Gases produced by the metabolic activities of anaerobic bacteria cause an inflation of the abdomen and the carcass forming a balloon-like appearance during the later part.

3-Arthropod activities combined with the putrefaction processes cause internal temperatures of the carcass to rise.



### 3. Decay stage (Days 5-13):

1-Abdominal wall is penetrated, resulting in the deflation of the carcass and ending the bloated stage.

2-The internal temperature rises to 14 degrees above the ambient temperature followed by a drop signifying the end of the decay stage.

3-Decaying odors are high increased during temperatures and drop with a fall in temperature.

4-There is a steady decrease in the weight of the carcass by 10th day.

6-There is a conversion of carcass biomass to dipteran larval biomass.

7-The larvae subsequently depart from the carcass to pupate.



#### 4. Post-decay stage (Days 10-23):

The post-decay stage begins when most of the Diptera larvae leave the carcass, leaving behind bones, cartilage, hair, small portions of tissue, and a large amount of wet, viscous material known as byproducts of decay (BOD).



**5. Dry stage (days 18-90):** This stage is characterized by bones with little cartilage remaining and the BOD has dried up. The transition from postdecay to dry stage is gradual, with declining adult and larval Diptera populations .





# Insects as Evidence

Forensic entomologists use their knowledge of **insects** and their **life cycles** and **behaviors** to give them clues about a crime.



Blow Fly



Carrion Beetle

Most insects used in investigations are in two major orders:

- 1 – Flies (**Diptera**) and
- 2 – Beetles (**Coleoptera**)

**Species succession** may also provide clues for investigators. Some species may feed on a fresh corpse, while another species may prefer to feed on one that has been dead for two weeks. Investigators will also find other insect species that prey on the insects feeding on the corpse.

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	Dermeestid 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	Dermeestid beetles	Completely dry	1-3 years
8	Beetles		3+ years

Taken from Smith, K. G. V. 1986, A manual of forensic entomology. Cornell Univ. Press, Ithaca, NY.



# Examples of Diptera (Flies)

## Early Stage Decomposition



**Life Cycle of a  
Calliphoridae Fly**

## Late Stage Decomposition



**Blow & Greenbottle Flies  
(Calliphoridae)**  
Metallic thorax and abdomen



**Flesh Fly  
(Sarcophagidae)**  
Striped thorax



**House Fly  
(Muscidae)**



**Cheese Skipper  
(Piophilidae)**

# Examples of Coleoptera (Beetles)

## Early Stage Decomposition



**Carrion Beetles (*Silphidae*)**

Adults & larvae feed on fly larvae

## Early to Late Stage Decomposition



**Rove Beetles (*Staphylinidae*)**

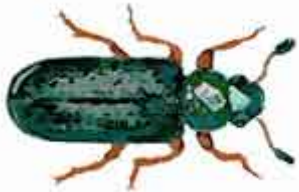
Predator of fly eggs



**Clown Beetles (*Histeridae*)**

Predator of fly eggs

## Late Stage Decomposition



**Ham & Checkered Beetles (*Cleridae*)**

Predator of flies & beetles;  
also feed on dead tissue



**Skin Beetles (*Dermestidae*)**

Feed on dried skin & tissues



**Hide Beetles (*Scarabidae*)**

Usually the last to arrive