FORENSIC ENTOMOLOGY

WHAT DO THEY DO?

Forensic entomologists apply their knowledge of entomology to provide information for criminal investigations.

A forensic entomologist's job may include:

- Identification of insects at various stages of their life cycle, such as eggs, larva, nymphs, pupa, and adults.
- Collection and preservation of insects as evidence.
- Determining an estimate for the postmortem interval or PMI (the time between death and the discovery of the body) using factors such as insect evidence, weather conditions, location and condition of the body, etc.
- Testifying in court to explain insect-related evidence found at a crime scene.

INSECTS AS EVIDENCE

Forensic entomologists use their knowledge of **insects** and and their **life cycles** and **behaviors** to give them clues about a crime. Most insects used in forensic investigations are in two major orders: **Diptera** (flies) and **Coleoptera** (beetles).

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

Weather data is also an important tool in analyzing insect evidence from a corpse. Investigators will make note of the temperature of the **air**, **ground** surface, the **interface area** between the body and the ground, and the **soil** under the body as well as the temperature inside any **maggot masses**. They will also collect weather data related to daily **temperature** (highs/lows) and **precipitation** for a period of time before the body was discovered to the day the insect evidence was collected.

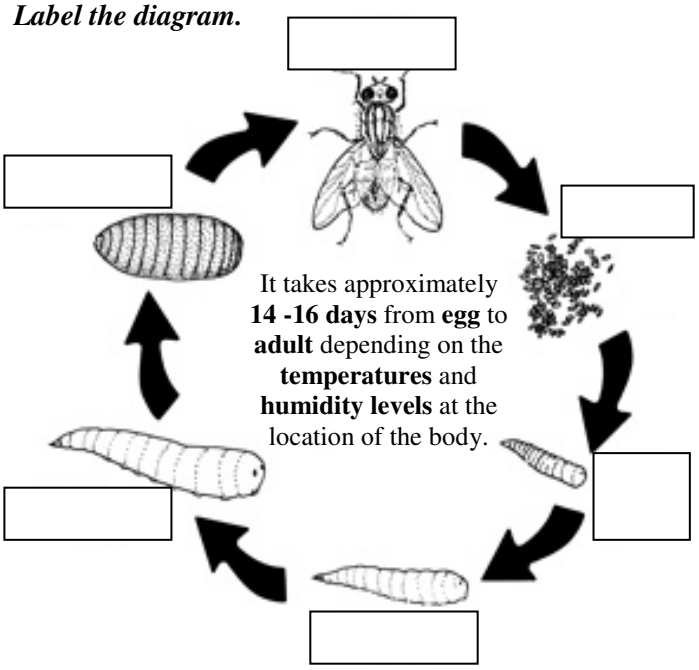
Other factors that might affect their PMI estimates:

1. Was the body was enclosed in an area or wrapped in a material that would have prevented flies from finding the corpse and laying eggs?
2. Were other insect species present that may have affected the development of the collected species?
3. Were there drugs or other poisons in or on the body that might have affected the larvae's development?

BLOW FLY LIFE CYCLE

Blow flies are attracted to dead bodies and often arrive within minutes of the death of an animal. They have a **complete** life cycle that consists of **egg, larva, pupa**, and **adult** stages.

Label the diagram.



1st – Adult flies lay eggs on the carcass especially at wound areas or around the openings in the body such as the nose, eyes, ears, anus, etc.

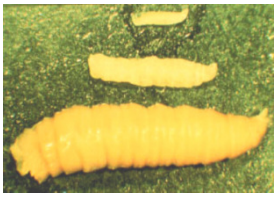
2nd – Eggs hatch into larva (maggots) in 12-24 hours.

3rd – Larvae continue to grow and molt (shed their exoskeletons) as they pass through the various instar stages.

- 1st Instar - 5 mm long after 1.8 days
- 2nd Instar - 10 mm long after 2.5 days
- 3rd Instar – 14-16 mm long after 4-5 days

4th – The larvae (17 mm) develop into pupa after burrowing in surrounding soil.

5th – Adult flies emerge from pupa cases after 6-8 days.



Blow Fly Larva

Did you know?

Maggots can be used to test a corpse for the presence of poisons or drugs. Some drugs can speed up or slow down the insect's development.

T. Trimpe 2009 http://sciencespot.net/

EXAMPLES OF DIPTERA

Early Stage Decomposition

Life Cycle of a Calliphoridae Fly

Blow & Greenbottle Flies (Calliphoridae)
Metallic thorax and abdomen

Flesh Fly (Sarcophagidae)
Striped thorax

Late Stage Decomposition

House Fly (Muscidae)

Cheese Skipper (Piophilidae)

EXAMPLES OF COLEOPTERA

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

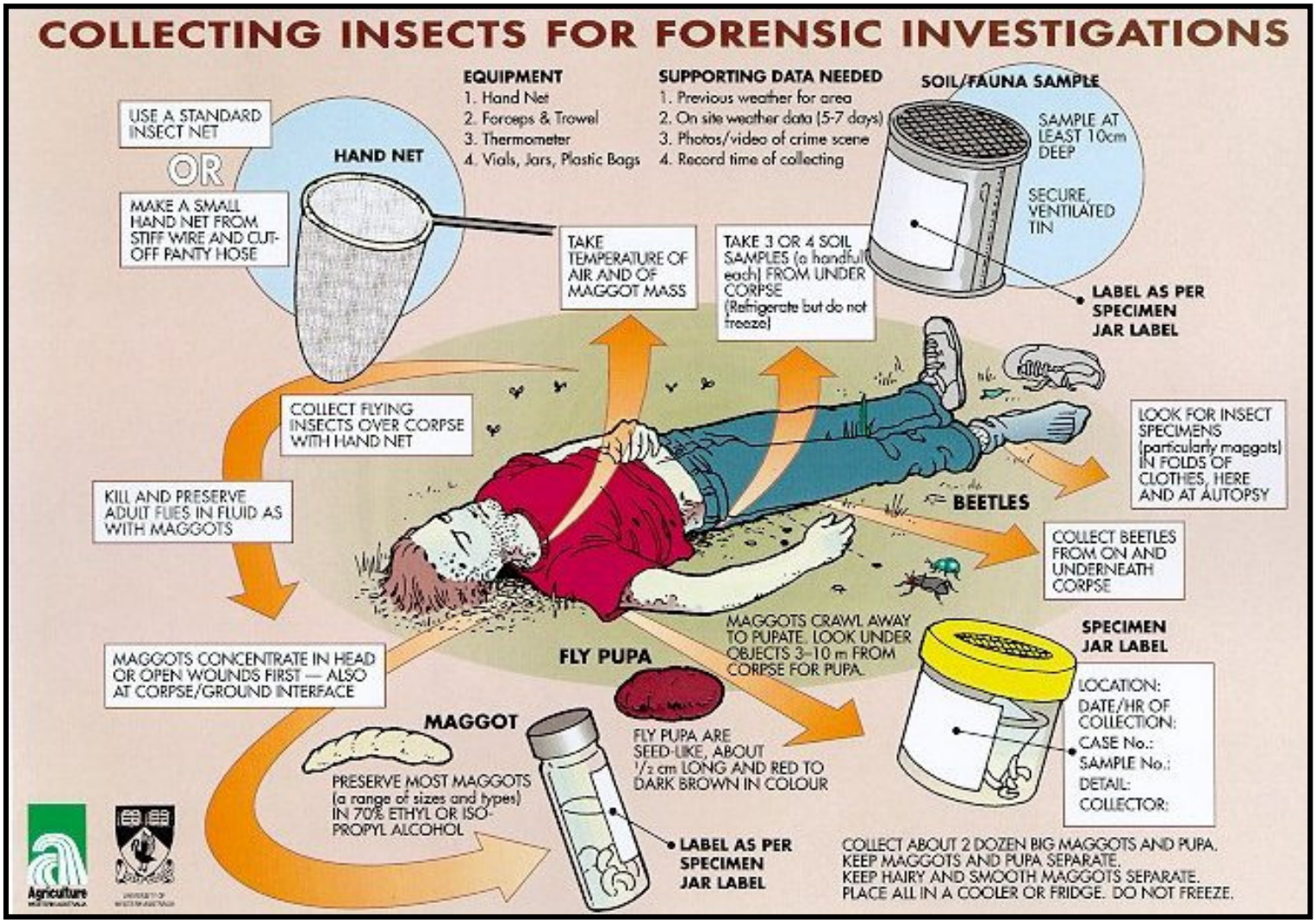
Late Stage Decomposition

Ham & Checkered Beetles (*Cleridae*)
Predator of flies & beetles; also feed on dead tissue

Hide Beetles (*Scarabidae*)
Usually the last to arrive

Skin Beetles (*Dermestidae*)
Feed on dried skin & tissues

Did you know? *The "Body Farm" in Knoxville, Tennessee is a university research facility to investigate human decomposition under various conditions in order to understand the factors which affect its rate.*



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