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 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 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.

It takes approximately 14 - 16 days from egg to adult depending on the temperatures and humidity levels at the location of the body.

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.

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.

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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.
1. What do they do?

Forensic ____________________________ 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 ___________ ____________, such as eggs, larva, pupa, and adults.
- Collection and preservation of insects as _________________.
- Determining an estimate for the postmortem interval or ___________ (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.
- ________________ in court to explain insect-related evidence found at a crime scene.

2. Insects as Evidence

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

Most insects used in investigations are in two major orders: ___________ (flies) and _______________ (beetles).

Species ________________ may also provide clues for investigators. Some species may to feed on a ___________ 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 ________________ on the insects feeding on the corpse.

3. Other Factors

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

What are some other factors that could affect a forensic entomologist's estimate of PMI? ________________

__________________________________________________________

__________________________________________________________

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4. Blow Fly Life Cycle

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

Label the life cycle diagram.

Fill in the blanks below.

1st – Adult flies lay eggs on the carcass.

2nd – Eggs hatch into larva (maggots) in ___-___ 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 ____ days
2nd Instar - 10 mm long after ____ days
3rd Instar - 14-16 mm long after ____ days

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

5th – Adult flies emerge from pupa cases after ____ days.

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CRIME SCENE CREATURES

#1 - What is the crime? ____________________________

#2 - Identify each tool by letter and then draw a line to connect it to its function.

- Forceps
- Ventilated jars
- Thermometer
- Hand net
- Trowel
- Specimen Jars
- Weather Station

- Used to dig up soil samples
- Used to store live species
- Used to collect crawling insects
- Used to collect flying insects
- Used to collect & preserve specimens
- Used to collect weather data
- Used to take temperatures (air, soil, masses)

#3 - Which specimens did you take back to the lab? Circle the five that you chose.

- Scorpion
- Beetle
- Large Maggots
- Small Maggots
- Empty Pupa Cases
- Spider
- Fly Eggs
- Adult Fly
- Fly (Crumpled Wings)

#4 - What was the correct PMI? ____________________________

#5 - Which two specimens were most helpful in finding the correct answer? ____________________________

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