

Plant protection
Elective - Forensic insects
Stage- 4th
Lecture 3
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INSECT COLLECTION

Insect Collections At a Crime Scene:

- 1-** Forensic entomologists begin their processing of the scene by collecting adult insects in the area. The most common method uses nets, although sticky traps placed near the corpse can be used as well. By collecting adult insects, forensic entomologists are able to determine what species may be on the corpse in larval form.
- 2-** The next step is to collect larvae in order to determine PMI. Orifices on the body (eyes, ears, nose, anus, and mouth) as well as any open wounds are good places to look for eggs and larvae.
- 3-** It is important for the forensic entomologist to not only collect larvae from around the body itself, but also underneath.

Types of forensic insects collecting by entomologist from around the corpse.

A- The first set of insects are used for immediate observation. These are preserved using boiling water and “kill jars,” or ethyl acetate.

B- The second set are allowed to remain alive in order to grow for larval or pupal identification. Both of these methods help provide a positive identification for the insect genus and species.

Tools of the Trade:

Forensic entomologists use a variety of tools to determine post-mortem interval:

- 1- Net
- 2- Sticky traps
- 3- Vials/kill jars
- 4- Preservation chemicals such as Ethyl alcohol and acetone
- 5- Latex gloves
- 6- Forceps
- 7-Live specimen containers
- 8- Shovel
- 9-Thermometers
- 10- Labels (adhesive)
- 11- Small paint brushes
- 12- Foil
- 13- Vermiculite and food
- 14-Graphite pencil
- 15- Hand towel
- 16-Camera
- 17- Ruler
- 18-Paper towels
- 19-Sifting screens
- 20-Death scene form

Basic Rules of Insect Collection:

A forensic biologist, developed the following basic guidelines for arthropod collection:

1. Take very good close-up photographs of all locations from where animals are collected. Also, bites of mites should be documented on living persons (e.g., possible offenders).
2. Photograph without a flash. Maggots will “flash out,” which means they become “just white nothings,” especially on digital photographs.
3. A metric and an inch scale should always be used on every picture. (This helps investigators indicate the relative size or scale of the contents.)
4. Collect one spoonful of insects from at least three different sites on the corpse and around the crime scene in three different, clearly labeled jars.
5. Put half of the insects in 98% ethanol. Cheap ethanol. Neither isopropyl alcohol (“hand cleaning alcohol”) nor formalin should be used! Killed insects can be stored frozen with or without ethanol.
6. Attempts should be made to kill the animals with hot water (“tea water”) before placing them in ethanol.

7. If possible, put half of the insects alive in a refrigerator (not a freezer). Put fabric on top of their open- lid containers so the insects can breathe. Maturing might become an issue, so forward the animals to a biologist within 1 or 2 days. Keep white larvae separate from brownish larvae and separate larvae from adults if possible.
8. Label excessively: location, exact time, date, initials.
9. If questions arise during collection, a forensic entomologist should be called.
10. Determination (i.e., identification of the arthropod species) must be performed by an experienced entomologist using keys that can be applied to the local fauna. However, for many regions of the world, appropriate keys are not yet available. Some forensic entomologists determine third instar larvae of known maggot species by the characteristics of the maggot's mouth parts.

PMI Calculation Example.

Body is found with *Lucilia sericata* larvae, prepupae, and pupae (in soil next to body). Temps at site had averaged 16° C. Pupae brought into the lab & held at that temp. began to enclose after 112 hours

Development rate of sheep blowflies, *Lucilia sericata*, (in hours) at three different temperatures

Temp(°C)	Egg	Larva 1st Instar	Larva 2nd Instar	Larva 3rd Instar	Pre- pupa	Pupa	Total time (days)
16	41	53	42	98	148	393	32
21	21	31	26	50	118	240	20
27	18	20	12	40	90	168	14

$$\text{PMI} = (41 + 53 + 42 + 98 + 148 + 393 - 112)/24 = \mathbf{26.5 \text{ days}}$$