



TECHNICAL INFORMATION

Entomology Kit Catalog No. ENT200

BACKGROUND AND PURPOSE

Application

The concept of forensic entomology dates back to the 1300s, however, only in the last several decades has it been systematically explored as a feasible resource in criminal investigations. It is the application and study of insects as they relate to certain criminal acts. Forensic entomology is primarily associated with death investigations, but it may also be used to detect drugs and poisons, determine the location of an incident, and find the presence and time of inflicted wounds.

Hazards/Safety Info

- Prior to using any of the contents of this kit, please consult the appropriate Safety Data Sheets (SDS) found on our website: <http://www.sirchie.com/support> and click on Safety Data Sheets.
- Reagents contained in this kit are flammable. Do not store near heat sources or open flames.

Information

The idea behind using insects to estimate a minimum Post Mortem Interval (PMI) is based on how the

insects develop and mature. Some insects—those with a complete metamorphosis—have immature stages (maggots) whose movement is extremely limited, but have adult stages that are among the most mobile animals on earth. Some of these insects are specialized to develop on dead animals including human bodies.

The insects recovered from human remains can be a valuable tool for toxicological analysis. The voracious appetite of certain insects can quickly skeletonize the remains. Over a short period, the fluids (blood, urine, etc.) and soft tissues needed for toxicological analysis will disappear. However, it is possible to recover the insect larvae and run standard toxicological analyses on them just as one would human tissue. Toxicological analysis can be successful on insect larvae because their tissues assimilate drugs and toxins that accumulated in human tissue prior to death.

Tool Explanation

The ENT200 Forensic Entomology Kit contains the most often needed tools and materials necessary for the collection of insects found at a death scene. Accepted practice dictates that both live and dead insects be submitted for observation and analysis by a qualified forensic entomologist in order to determine the post mortem interval (PMI), which is the period from the onset of death until discovery of the body.

Evidence Recovery Tools

- Digital Thermometer, (7780TLZ0166) used to record temperatures of the maggot mass, various areas on and under the cadaver and the nearby environment including the soil.
- Miscellaneous tools: forceps, spoons, aluminum foil, scalpel, photo evidence scales, and maggot brushes.

Reagents:

- Ethyl Acetate (ENTES2) is used as a fumigant to kill larvae and mature insects prior to preservation.
- Ethyl Alcohol (ENTEAS2) is used to preserve the carcasses of dead larvae and mature insects.

Evidence Containers:

- Maggot container with Vermiculite, to store maggots and absorb moisture while transporting.
- Kill Jar, 4 oz. with cotton balls used in conjunction with ethyl acetate to kill collected live specimens.
- Glass vials, 4 dram, for collecting and preserving insects and larvae from the scene.
- Evidence bags for vegetable matter and soil samples, plus other evidence.
- Evidence labels and seals
- Processing forms

Usage Instructions

Special Note! Extreme care must be taken during insect collection so that the remains are disturbed as little as possible. Once crime scene photography has been completed, but before collections are made, notes should be taken as to the general habitat, ambient weather conditions, and location of the body. See Sirchie forms ENT:SCENE.1, ENT:INFO.1, and ENT:LOG.1.

Entomological investigation of a death scene can be broken down into the following steps:

1. Observations should note the general habitat and location of the body in reference to vegetation, sun or shade conditions, and its proximity to any open doors or windows if recovered inside a structure. Locations of insect infestations on the body should be documented as well as noting what stages of insects are observed (such as eggs, larvae, pupae, or adults). It is also useful to

document evidence of scavenging from vertebrate animals and predation of eggs and larvae by other insects such as ants and beetles.

2. Collection of meteorological data at the scene. Such data should include:
 - a). Ambient air temperature at the scene taken approximately at chest height with the thermometer in the shade.
SPECIAL NOTE! Do not expose thermometer to direct sunlight.
 - b). Maggot mass temperature (obtained by placing the thermometer directly into the larval mass center).
 - c). Ground surface temperature.
 - d). Temperature at the interface of the body and ground (simply place the thermometer between the two surfaces).
 - e). Temperature of the soil directly under the body (taken immediately after body removal).
 - f). Weather data that includes the maximum and minimum daily temperature and rainfall for a period spanning one to two weeks before the victims disappearance to three to five days after the body was discovered. Such information can be gathered by contacting the nearest national weather service office, or your state climatologist.

Collection of Insects from The Body at The Scene

Prepare the Killing Jar before proceeding to capture flies and beetles. This jar contains an two cotton balls (which can be replaced with any standard cotton balls for future usage). Pour a small amount of Ethyl Acetate (ENTEA2) onto the cotton balls (approximately one to two teaspoons full). Recap the jar.

The first insects that should be collected are the most mobile ones: adult flies and beetles. If possible, flies and/or beetles should be collected and placed in the kill jar (see above). The jar is then capped and the insects will be immobilized within a few minutes. Once they are immobile they can be easily trans-

ferred to one of the ten glass preservation jars. Add enough 80% Ethyl Alcohol (ENTEAS2) to cover the insects. Do not mix flies in with beetles. They must be preserved in separate jars.

It is extremely important that the collected specimens are properly labeled. Labels should be marked with a dark graphite pencil, NOT INK. Place a label on each jar with the following information:

1. Geographical Location
2. Date and hour of collection
3. Case number
4. Location on the body from where evidence was removed
5. Name of collector

The next step is to examine the remains for the presence of eggs. Fly eggs have the general appearance of saw dust and are often found in the folds of clothing or open body orifices. Eggs should be preserved in ethyl alcohol as described above. Living samples may also be useful to the forensic entomologist. Use the Maggot Motel method of transporting live specimens listed below.

Once the adults and eggs have been collected, the collection of larval specimens from the body can begin. The larvae (maggots) should be readily apparent on the body. The largest larvae should be actively searched for and collected. Additionally, a representative sample of 50-60 larvae should be collected from the maggot mass. These insects can be placed directly into the killing jar or ethyl alcohol preservative. In any case, document the exact preservation techniques and forward to the forensic entomologist. If the body has more than one area of colonization (more than one maggot mass) each site should be collected, labeled and logged separately.

Once the preserved collections have been made, duplicate samples should be made for live shipment. Living specimens are to be placed in the Maggot Motel (ENTMAG5) To prepare these containers proceed as follows:

1. Open the Maggot motel by removing the lid.
2. Tear off a four inch square piece of aluminum foil from the square.
3. Form the piece of the foil in the shape of a cup. Poke several pinholes into the bottom of the foil to permit drainage of any fluids that may accumulate.
 - a). ***Special Note!*** If the interval from the time of collection to delivery to an entomologist will exceed 24 hours, it will be necessary to provide food for the larvae. Some recommend removing small pieces of flesh that remain on the carcass for this purpose.
4. Add the maggots to the foil, and then place the foil into the container on top of the vermiculite and put the lid in place.
5. Poke several holes in the lid to permit air circulation.
6. Label each container as described previously.

Collection of Insects from The Scene After Body Removal

Many of the insects that inhabit the cadaver will remain on, or buried, in the ground after the body has been removed. The steps listed above should be followed when collecting insects from the soil (i.e. both a preserved and a living sample should be taken). Soil and litter samples should also be taken both immediately under where the body was positioned, and from the immediate surroundings. It is not necessary to dig deeply. A good technique is to collect the leaf litter and debris down to the exposed upper surface of the soil, and then make a separate collection from about the first two or three inches of topsoil. Each soil collection area should be about four to six inches square, and be taken from underneath the head, torso and extremities. All soil samples should be placed in containers such as the plastic evidence bags included in the Identification Kit for immediate shipment. These collections should be labeled and forwarded to the forensic entomologist along with the insects collected from the body.

How should insects be shipped to a forensic entomologist?

While personal delivery is highly recommended, properly collected and preserved insects (see above) may be shipped using overnight express either via the United States Postal Service (US Mail), or the United Parcel Service (UPS). Federal Express may not ship insects living or dead. All packages should be sealed with Chain of Custody labels and also labeled with a Biohazard label.

References

Byrd, J.H., PhD, Forensic Entomology, <<http://www.forensicentomology.com/info.htm>> August 5, 2009

Bullington, Stephen W., PhD, Forensic Entomology, <<http://www.forensic-ent.com/>>August 5, 2009

Smith, Kenneth G.V. 1986. A Manual of Forensic Entomology. Comstock Publishing Associates, Cornell Univ. Press, Ithaca, NY, 205 pp.

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