LECTURE # 9

COLLECTION AND PRESERVATION OF INSECTS

The behavior of insects can be observed most easily in their natural environments. However, many species, especially the smaller ones, must be collected and properly preserved before they can be identified. Because correct identification seldom is easy, it is important that specimens be preserved in the best condition possible. The identification of a particular insect or mite usually requires examination of minute details of its anatomy with the aid of a hand lens or microscope. Some specimens may require dissection or even study with the electron microscope. If these details on a specimen are concealed, missing, or destroyed because of improper handling or preservation, identification is made difficult or impossible, and information about the species to which it belongs cannot be made available. Therefore, adequate preservation and proper labeling of specimens are essential to their identification. The methods used to collect insects and mites are dictated by the ultimate goal of the samples collected. Insects may be collected as a hobby for personal enjoyment of their diversity and beauty. They may be collected in conjunction with school courses on biology or entomology. Specific insects groups may be sampled to assess or measure biodiversity to help identify appropriate areas to be included in reserves. Aquatic species may be used to detect changes in water quality. Pest species may be sampled to assess presence/absence or abundance in order to determine whether control measures are necessary. Specific groups or species may be collected to acquire material for biological, physiological, ecological, molecular, and systematic studies.

Equipment and Collecting Methods

(1) Forceps. Fine, lightweight forceps are recommended; if sharp-pointed forceps are used, care must be taken not to puncture specimens. If possible, grasp specimens with the part of the forceps slightly behind the points.

(2) Vials containing alcohol or other preservatives

(3) Killing bottles of various sizes.

(4) Small boxes or containers for storing specimens after their removal from killing bottles. These may be made of cardboard, plastic, or metal and should be partly filled with soft tissue or cloth to keep specimens from rolling about. Do not use cotton because specimens become entangled in the fibers and may become virtually impossible to extricate without damage.

(5) Small envelopes for temporary storage of delicate specimens and/or gelatin caps for tiny specimens.

(6) One or more aspirators.

(7) Absorbent tissue for use in killing bottles and aspirators.

(8) Notebook and writing equipment for jotting down notes and label data.

(9) A strong knife for opening galls, seed pods, twigs, etc and a pair of scissors for cutting labels.

(10) A small, fine brush (camel’s hair is best) for picking up minute specimens. Moisten the tip; tiny specimens will adhere to it and may be transferred to a killing bottle or vial.

(11) Bags for storing plant material, rearing material.
Collecting Nets

Killing Jars or Bottles

To make a cyanide killing jar or bottle, place a layer (about 15 mm) cyanide crystals in the bottom. Potassium cyanide is best; sodium cyanide is as effective but is hygroscopic, that is, it absorbs water and makes the jar wet; and calcium cyanide is seldom available. Cover the crystals with about 10 mm of sawdust and then add about mm of plaster of paris mixed with water to form a thick paste, working quickly before the plaster solidifies. Then add crumpled absorbent paper to prevent water condensation on the inside glass surface. Instead of the plaster of paris, a plug of paper or cardboard may be pressed on top of the sawdust. Be sure that it fits tightly. When ready to use after a few hours, place several drops of water on the plaster or paper plug. In an hour or so, enough fumes of hydrocyanic acid will have been produced to make the jar operative. **Do not test this by sniffing the open jar.**

Liquid Killing Agents

Among the liquid killing agents are ethyl acetate (CH3CO2 • C2H5), ether (diethyl ether, C2H5 • O • C2H5), chloroform (CHCl3), and ammonia water (NH4OH solution). Ethyl acetate is most widely used. All of these chemicals are extremely volatile and flammable and should never be used near fire. Children should only use them under adult supervision. Ethyl acetate is regarded by many as the most satisfactory liquid killing agent. Ethyl Alcohol (ethanol or ETOH) is widely used to kill small Coleoptera adults, small Hymenoptera, and many immature insects and soft-bodied insects. It is most commonly used at 70-80% concentration.
Aspirators and Suction Devices

The aspirator, known in England as a ‘pooter,’ is a convenient and effective device for collecting small insects and mites. The following materials are needed to construct an aspirator:

1. Vial 2.5-5 cm in diameter and about 12 cm long.
2. Two pieces of glass or copper tubing about 7 mm in diameter, one piece about 8 cm long and the other about 13 cm long.
3. Rubber stopper with two holes in which the tubing will fit snugly.
4. Piece of flexible rubber or plastic tubing about 1 meter long, with diameter just large enough to fit snugly over one end of shorter piece of stiff tubing.
5. Small piece of cloth mesh, such as cheesecloth, and rubberband.

Malaise Traps

One of the most widely used insect traps was developed by the Swedish entomologist René Malaise and that now bears his name. Several modifications of his original design have been published, and at least one is available commercially. The trap, as originally designed, consists of a vertical net serving as a baffle, end nets, and a sloping canopy leading up to a collecting device. The collecting device may be a jar with either a solid or evaporating killing agent or a liquid in which the insects drown. The original design is unidirectional or bidirectional with the baffle in the middle, but more recent types include a nondirectional type with cross baffles and with the collecting device in the center. Malaise traps have been phenomenally successful, sometimes collecting large numbers of species that could not be obtained otherwise. Attractants may be used to increase the efficiency of the traps for special purposes.

Pitfall Traps

Another simple but very effective and useful type of interception trap consists of a jar, can, or dish sunk in the earth (fig. 10). A cover must be placed over the open top of the jar to exclude rain and small vertebrates while allowing insects and mites to enter. A piece of bark, wood, or flat stone will serve this purpose. Pitfall traps may be baited with various substances, depending on the kind of insects or mites the collector hopes to capture. Although most that fall into the trap will remain there, it should be inspected daily, if possible, and desired specimens removed and placed in alcohol or in a killing bottle while they are in their best condition.
Screen light trap

Light Trap

Mounting specimens

Material Required for Mounting Specimens

Spreading Wings

Pinning of Different Insects
A. B. Grasshoppers, C. Bugs, D. Bees, E. Beetles, F, G. Butterflies and Moths

A point mounted specimen

Method for Shipment of Specimens
Specimen to send other countries.
Must write on box. Specimen for Study Purpose
and No Commercial Value

Data Label Information:
Locality
Date of Collection
Name of Collector
Host plant
Technical name