

# Entomology: Methods and Techniques

## Capturing Insects

Many insects are adept at evading or escaping predators and can easily evade our clumsy efforts. Others can be dangerous to handle; bees and wasps inject venom as they sting, and many of the larger true bugs can deliver a painful bite. For these, and for insects that hide in tall grass or underwater, we need a net, of which there are three basic types.

An aerial net, with which most of us are familiar, is used for netting flying insects out of the air. It is a long sack of soft nylon or silk netting that will not normally damage specimens. This delicate material does not wear well and should not be used to capture insects in vegetation or on the ground. After netting an insect with an aerial net, give the handle a quick half-twist to double the net over the opening and prevent escape. The best way to retrieve your catches is by inserting a jar into the net and trapping the insect between the netting and the jar.

Sweep nets are made of heavy white muslin or canvas and are used with a sweeping motion to capture unseen insects in tall grass or weeds. This "shotgun technique" rarely fails to turn up something of interest. It is especially useful in meadows during the summer and fall.

A dip net is a long-handled tool used to capture aquatic insects. It has a flat side that may be placed against the bottom of a stream or pond. The triangular hoop is threaded through a tube of heavy muslin with a screen of heavy nylon netting on the end, to allow water to flow through. Insects may be difficult to see among aquatic debris, so you may need to dump the contents into a white tray and watch for movement.

Pit fall traps are effective in catching insects that scurry across the ground rather than fly. Simply dig a small hole with a garden trowel and sink a jar or cup in it so that the top is flush with the surface of the ground, filling in with soil around the outside of the container. An inch of 30% water to 70% alcohol mixture in the bottom will kill the insects if you do not wish any to escape. If you do not want to kill any insects, use yogurt cups with drainage holes and check every few hours. Place three or more strips of wood radiating from the rim like the spokes on a wagon wheel; these will guide insects into the trap. Cover the trap with a slab of wood or stone to keep out rainwater, and check it daily. You should set several traps in a variety of locations in order to find the best sites in a given area.

One of the major pastimes of insects is searching for food, and many species can be lured with bait. Pitfall traps or small containers suspended from a tree branch make excellent bait traps. Cover them securely with a large-mesh screen with openings about 2 cm square to admit large insects but keep out other scavengers.

A mixture of equal parts of molasses and water makes a fine bait. Add a little yeast and allow the mixture to ferment for a day or two before baiting traps with it. A mash of fermenting fruit also works well. Cloth strips soaked in a bait mixture and suspended from a tree branch will attract larger insects, such as nocturnal moths, that cannot fit through the screen covering your other bait traps. The mixture can also be painted onto the bark of a tree. Visit the site every hour or so during the night.

Decaying animal remains or meat scraps will attract many species, especially beetles and flies. If you wish to kill your prisoners, suspend the bait in a cheesecloth sack from the wire screen and put an inch of the water and alcohol mixture in the bottom of the trap. Dung is also a very effective bait, but take precautions against the transmission of disease or parasites by handling it only with disposable implements. The water and alcohol mixture in the trap should sterilize any specimens attracted to the dung.

### Killing Insects

Dispatching insects for your collection requires a killing jar with an airtight lid into which you place the insects, together with a volatile, poisonous substance. Professional entomologists sometimes use potassium cyanide as a killing agent, but this is extremely toxic and very dangerous if not handled with extreme care. By far the better choice is ethyl acetate, which is available from pharmacists and biological supply companies and is far less hazardous. If ethyl acetate is not readily available, acetone (fingernail polish remover) is a good substitute. No matter which of these two you choose, avoid breathing the fumes or spilling any on your skin. Killing jars should be clearly labeled "POISON" and should be kept out of the reach of small children. Killing jars are easy to make. You will need three wide-mouthed jars- large, medium, and small- with screw-top lids. Pour about a one-half inch layer of plaster of Paris, made with a little extra water so it pours easily, into the bottom of each jar and allow them to dry overnight with the lids off. Tape the bottom third of the jar with electrical tape to reduce the chance of its shattering if dropped. Just prior to using each jar, sprinkle a few milliliters of ethyl acetate onto the plaster of Paris, which will absorb it, and close the lid for about five minutes. You will need to recharge the jar with ethyl acetate every few

days, depending on how often it is opened. Reserve the large jar for butterflies and moths, which tend to lose wing scales that could foul other specimens. Wipe the jars clean periodically.

Glassine envelopes are an alternative way to transport and kill butterflies. The butterfly is inserted into the opening of the glassine envelope with the wings folded above its body. Work the butterfly into the middle or bottom of the envelope so that it won't work its way out. Then, firmly compress the thorax of the butterfly to paralyze it. Don't compress so hard that you squeeze its insides out its abdomen.

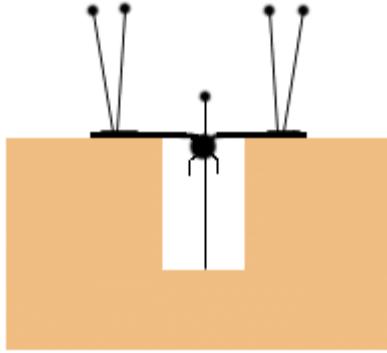
### Mounting Specimens

In order for your collection to be worth anything, the specimens must be mounted properly. In most cases, this entails pinning the insect through the thorax so that it is suspended right side up, and parallel to the floor of the collection case.

Special insect pins, available through the biological supply companies listed in the appendix, must be used to mount your specimens. These are available in different sizes, No. 1 being the most slender and No. 5 the thickest that you will need. They are usually black and coated with varnish to make them rustproof. Common sewing pins will damage specimens because they are too thick, and they will rust.

Most insects, including flies, wasps, bees, butterflies, moths, mantids, and cockroaches, should be pinned vertically through the right side of the thorax between the bases of the front wings, with the pin emerging where it will not damage legs or other delicate identifying features on the underside. Beetles and most families of the Order Homoptera (leafhoppers, cicadas, etc.) are pinned through the front portion of the right wing. True bugs should be pinned through the right side of the scutellum if it is large enough to do so, or through the right wing, like beetles, if it is not. Grasshoppers, crickets, treehoppers, and leafhoppers are pinned through the right rear portion of the pronotum; grasshoppers may also be pinned with one wing spread on a spreading board. Dragonflies and damselflies may either be pinned vertically, with their wings spread, or horizontally through the thorax, with the left side up and with their wings positioned over the back before pinning. Long abdomens, antennae, and other structures that might droop can be supported by pushing the pin deep into a soft surface, such as cork, balsa wood, or Styrofoam, positioning the parts as they rest on this surface and leaving them until they dry.

Don't Panic! I will personally present to the class a PowerPoint slide show on proper pinning techniques.



DIG A CHANNEL IN THE STYROFOAM SO THE BUG CAN SIT FLAT



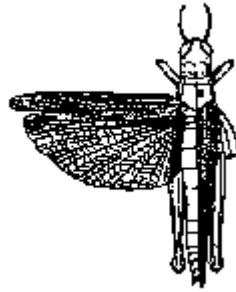
USE STRIPS OF PAPER OR CLOTH TO SECURE FRAGILE PARTS



Bee



Stink Bug



Grasshopper



Beetle



Butterfly

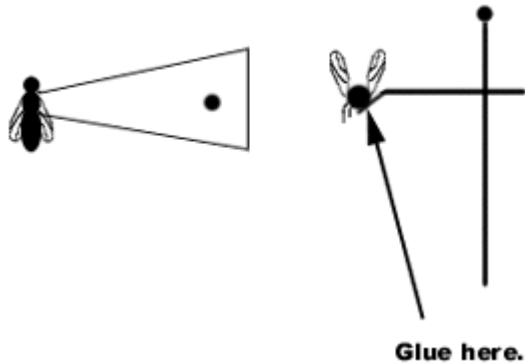


Moth

### Mounting Small Insects

Some insects are so small that pins would damage their delicate structures. Wide-bodied insects less than 6 mm long or narrow-bodied specimens less than 9 mm in length are best mounted on points, small triangular pieces of thin white cardboard made entirely from rags so that they will not deteriorate with age.

Special punches to make points may be purchased from biological supply houses, as can the points themselves, or you can make your own by cutting out isosceles triangles 4 mm at the base and 8 mm high. Bend the tip of the point slightly downward with forceps and use a very small amount of white glue or clear fingernail polish to attach the right underside of the insect to the tip of the point, trying not to obscure many of its features. The points should be mounted approximately  $\frac{1}{2}$ " -  $\frac{3}{4}$ " from the top of the pin.



### Labeling Specimens

Unlabeled specimens have very little value to the scientific community. At the very least, each specimen should be labeled with the location and date of its capture and the collector's name. Location details should include the country (abbreviated), state (abbreviated), and county or nearest town. Record the date with the month abbreviated (for example, Oct. 4, 2009) rather than written numerically (3/4/09), which could be mistaken for April 3, 2009. If your full name is too long to fit on the label, then it may be recorded by your first two initials plus your last name. Place the label directly underneath the specimen (head-to-axis) and approximately  $\frac{1}{2}$ " below the legs of specimen.

Additional information that would add to the value of your specimen may be recorded on a second label. Such data may include the collector's name (if this is not on the first label), and the insect's habitat, the method of capture or equipment used, the elevation at which it was found, or a specific landmark. This label should be placed parallel to the first label and underneath it, by about  $\frac{1}{2}$ ".

Each of these labels should measure 8.5mm x 17mm. This is a fairly small area, so you must print very small, preferably with an extra-fine point pen and permanent ink, such as India ink. Use stiff white paper, with 100% rag content, that will not deteriorate. Ask me to give you download onto your jump drive a Microsoft Word Macro that can create Insect labels. It is a very helpful program.

## Arrangement of Your Collection

Display cases can be purchased from a craft store. Just make sure the box has enough height to it so pinned specimens can fit into the box without touching the lid. If you are a handy person, you can build box out of wood or whatever materials you like. Put styrofoam or a similar substance in the bottom so that the pinned specimens will be securely held in place. Once this is done, you are ready to begin arranging your collection of specimens.

Collections should be arranged by orders, and by families within each order. A large label with the Latin and common names of each order may be pinned to the according to your instructions on "How to Pin Insects" (PowerPoint Presentation), with a label listing the Latin and common names of each family pinned below the order label. You may wish to color code the ink or paper on order and family labels for display purposes. Arrange specimens of each family in orderly rows and columns. Extra points will be awarded to those students who include proper Genus and species names. Furthermore, the grading of your collections is somewhat subjective in regards to neatness, creativity, and artistic expression. In general, the more work you do, the better your grade will be.

Pests such as dermestid beetles that feed upon dry specimens can be repelled by including fumigants, such as naphthalene or paradichlorobenzene (PDB), both sold commercially as either moth balls or moth flakes. A combination of the two works well, as PDB is more toxic to pests, but naphthalene lasts longer. Place them in small boxes with screened lids in the corner of your display case, and check them every month or two. If an infestation does occur, as evidenced by sawdust-like material beneath specimens, or shed beetle larva cases, introduce ethyl acetate on a wad of cotton or gauze to the closed display case.

GOOD LUCK AND HAVE FUN!